



MARJU LUOMA

## Boundaryless Work

An Explorative Case Study on the Nature of Boundaries  
and Boundary Crossings in Rapidly Changing  
Research & Development Work



ACADEMIC DISSERTATION

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University of Tampere  
Department of Education  
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Distribution  
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P.O. Box 617  
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Tel. +358 3 3551 6055  
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## ABSTRACT

This study focuses on *boundaries* and the *nature and dynamics of boundaries* in rapidly changing R & D / product development work. The purpose of the study is to find out more about the nature and dynamics of boundaries in one global case company. Further, the objective is to find out more about the nature and dynamics of boundaries related to job roles, careers and expert work. During the past decade boundaries and boundarylessness have entered the research literature, the consultant language and also the common discourse as one of the trends describing the most recent developments in the working life.

In this study, *boundaryless work* is defined as something that takes place in work contexts, where efficient boundary work is enabled via various tools and practices. It does not mean that boundaries are non-existent in such contexts. The question is rather about knowing how to navigate and negotiate the existing boundaries. There are no established theoretical frameworks to study boundaries at work. Therefore I have selected to use several theoretical frameworks to approach the phenomenon under study: first an *activity theoretical framework* and secondly *self-organising (systems)*. The third approach, *network ties and social capital*, is to study how people integrate over boundaries. These frameworks are loosely used to describe the context and in data analysis. The study used data gathering and data analysis methods appropriate to an explorative qualitative case study. Thus, several data gathering methods were used: predominantly interviews and in addition, survey, observation and field notes and some official documents. The dominant mode of analysis with the main data, interviews, was data-driven, interpretive and qualitative. The intention was to bring forward and describe the “local and emergent” in the case organisation as described by the informants. The focus and perspective is on individual actors and what can be induced and generalised from their views, conceptions and insights.

As a result, *a set of parameters that can be used to describe boundaries and their dynamics and nature* were obtained. *Boundary dynamics* were described by their *permeability* or *impermeability*. In the case company it seemed that *people, horizontal, time and space boundaries* had become more permeable. *Vertical boundaries* (hierarchies) and *external boundaries* seemed to have become more impermeable from the informants’ perspective. Regarding *technological boundaries*, conflicting forces were identified. *Organisational change manifested as a catalyst that reconfigures boundaries*. In addition, organisational changes enable a flux of job role and career boundary crossings in the organisation.

With integrating over boundaries I focused on *boundaries around knots and meetings* as well as on the *boundary between collaborative and individual work*. In the case company, *a varying set of meetings and knots seemed to be used dynamically for different purposes*. The boundaries of meetings and knots are blurry. The *optimal representation of*

*people in meetings and knots is continuously negotiated. The knowledge created in them is dynamically cascaded over the boundaries to the participants' networks and interest groups, in some cases even on-line through electronic tools. Overall, people constantly navigate over the boundaries between collaborative work, hybrid mode and individual work.*

There are various *dynamic links over the borders* built into the organisation to ensure the alignment and synchronization of the whole system across volatile boundaries. Some of the links over the borders are *explicit and systematic* like *processes*, the *R & D incentive/bonus system* or systematic means to transfer an object of activity or related knowledge to another activity system (e.g. *competence transfer practice*). Some are *implicit or ad hoc*, like for example *role switching* in collaborative situations or dynamically forming *duo working over a boundary*. Implicit and ad hoc links over the borders are features of self-organising in the case organisation.

*Job roles* were investigated in terms of the *boundaries around job roles (more bounded roles and more unbounded roles)* and the *overall job role structure*. In the case company *boundaries between a change in one job role and a proper job role change are blurry*. This is due to frequent changes and several features of self-organising in the case organisation; for example, an individual can flexibly take or be assigned tasks outside of his/her present role. *Task boundaries* ("who does what") seemed to have developed to a more permeable direction. *Job role changes are based on both active elements (people's activity) and passive elements*. Passive elements were manifested as a "*drift theory*" or *filling jobs based on "availability"*. *A combination of more unbounded job roles (managers, projects managers, horizontal specialists and R & D boundary roles) and more bounded job roles (designers/engineers and vertical specialists) forms a reconfigurable structure of job roles in the organisation*. Authority based on line management role/relations seemed to have shifted towards "*authority over content*" based technology, project and product knowledge.

Parameters I used to describe *career boundary crossings* were *driver* of career boundary crossing, its *nature regarding learning*, *direction in the organisational structures* and the *boundary crossing experience*. In the case company the driver and the nature of career boundary crossings did not clearly anticipate how they were subsequently experienced. Active radical career boundary crossings (for example to a completely different competence area) with a great deal of learning were often experienced as highly rewarding.

As a phenomenon *career* was investigated in terms of *bounded or boundaryless features*. Based on the results *career paths in the case organisation evinced both bounded and unbounded features*. On the one hand, the opportunities and premises for boundaryless career paths seemed to be well in place. Some people's careers were less standardized and less predictable. Overall, the myriad of people's individual career experiences seemed enormous. On the other hand, some people called for more "job rotation" (a term that in this study is considered to belong to the previous era of mechanistic tools to organise work). Radical career boundary crossings and inter-organisational

boundary crossings seemed to be rare. Many had evolutionary careers within R & D/product development, which in any case contained a great deal of personal learning and development.

The *expert work* and *expertise* were investigated in terms of how much *extending the boundaries of one's expertise* is needed and how this happens. The boundary around one's expertise seemed blurry and there was a *constant need to extend one's expertise in various directions* (current moment, past and future.) The interviewees described "detective work" as a significant means to search for knowledge and to develop one's expertise. *Detective work* is about unravelling urgent issues at hand by searching cues about it through contacting people who possibly might know something, going "from one counter to another". There is a continuous *tension between reactive and proactive mode of expert work*; the interviewees felt that too often their expertise is stretched in a reactive mode through tasks they encounter. They felt that the time for proactive learning outside one's own area or about future things had reduced.

The quality, quantity, nature and dynamics of work related boundaries vary over time and in different organisations, contexts and from different individuals' perspectives. The ultimate goal should not be reducing all boundaries and to make them disappear wherever possible. The goal is rather to understand the nature and dynamics of boundaries and to make them permeable wherever needed in an intelligent manner. The essential is to understand and acknowledge the significance of work related boundaries and their dynamics. *From the perspective of both individuals and organisations it is essential to learn to act intelligently on the boundaries and with the boundaries.* From individual actors' perspective ultimately the question is about knowing how to navigate, negotiate and cross the existing boundaries and even to transform them.

**Keywords:** boundary, boundary crossing, boundaryless, boundary dynamics, job role, boundaryless career, expert work, expertise

## TIIVISTELMÄ

Tämän tutkimuksen tarkoituksena on analysoida työssä esiintyviä rajoja ja niiden luonnetta ja dynamiikkaa yhdessä globaalissa tapausorganisaatiossa. Tavoitteena on lisäksi kartoittaa työroolien, työurien ja asiantuntijuuden rajojen luonnetta ja dynamiikkaa. Viimeisen vuosikymmenen aikana työn rajat sekä rajattomuus ovat tulleet tutkimuksen, konsultoinnin ja yleiseen kieleen yhtenä työelämän muutoksia kuvaavana piirteenä.

Tässä tutkimuksessa *rajattoman työn* nähdään sijoittuvan sellaisiin konteksteihin, joissa tehokas työskentely erilaisilla rajapinnoilla on erilaisin työkaluin, keinoin ja työtavoin tehty mahdolliseksi. Rajattomassakin työssä on rajoja. Merkittävää on se, miten näillä rajoilla ja niiden yli osataan työskennellä, ja miten rajoista osataan neuvotella. Työhön liittyvien rajojen tutkimukseen ei ole vakiintunutta teoreettista lähtökohtaa. Tämän vuoksi olen valinnut useita teoreettisia lähtökohtia, joista käsin lähestyn tutkimukseni kohdetta: *toimintateoreettinen viitekehys, itseohjautuvuuden* käsite ja *sosiaalisen pääoman sekä verkostositeiden* käsitteet. Näitä teoreettisia lähtökohtia käytetään löyhästi tapausorganisaation kontekstin kuvauksessa ja aineiston analysoinnissa. Tässä laadullisessa tutkimuksessa on käytetty tapaustutkimukselle tyypillisiä aineiston keruu- ja analyysimenetelmiä. Tärkeimmän aineiston muodostaa litteroitu haastattelumateriaali. Lisäaineistoina on käytetty verkkopohjaisen kyselyn tuloksia, havainnointi- ja kenttämuistiinpanoja sekä joitain virallisia dokumentteja. Aineisto analysoitiin pääosin aineistolähtöisesti tulkinnallisina ja laadullisina menetelmin. Tarkoituksena on tuoda esiin ja kuvata paikallisesti esiin nousevia ilmiöitä informanttien kautta. Painopiste on yksittäisissä toimijoissa ja siinä mitä heidän näkemyksistään ja käsityksistään voidaan yleistää.

Tulosten rungon muodostavat *tekijät, joilla voidaan kuvata rajoja, niiden luonnetta ja dynamiikkaa. Rajojen dynamiikkaa* voidaan kuvata niiden *läpäisevyydellä* tai *läpäisevämmättömyydellä*. Tulosten perusteella tapausorganisaatiossa *ihmisiin, aikaan ja tilaan* sekä *horisontaalisiin rakenteisiin liittyvien rajojen* koettiin tulleen helpommin ylitettäväksi eli helpommin läpäistäväksi. Organisaation *vertikaalisiin rakenteisiin* (hierarkiat) liittyvien rajojen ja *ulkoisten rajojen* koettiin tulleen heikommin läpäistäväksi; informanttien näkökulmasta nämä rajat ovat vahvistuneet. *Teknologisten rajojen* läpäisevyyteen näytti liittyvän ristiriitaisia tekijöitä. *Organisaatiomuutokset näyttäytyivät katalysaattoreina, jotka liikuttavat ja sekoittavat rajoja*. Sen lisäksi organisaatiomuutokset mahdollistavat joustavan liikkumisen ja rajojen ylitykset työtehtävien välillä ja ihmisten työurilla organisaation sisällä.

Tutkiessani ihmisten väliseen yhteistyöhön liittyviä rajojen ylityksiä keskityin erityisesti erilaisten *kokousten ja tapaamisten rajoihin* sekä *yhteistyön ja itsenäisen työn rajoihin*. Tapausorganisaatiossa näyttää olevan käytössä *vaihteleva kokoelma kokous- ja tapaamismuotoja, joita käytettiin joustavasti eri tarkoituksiin*. Kokousten ja tapaamisten ympärillä olevat rajat ovat joustavia ja läpäiseviä. *Oikea osallistujajoukko kokouksiin*

ja tapaamisiin on jatkuvan neuvottelun kohteena. Niissä syntyvä tieto jaetaan rajojen yli osallistujien verkostoille ja viiteryhmille, joissain tapauksissa jopa ajantasaisesti elektronisten työkalujen kautta. Tapausorganisaation *työntekijät liikkuvat jatkuvasti ja joustavasti yhteistyön, yksilötyön ja sekamuodon välillä.*

Aineistosta nousi useita *rajoja ylittäviä linkejä*, joita oli rakentunut organisaation toimintaan. Näillä *dynaamisilla rajoja ylittävillä linkeillä* varmistetaan organisaation yhteinen suunta ja linja jatkuvasti liikkeessä olevien rajojen yli. Jotkut näistä linkeistä ovat *eksplisiittisiä ja systemaattisesti käytettäviä* kuten *prosessit* tai *tuotekehityksen yhteinen bonussysteemi*. Tällaisia ovat myös keinot siirtää vastuu toiminnan kohteesta tai siihen liittyvä tieto toiseen toimintajärjestelmään esimerkiksi *osaamisen siirtokäytäntö*. Jotkut rajoja ylittävistä linkeistä ovat *implisiittisiä* tai *tilapäisiä, tilanteen vaatiessa ilmeneviä*. Tällaisia ovat esimerkiksi *roolinvaihto* yhteistyötilanteissa tai dynaamisesti muodostuva *parityö rajan yli*. Implisiittiset ja tilanteen vaatiessa ilmenevät linkit ovat itseohjautuvuuden piirteitä tapausorganisaatiossa.

*Työrooleista* tutkittiin niiden *rajoja (rajatummat roolit ja rajattomammat roolit)* ja *koko työroolirakennelmaa* tapausorganisaatiossa. Tulosten perusteella näyttää siltä, *että raja tietyssä työroolissa tapahtuvien muutosten ja varsinaisen työroolim muutoksen välillä on häilyvä*. Tämä johtuu tiuhasta muutostahdistasta sekä monista itseohjautuvuuden piirteistä organisaatiossa; yksilö voi joustavasti ottaa tai saada tehtäviä myös oman roolinsa ulkopuolelta. *Työtehtävien rajat* näyttivät tulleen läpäisevämmiksi. *Varsinaiset työroolim muutokset perustuvat sekä aktiivisille (ihmisten oma aktiivisuus) että passiivisille tekijöille*. Passiiviset tekijät näkyivät *ajautumisena ("ajautumisteoria") tai työroolien täyttämisenä "saatavuuden" perusteella*. *Yhdistelmä rajattomampia työrooleja* (päälliköt, projektipäälliköt, horisontaaliset specialistit ja tuotekehityksen rajaroolit) *ja rajattomia työrooleja* (suunnittelijat ja vertikaaliset specialistit) *muodostaa joustavan työroolirakennelman organisaatioon*. Linjanagerisuhteisiin perustuva auktoriteetti näytti siirtyneen kohti teknologoiden, projektien ja tuotteiden tuntemukseen perustuvaa *"sisältöauktoriteettia"*.

Tekijät, joilla kuvattiin *urarajojen ylityksiä* olivat seuraavat: *rajanylityksen yllyke/syy, sen luonne oppimisen näkökulmasta, sen suunta organisaatorakenteissa sekä rajanylityskokemus*. Näytti siltä, että urarajan ylityksen yllyke/syy tai sen luonne oppimisen näkökulmasta ei selkeästi ennustanut sitä minkälaisena rajanylitys jälkeenpäin koettiin. Aktiiviset ja radikaalit urarajan ylitykset (esimerkiksi kokonaan toiselle osaamisalueelle), joihin liittyi paljon oppimista koettiin usein hyvin palkitsevina.

*Uraa* ilmiönä tutkittiin siltä pohjalta, miten *rajattomia tai rajallisia piirteitä* siihen liittyi. Tämän tutkimuksen perusteella *tapausorganisaation urapoluissa havaittiin sekä rajattomia että rajallisia piirteitä*. Yhtäältä tapausorganisaatiossa lähtökohdat rajattomille urille ovat kohdallaan ja erilaisia uramahdollisuuksia on hyvin tarjolla. Joidenkin haastateltavien urat olivat standardista poikkeavia ja ennustamattomia. Yksilöiden urakokemusten kirjo näytti olevan valtava. Toisaalta jotkut kaipasivat enemmän "työnkiertoa" (termi, jonka tässä tutkimuksessa nähdään kuuluvan edellisen aikakauden työn organisoimisen mekanismin työkaluihin). Radikaalit urarajanylitykset

ja organisaatorajojen ylitykset uralla näyttivät olevan harvinaisia. Monet kuvasivat vähittäin kehittyviä uria tutkimus- ja tuotekehityksen piirissä, jotka nekin pitivät sisällään paljon henkilökohtaista oppimista ja kehittymistä.

*Asiantuntijatyötä ja asiantuntijuutta* tutkittiin siitä näkökulmasta millainen tarve on laajentaa asiantuntijuuden rajoja ja miten tämä tapahtuu. Asiantuntijuuden ympärillä oleva raja näytti häilyvältä ja *jatkuva tarve laajentaa omaa asiantuntijuuttaan eri suuntiin* (nykyhetken lisäksi menneeseen ja tulevaisuuteen) näytti ilmeiseltä. Haastateltavat kuvasivat ”salapoliisityön” tärkeäksi tavaksi etsiä tietoa ja kasvattaa asiantuntijuuttaan. *Salapoliisityö* on hakulankojen kuromista ottamalla yhteyttä ihmisiin, jotka mahdollisesti tietävät jotain kiireellisestä työn alla olevasta asiasta kulkemalla ”luukulta luukulle”. *Reaktiivisen ja proaktiivisen asiantuntijatyön välillä on jatkuva jännite*; haastateltavat kokivat, että liian usein asiantuntijuutta laajennetaan reaktiivisesti vastaan tulevien työtehtävien kautta. Proaktiiviseen oppimiseen ja tulevaisuuden asioiden opiskeluun käytettävän ajan koettiin vähentyneen.

Työhön liittyvien rajojen laatu, määrä sekä niiden luonne ja dynamiikka vaihtelevat eri aikoina, eri organisaatioissa, konteksteissa ja eri yksilöiden näkökulmasta. Rajojen ohentamisen ja vähentämisen ei pitäisi olla tavoitteena kaikkialla ja kaikissa mahdollisissa tilanteissa. Tavoitteena pitäisi olla rajojen luonteen ja dynamiikan ymmärtäminen ja niiden tekeminen läpäisevimmiksi siellä missä se on tarpeen. *Oleennaista on ymmärtää ja tiedostaa työhön liittyvien rajojen ja niiden dynamiikan merkitys sekä yksilön että organisaation näkökulmasta. Oleennaista on myös oppia toimimaan älykkäästi rajoilla ja rajojen kanssa.* Yksilöiden näkökulmasta kysymys on viime kädessä siitä, miten osataan työskennellä rajoilla, neuvotella niistä, ja ylittää niitä ja jopa muuttaa niitä.

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Tampere, Pyynikki, April 2009  
*Marju Luoma*

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## **I. INTRODUCTION**

The subject matter in this study is the topical theme of the most recent profound changes and developments in working life. Since the 1990s many traditional boundaries and rigid structures have begun to erode, especially in knowledge intensive work. The old Tayloristic ways of organising work have been abandoned in favour of trends enhancing globalization, stiffer competition, agility, customer centricity, information technology and networks of enterprises.

Mobile communications is a field characterized by rapid growth, concurrent standardization and product development, emphasis on time-to-market, virtual mode of working and networks. The newest types of work organisations that support modern collaborative work can be described as co-configuration work (Victor, 1998). A critical pre-requisite of co-configuration is the creation of customer-intelligent products or services, which adapt to the changing needs of the user. Often these products are created in cooperation with customers and within networks of organisations so that several products or configurations of them are being developed in parallel. The work is often conducted in multifunctional projects and teams combining technical, business and financial units of the company in an effort to create products that sell and that enjoy the support of all sections of the company.

Research & development work in a global spearhead technology-intensive product development company is a prime example of knowledge work. Creative R & D work deals with ill-defined problems and often aims at innovating new products, systems or services. R & D work is characterised by rapid change and a considerable uncertainty with the outcome of R & D activities (Clarke, 2002). Further, in R & D design work and tasks are often highly interdependent (Detienne, 2006). The case company, Nokia, and especially the Networks (one business unit at a time of this study) develops complex networks including several generations of network elements (products) that can together form complex network systems (system products). Hundreds of developers at geographically distributed locations participate in systems development. In these systems practically everything is interrelated; seamless functioning of the system

products also requires on-line boundaryless collaboration during the development phase of these systems. To maintain their competitive advantage knowledge-intensive organisations rely increasingly on the constant competence renewal of their employees and on creating new knowledge (Drucker, 1993, Prahalad & Hamel, 1990, Sveiby, 1997, Sarala & Sarala, 1996). In this study R & D work is considered to belong to the category of knowledge work. The case organisation can be regarded as a knowledge intensive organisation and its employees as knowledge workers. I also regard R & D work as expert work. In this specific case study most of the people interviewed and survey respondents do not work in purely research, but in R & D product development, which often sets certain efficiency, productivity and schedule requirements for the work.

From the individual employees' perspective the most recent changes in working life emphasise the increasing complexity of work assignments, accelerating need to update individuals' competencies and a new kind of professionalism (Dyer & Shafer, 2003, Brödner & Forslin, 2002, Zuboff, 1988). The accelerating pace of change sets new requirements for collaborative work and collaborative problem solving (Gratton, 2005, Nonaka & Takeuchi, 1995, Dixon, 2000, Katzenbach & Smith, 1996). The cognition in this kind of environment is markedly distributed (Bereiter & Scardamalia, 1993, Latour, 1987). There is a need for seamless collaboration and interaction between different kinds of employees with various competencies representing various organisational functions or even different organisations. Such work calls for continuous negotiation and navigation on the various boundaries in their work.

Further, the boundaries around highly specified job roles have become blurry (Powell, 1990, 2001, Lindbeck & Snower, 2000, Casey, 1995, pp. 36-37). Favourable conditions in organisations allow discretionary work design (Dyer & Ericksen, 2005) where flexible job roles and flexible boundary crossings to new job roles are enabled. In working life collaborative "horizontal expertise and boundary crossing are happening at a fast pace" (Engeström et al., 1995). For employees all these developments present new opportunities for learning and development at the workplace. On the other hand, new intensity and stress factors have arisen from the same developments.

New requirements of leaders and leadership have also attracted attention. For instance, according to Senge et al. (1999) the most pressing challenges leaders face today require innovative thinking and collaboration for change across traditional boundaries, business and units, organisations, industries, even sectors and cultures. Leaders need to transcend boundaries and rigid behaviour patterns, realise new possibilities, and work together to enable transformation. Many of the leaders, when interviewed, emphasise the importance of working over horizontal boundaries as did Sari Baldauf in the economic publication *Talouselämä* (33/06) in stating that "the leadership has also changed. A leader needs to concentrate on mastering horizontal work and processes instead of vertical command chains."

By the end of the 1990s and in the 21st century, the complexity of knowledge work, the pace of changes, the globalization of markets and workforce, project-based work and the progress of information and communication technologies have further intensified. This development has been accompanied by an increasing need for the previously more separate *academic fields* to come closer to each other and discuss at the newly found interfaces. Various academic disciplines need perspectives and views from other disciplines more than before.<sup>1</sup> One could even say that the boundaries between the fields of academia have become more blurry as is the case with many phenomena they are studying. There is a jungle of philosophic traditions and their applications in the multidisciplinary field of studying work. Sometimes these paradigmatic backgrounds are either mixed or ignored in research. In this study it is a conscious choice to use various concepts and theories from different theoretical backgrounds. It does not mean, however, that these backgrounds and their philosophical underpinning should be ignored or artificially mixed. It is the task of the reader to evaluate the appropriateness of the selected components as approaches to explore boundaryless work and individuals in boundaryless work contexts.

Indeed, in the past decade boundaries and boundarylessness have entered the research literature, consultant language and the common discourse, as one of the trends describing the most recent developments in the working life. This area being relatively new, the first endeavour was to find a suitable framework to study “boundaryless” work. The decision was to select several theoretical frameworks as approaches (activity theoretical framework, self-organising (systems) and network ties/social capital) and use them loosely to describe the context and in data analysis. Their suitability to act as a framework to study boundaryless work contexts is discussed but the intention is not to combine these frameworks.

The word *boundary* (or border) is difficult to define explicitly. It is used in a wide variety of contexts in everyday language as well as in research. The most common dictionaries do not list the word “boundaryless” as a separate word at all. The word boundary has many meanings, in concrete and abstract senses, as something that indicates the farthest limit or a line, often imaginary, separating one thing from another.<sup>2</sup> If boundaryless is not found in dictionaries, then boundless and boundlessness are related to something “unlimited or having no limit”. The following abstract combinations were also found in the dictionary: occupational boundary (in Finnish *ammattiraja*) and the boundaries of knowledge (in Finnish *tiedon rajat*). (See MOT Dictionary, 2006)

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1. For example, information technology developments and research have greatly influenced many academic disciplines related to people, including psychology. On the other hand, the results from many other disciplines like sociology, psychology and economics, are used to support the processes of applying and developing information technology. (see e.g. Kuutti, 1999)
  2. One example of a non-work related abstract boundary is the gender boundary (see for example Moore's (2003) study of children crossing boundaries in summer camps).

The very notion of a *boundary* is multi-faceted. Boundaries are necessary to human life. Without them everyday life would be impossible since boundaries structure the world around us. Many disciplines and scientific approaches with differing ontologies and epistemologies are concerned with the social study of boundaries. (Kerosuo, 2006, pp. 2-3) According to Lamont & Molnár (2002, p. 169) boundaries in social sciences are examined as “relational processes at work across a wide range of social phenomena, institutions and locations.” Anthropologists study boundaries as something separating social forms, people, and regions (Alvarez, 1995, p. 448). Classical organizational theories conceptualize boundaries as coherent stable contours of organizations that are created to manage the complexities between an organization and its environment (Lawrence & Lorch, 1967). Recent organizational studies take into account the social interactions and mental aspects related to boundaries. Social entities, for example organizations, professions or occupations, can be defined as independent “things” with the central properties of endurance, the ability to originate social action and with coherent internal autonomy (Abbot, 1995). Boundaries of such social entities have an important role in identity formation by “sharpening identity in the minds of [a group’s] members” (Cross & al., 2000) and showing “rules of exclusion” to actors outside the entity’s boundaries (Kogut & Zandler, 1996).

Boundaries are embedded in the contextual activity and practice, for example at workplace and in organizations; they do not exist in a vacuum.<sup>3</sup> Boundaries can be considered both enabling and constraining structures (Hernes, 2003). They can be studied on macro level (outcomes of social change), on micro level (e.g. boundaries of different sizes of communities, activity systems, groups and teams) and in my view also from *individual actors’ perspective*, which is the focus in this study. Still, the surrounding context needs to be taken into account. Scholars have lately called for more empirical research on boundaries (e.g. Heracleous, 2004).

In this study my definition of boundaries is broad enough to allow qualitative, explorative and data-driven approach. I define *boundaries* as *visible or invisible distinctions and differences that shape people’s everyday work*.<sup>4</sup> People encounter this kind of distinctions and differences in their everyday work (in the practice and action they

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3. *In the activity theoretical framework the emergence of activity takes place as a threefold formation. Firstly, collective, object-oriented activity is directed by motives. Secondly, actions are directed by goals that actors have in terms of objects and collective motives. Thirdly, operations are directed by the circumstances and tools at hand. (Leontjev, 1978, p. 63) For Engeström (2008) practice is one of the challenging “intermediate conceptualizations” between activity and action. It can be a conventional, often repeated, stable string of actions (e.g. letter writing) or a more unique and non-repetitive string of actions (e.g. a project). For Wenger (1998) practice is a “process by which we can experience the world and our engagement with it as meaningful” (p. 51). It is neither a specific, narrowly defined activity or interaction nor a broadly defined aggregate that is abstractly historical and social” (ibid, pp. 124-125).*
  4. *For example Kerosuo’s (2006, p.4) activity theoretical definition of boundaries is more focused on collective activity systems: “established distinctions and differences between and within activity systems that are created and agreed on by groups and individual actors during a long period of time while they are involved in those activities.” The focus is on collective (activity systems) level of understanding, negotiating and even transforming boundaries. Boundary crossings are investigated as processes of learning and development which includes dissolving, reshaping and stabilization of the prevailing collective routine practices at work (ibid, p. 115).*

engage into) and in their job roles and careers. This definition also allows gathering data from individual informants and their conceptions, views and insights of boundaries that shape their everyday work. I acknowledge the embeddedness of boundaries in the activity and practice at workplace, but in this study I take a liberty to approach the research subject from several angles and focus on findings that emerge from the data. The focus is more on individual actors at the grassroots of the case organization rather than the executive level managers (cf. for example Gratton's (2005) and Doz & Kosonen's (2008a, 2008b) data is mostly from the case organization's executive level leaders.)

*Boundary crossing* is another key concept in this study. Research on new emerging organizational forms indicates that capability to cross boundaries is an essential element in these new environments (e.g. Powell, 1990). Boundary crossing is a broad and little-studied category of cognitive process (Engeström & al., 1995). Based on Suchman (2002) boundary crossings are about "encountering difference; entering onto a territory on which one is unfamiliar and, to a significant extent, therefore, unqualified to act." *Boundary crossing* is defined in this study in relation to the definition of boundary: boundary crossing takes place when *an individual actor or collectivity can work out, overcome or navigate in relevant manner a certain distinction or difference that shapes their everyday work*. Again the definition is broad allowing data-driven and exploratory character.<sup>5</sup>

Boundaries and "boundarylessness" serve as a perspective in this study focusing on how individuals experience their work practices, environment and how work is organised. It is used to delimit the subject field. The perspective was selected because boundaries and boundarylessness have recently been widely used in research and pragmatic literature but often not very thoroughly defined. The other reason is that these concepts aptly describe some of the changes that have recently taken place in many knowledge-based organisations. People need to reach out more and more extensively over many kinds of boundaries, e.g. in terms of how, when, and with whom they collaborate. It is also interesting to see how these fundamental changes have affected people's job roles, careers and expert work. In this study "boundaryless work" (see *Section 3.7* and *Section 8.7.3*) is defined as the kind of work emerging in a context where efficient boundary work is enabled and enhanced through various tools and practices. It does not mean that in such a context the boundaries are non-existent. Boundarylessness or boundedness is a continuum of conditions and features in different organisations. The question concerns the extent to which people know

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5. *In the vein of activity theoretical approach boundary crossing is analyzed as a process of collective concept formation or problem solving in which the initially assumed roles of the parties may be changed or reversed. The aim is to capture interactive processes and mediating artifacts involved in boundary crossing in specific cultural-historical activity systems. (Engeström & al., 1995) Engeström & al. (1995) take a critical view on studies where individual actors are classified into categories and the focus of interest is in studying the border crossing ability or orientation of these categories. They, however, acknowledge that such "typologies may be instructive and diagnostically valuable."*

how to navigate (articulate and engage with) and negotiate (redefine, reconstruct) the boundaries in a certain organisational context.

Empirical data collection was done in parallel with the investigation of the theoretical and conceptual viewpoints. The objective was to explore what has been said about boundaries and boundarylessness in the literature and to formulate the research questions around these. The data were gathered from interviews, from a survey and from observation and field notes, i.e. the stories, experiences and interpretations of individual employees concerning the boundaries in their work, especially in their work practices, work environment, job roles, careers and finally expert work. The data were gathered in two phases (phase I 2003-2004, phase II 2006) between the years 2003 and 2006 and consists of 51 thematic interviews, web-based survey responses from 951 employees, observations and field notes.

The theoretical approaches to studying boundaryless work were selected in a process combining empirical data gathering and analysis and a literature review. None of the approaches alone would have provided a solid enough platform to approach boundaryless work. They were chosen partly according to the interesting research results with linkages to the empirical findings in this case study. The *activity theoretical framework* (see e.g. Engeström, 1987) bridges the gap between individual and collective. It takes into account the culturally mediated and historical developments of the work in certain contexts (activity systems) and it studies the discrepancies in these contexts and aims at developing the work. The activity theoretical model used in work research ultimately has its roots in the Marxist-critical tradition. The frameworks of *self-organising systems* (see e.g. Holbrook, 2003, Dyer & Ericksen, 2005) have their roots in biology and chaos theories. They study human-built contexts (e.g. organisations) and compare how the models derived from nature and biology can be used to describe the *nonlinear incidents* in organisational life. (In this study I do not, however, subscribe to the biological explanations. For me self-organising requires the consciousness and intellect of human beings.) The concept of *social capital* (see e.g. Adler & Kwon, 2004, Gratton, 2005) is related to *integrating over boundaries* and to the indispensable *network ties between people*. The researchers of social capital study the type, formation and functioning of network ties. Social capital in itself evokes an image of something like a commodity that people build and use with the deriving of obtaining benefit. In this study the term social capital is used, but the focus is on the network ties and integrating over boundaries. Social capital has emerged in many academic disciplines, perhaps mostly in the fields of organisational studies and economic studies. Other disciplines, building on various kinds of philosophical underpinnings, have approached the same phenomenon from a more non-commodity perspective, and rather focused on the networks and network ties.

What kind of boundaries can be identified in the context of the case organisation? What is the nature and dynamics of the boundaries? When the focus is more on individual actors, the job roles, careers and expertise will also become a focus of interest.

Due to fundamental changes in working life the nature of job roles and careers has changed. What kind of job role, career and expert work boundaries can be identified in the context of the case organisation? What is the nature and dynamics of boundaries related to job roles, careers and expert work? I will pay attention on people's conceptions, views and insights on how easy or difficult the boundary crossings are, i.e. how they describe the *permeability or impermeability of boundaries*. When starting this study any contributions to the above questions felt meaningful because they might make a modest contribution to the further development of conceptual frameworks related to boundaries and what their implications in work organisations are.

This study was first begun in 2001. From a personal perspective, there were several factors that gave impetus to the study. Firstly, I was lucky enough to find my way at the University of Tampere to an active post-graduate seminar group led by Professor Annikki Järvinen concentrating on exploring the phenomena related to work and learning. Secondly, I had joined the case company of this study a few years earlier and had had an opportunity to grasp the way of working in a knowledge-intensive global company where many of the traditional rules of work life were simply no longer valid. Moreover, the public discussion regularly touched upon fundamental changes emerging in working life. However, maybe the weightiest reason for the selection of the research field was the fact that, at least at that point, established frameworks and theories to study the phenomenon of boundaryless work were not totally available. Bearing that in mind gave an extra surge of excitement and a feeling of exploration both to the related theoretical and empirical phases of the study.

The nature of the subject field and the perspective required me to focus on *individuals* and *context*. Furthermore, my perspective in this qualitative study is to look at *R & D work from the boundary of it*. This means that I have myself worked in several job roles on the boundary of R & D, i.e. in R & D related jobs, but not directly in product development. Also, 16 interviewees (out of 47) were or had been in such job roles. This study therefore presents a particular view of the R & D world, at the same time from the inside and from its boundary.

The subject field and the perspective of boundaryless work proved rewarding as this is an emerging new area in many academic fields. At the same time it proved a very complex perspective. Firstly, it proved challenging because the recent changes in working life have been quite dramatic, especially in knowledge work and so far there really are no established paradigms to study boundaryless work. Secondly, it proved challenging because the literature review of boundaries and boundary work yielded numerous academic disciplines with a great variety of assumptions and philosophical underpinnings. (For example the activity theoretical framework was ultimately used to set the scene and to describe the context as described by the individual informants.)

As its results, this study will present a set of data-driven parameters that can be used to describe the dynamics and nature of boundaries at work. I will equally present several features related to the dynamics and nature of boundaries in the case company.

The results will indeed show that the boundaries in R & D/product development are numerous and volatile. In general, the phenomena related to the dynamics and nature of boundaries proved complex. Many boundaries identified seemed to have become more permeable. On the other hand, there were also some that seemed to have become more impermeable. Most boundaries related to job roles, careers and expert work seemed to be rather blurry. On the other hand, several bounded features related to careers were identified.

The research report is organised in ten chapters. *Chapter 2* presents the traditional ways to organise work and features of emerging boundaryless organisational contexts. In *Chapter 3*, I review earlier research on boundaries, boundary work, boundary practices, network ties, boundaryless job roles, careers and expert work/expertise. I conclude *Chapter 3* by summarizing the definition of boundaryless work in this study. In *Chapter 4*, the theoretical approaches (activity theoretical framework, self organising (systems), and social capital and network ties) are highlighted. The research questions are listed in *Chapter 5* and the process of conducting the research is described in *Chapter 6*. In *Chapter 7*, the relevant features of the case organisation are presented. The results of the study are presented in *Chapter 8*. First, I will focus on presenting the work context and environment in the case organisation. Second, the boundaries identified and dynamic links over the borders are discussed. Third, integrating over boundaries through network ties and forms of collaboration are described. Fourth, the findings related to the boundaryless job roles, careers and expert work are described in separate sections. *Section 8.7* contains a summary of the results. Validity and reliability considerations are discussed in *Chapter 9*. Finally, the study and the results are discussed as a whole in *Chapter 10*.

## 2. TOWARDS BOUNDARYLESS ORGANISATIONS

In *Chapter 2* I will first briefly shed light on the *traditional ways to organise work* (2.1). I will then continue by describing various angles related to the *most recent types of work and organisations* (2.2). The emphasis is on bringing to the fore the importance of communication and dialogue as well as the concurrent, agile activation of the whole system towards needed actions in changing circumstances.

### 2.1 TRADITIONAL WAYS TO ORGANISE WORK

There is no ideal way to organise work nor have any pure models in the strict sense been used in workplaces. Nevertheless, the way work is organised always has its roots in some model or schema even if unconscious. The power of tradition is extremely influential in the ways work is organised. Senge (1990, pp. 6-10) calls routinized ways of thinking that are often unconscious as mental models. Many of these traditional ways to organise work are still today more or less alive in mental models in true organisations.

The study of work and organisational forms has a long history. How work is organised, the job design strategies and organisational forms are critical parameters for the functioning of the organisations. The issue of how to handle the assumptions about the social values on the one hand and efficiency on the other hand has been present in almost all major thinkers (Brödner & Forslin, 2002, p. 19). These assumptions have varied over time but they have always had an effect on how work has been organised. *Table 1* shows one classification of traditional approaches to organise work. (See e.g. Bratton & Gold, 2003; Järvinen et al., 2000; Brödner & Forslin, 2002; Kuutti, 1999; Kuutti, 1989; and Bansler, 1989)

	<b>Tayloristic, Scientific Management</b>	<b>Sociotechnical Tradition</b>	<b>Humanistic Tradition</b>
<b>Notion of knowledge</b>	Objectivistic	Objectivistic Some instrumental or subjectivist	Subjectivist
<b>Notion of human being</b>	Objects Rational system element	Actors (individuals)	Individualistic
<b>Notion of actions</b>	According to rules	Humans as actors IS also an actor	Humans only actors IS is a tool
<b>Notion of communication</b>	Minimal need for communication as target	IS equal comm. partner  + unofficial communication	All communication between humans
<b>Notion of organisation</b>	“Assembly line” Bureaucratic	Sociotechnical system Two parallel systems Still bureaucratic	Framework for human beings
<b>Notion of information systems development</b>	Integrated total systems IS use and develop- ment separated/ Development by experts	Design of social system Users notified	Incremental development Development by users or users heavily involved
<b>Notion of capital/ labour relations</b>	Common interests	Common interests	Common interests Focus on individual needs
<b>Economic Objective</b>	Profit maximizing Rationalization	Efficiency Job satisfaction/ participation	Productivity by social consideration
<b>Underlying social values</b>	Material welfare Reduced human ware	Fulfilling also psychological job demands	Fulfilling also psychological and social needs

**Table 1.** Traditional ways of organising work and their underlying assumptions (based on Brödner & Forslin, 2002, p. 19, Kuutti, 1999, pp. 362-363, Bratton & Gold, 2003, pp.116-143)<sup>1</sup>

1. *Note that information systems is abbreviated to IS. I selected the parameters for the table as follows: economic objectives and underlying social values from Brödner & Forslin (2002, p. 19) and the other notions from, Kuutti (1999, pp. 362-363). Kuutti's focus is on the traditions of IS research and he draws from Bansler (1989) and Nurminen (1988).*

In the 18th century, traditional work practices of pre-industrial society gave way to the division of labour and the discipline of the factory system of work organisation. For *Adam Smith* (1723-90), the founder of modern economics, the separation of manual tasks was a central part of his theory of economic growth. The emergence of industrial division of labour gave impetus for more *critical and radical views*; *Karl Marx* (1818-83) argued that the new work patterns constituted a form of systematic exploitation and that workers were alienated from the product of their labour because of capitalist employment relations and the loss of autonomy at work. (Bratton & Gold, 2003, p. 118) The critical tradition is also ultimately behind the modern versions of activity theoretical models. The aim is to find underlying systemic deficiencies in the work organisations and enable related improvement and development activities.

At the turn of the 20th century, the *scientific management movement* was regarded as an opportunity to increase control and coordination of worker effort. The term *Tayloristic* (see e.g. Brödner & Forslin, 2002, pp. 16-17) refers to the type of work that has evolved since the beginning of the Industrial Revolution, the ideas of which are perhaps most clearly stated in the works of *Frederick Taylor* (1861-1919) on scientific management. His approach to job design was based on maximum job fragmentation, separation of planning and execution, separation of direct and indirect labour, minimization of skill and learning requirements and the reduction of material handling to a minimum. The influence of Taylor's principles has been extensive on Western job designers. Even though Taylorism is no longer very popular, much shop floor work is still of this type. A well-known problem of such rationalized work is alienation, manifested in difficulty in maintaining the motivation of workers who have no control over their work processes or its results (see e.g. Brödner & Forslin, 2002, pp. 16-17, Järvinen et al., 2000, pp. 28-30). Ritzer (1993) brought forward a concept of the mcdonaldization of society. He claimed that the typical ways to organise work in hamburger chains: efficiency, predictability and control, are pervading other fields of society like services, education, travel and even people's free time.

*Henry Ford* applied the major principles of Taylorism but also installed specialized machines and perfected further the flow-line principle of *assembly work*. *Fordism* brought about the interlinking system of conveyor lines that feed components to different work stations and the standardization of commodities to gain economies of scale. Tayloristic and Fordist type of work simplification, however, led to boredom and dissatisfaction and threatened the industrial relations climate. Paradoxically they also increased control and coordination costs in the form of employed planners, controllers, supervisors and inspectors. (Bratton & Gold, 2003, pp. 119-120)

The term *humanized work* refers to the type of work that has evolved in opposition to the rationalized type of work and as an answer to the problems created by it. The adverse reactions to extreme division of labour led to the development of new approaches to job design that attempted to address these problems starting with the human *relations movement*. The movement grew out of the Hawthorne experiments

conducted by Elto Mayo in the 1920s. The main messages were related to the social needs of the workers, worker participation and non-authoritarian supervisors. Despite many critics, the human relations approach to job design started to have some impact on work design after the Second World War. (Brödner & Forslin, 2002, pp. 17-18)

In the 1960s and 1970s the concern about declining productivity, increasing industrial disputes and worker dissatisfaction led to new work structures that emphasised worker autonomy, participation and a variety of functional tasks through “job enrichment”. The *neo-human relations approach* to job design and the wider-based quality of working life movement gained ground in 1960s and 1970s. They emphasised the fulfilment of social needs by recomposing fragmented jobs. Littler & Salaman (1984, as quoted in Bratton & Gold, 2003) put forward five principles of “good” job design. First, the scope of the job needs to be such that it includes tasks to complete a product or process, thus satisfying the social need for achievement. Secondly, the individual or a group should be able to assume the quality control of his/her/their product or process. The third principle is about task variety, so that the worker is to acquire a range of different skills thereby making job flexibility possible. The fourth principle is the self-regulation of the speed of the work. Finally, the job structure should permit some social interaction and cooperation among workers. (Bratton & Gold, 2003, p. 121)

Another tradition that emerged as a criticism of Taylorism and as a search for consensus by developing work satisfaction was the *sociotechnical tradition*. During the 1970s the so-called sociotechnical school gained a footing, especially in the United Kingdom and Scandinavia. The sociotechnical school also challenged the strictly technologically oriented views of information. This approach directs attention to the human resources of an organisation and attempts to motivate the workers by giving them more control over their work. STS endeavours to consider both the social system and the technical system simultaneously. The technical system refers to the production structure, the technical equipment and to systems from the field of information and communication technology. The social system refers to human resources, job design and to the control structure. The principle of minimal critical specification refers to defining as little as possible how a worker should perform a task, but providing just enough directives to ensure that he/she is able to perform the task properly while still allowing the employee’s personal contribution. There are two major levels of humanized work: 1) arrangements at the individual level, such as job rotation, job enlargement, and job enrichment, and 2) more fundamental work reorganisation, typically by forming semiautonomous work groups in which some parts of the design and planning of the process are done by the workers themselves. These means should result in enriched jobs and empowered workers (see e.g. Molleman & Broekhuis, 2001, Brödner & Forslin, 2002, p. 18, Järvinen et al., 2000, pp. 34-35, Torraco, 2005). In sociotechnical systems the autonomy is still restricted to work processes and the workers have no influence on product design and many other matters. The notion of knowledge is rather objectivistic and the notion of organisation rather bureaucratic.

*Job enrichment* refers to a number of different processes of rotating, enlarging and aggregating tasks. An early example of this process was the use of *job rotation*, which involves the periodic shifting of worker “from one work-simplified task to another” (Bratton & Gold, 2003, p. 122). An alternative approach was the horizontal expansion of tasks, referred to as *job enlargement*. Job enrichment could also refer to vertical expansion of assignments giving workers additional responsibilities from the planning and quality control side. (Bratton & Gold, 2003, p. 123)

On top of job enrichment type of work design, there were attempts at the reorganisation of assembly lines and Japanese-style work designs in the late 1970s. The Fordist model of mass production was incapable of responding quickly enough in highly competitive consumer industries. Toyota became the model for reorganising assembly lines. *The post-Fordist work design* emphasised diverse production, high quality and self-managing teams. (Bratton & Gold, 2003, pp. 126-127, Bowring, 2002) The horizontal communication between R & D, design and production was one important aspect of Japan’s capability to assimilate and learn new technologies (Miettinen, 2005, p. 36).

*Flexible specialization*, which represented a revival of the craft paradigm, was brought about as an alternative to traditional Fordism. In this scheme Atkinson (1984, 1985 in Bratton & Gold, 2003, pp. 88-90) attracted attention with his *flexible firm model*. This model has contributed to the legitimacy of flexible employment arrangements and consequently, partly to the growth of non-standard labour. The centrepiece of the flexible firm model is formed by functional, financial and numerical flexibility. The flexible firm model has been linked with the post-bureaucratic agenda of promoting fluidity by creating looser organisational boundaries that tolerate outsiders coming into the organisation (Felstead & Jewson, 1999).

The Japanese ways of work design affected European and American companies in 1980s. The principles underpinning Japanese work design strategies were later referred to as *lean production*. The Japanese approach to managing production and employment relationship had three notable elements: flexibility, quality control and minimum waste. The system was thought to achieve flexibility by arranging machinery in cells and using multi-skilled workforce with flexible job boundaries. The management philosophy of *total quality control* (TQM) attempts to build quality standards into the manufacturing process by making quality everybody’s concern and responsibility. Stocks of components and raw materials are minimized by *just-in-time production*. The Japanese approach to work organisations is characterized by self-managed work teams, cooperativeness, and group problem solving and heightened “sense of urgency” due to just-in-time production. It needs to be noted, though, that a number of observers have acknowledged that models of Japanese manufacturing and employment practices may be at least partly based on myths and their adaptation to Western companies lesser than believed. (Bratton & Gold, 2003, pp. 129-131)

Technological change and the processes of globalization produced new systems of work organisation in the 1990s. Bratton & Gold (2003) state that the “managerial mantra of the 1990s was flexibility, and studies of organisational innovations such as flexible specialization, cellular production, lean production, team-based horizontal work structures, re-engineering and virtual organizations” (p. 114).

Just as the shift to the era of the assembly line, vertical integration, and mass production brought with it a great transformation, so did the change to what today we inarticulately term the “new economy” or decentralized capitalism. This new logic of organising also involves changes in the standard recipes for jobs, organisations, and industries. At a minimum, a number of key features—job security, routine pay increases, narrowly defined jobs and considerable distance between managers’ and shareholders’ interests—have been eroded. (see e.g. Powell, 1990, 2001)

None of the traditional ways to organise work seem to directly fit the latest “ad hococracy” types of “boundaryless” organisations. Next I will move on to examine what has been said about the most recent types of organisations. This paves the way towards examining why and how the boundaries have become such an area of interest. When studying the most recent forms of knowledge-based organisations it has become appropriate to study the very concept of knowledge, work and organisations. In the new era of work it has also become appropriate to investigate the boundaries of various organisational units. Thus, in *Section 2.2* I will first shed light on how *knowledge* itself can be classified into smaller categories. Secondly I will focus on the changing character of *work* and *organisations*. Thirdly I will pay attention to different *organisational units of analysis* from the perspective of how bounded or unbounded they are.

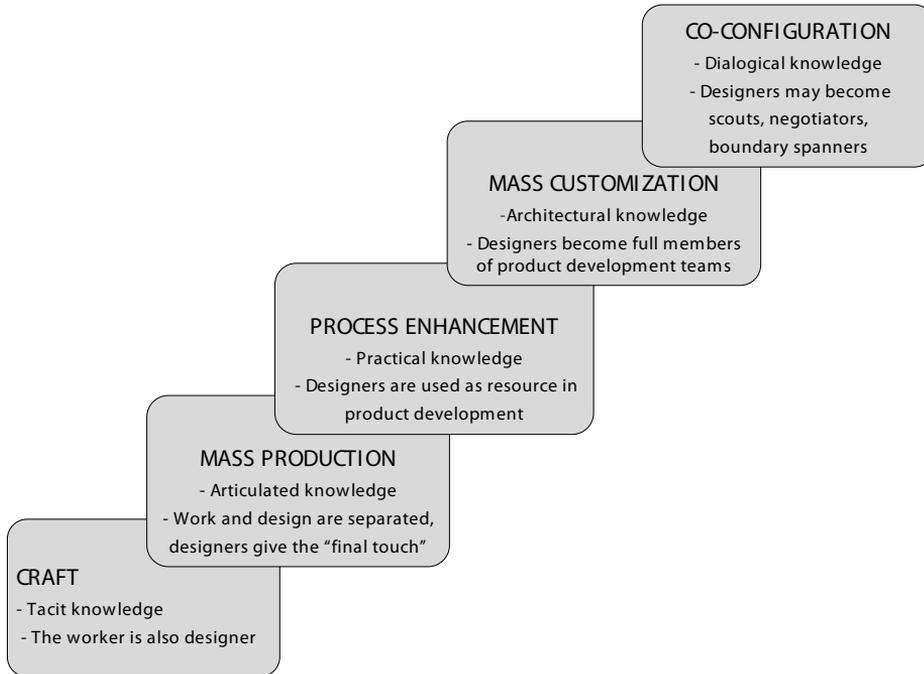
## 2.2 EMERGING BOUNDARYLESS ORGANISATIONAL CONTEXTS

### 2.2.1 CHANGING NATURE OF WORK

It is widely accepted that more and more organisations are knowledge intensive and to maintain their competitive advantage they rely increasingly on creating new knowledge. (see e.g. Drucker, 1993, Prahalad & Hamel, 1990). “Knowledge intensive organisations” are the ones staffed with a high proportion of highly qualified staff that trade knowledge itself and the employees should be managed as “knowledge workers” (see e.g. Alvesson, 1993, Starbuck, 1992, Blackler, 1995, Zuboff, 1988). A great deal of effort has been put into investigating the competitive advantage that knowledge may provide for organisations and into investigating knowledge workers, expert work, knowledge-intensive organisations and organisational competencies.

It is important to place the context of work into a historically developing picture of the changing character of work itself. I will present an historical framework of the

reintegration of organisation, work and design based on Victor & Boynton's (1998) model and further developed by Engeström (see e.g. 2005b). *Figure 1* shows the five types of work in the history of industrial production: craft, mass production, process enhancement, mass customization, and co-configuration.



**Figure 1.** Historical forms of work, knowledge and design (based on Victor & Boynton, 1998, p. 6, 233, elaborated by Engeström, 2005b)

Each of these types of work requires a certain type of knowledge and design. In craft, the worker and the designer are essentially one and the same person, the master craftsman. In mass production, design is concentrated in the hands of engineers and separated from the actual execution of the work. Mass production creates a demand for professional designers whose task is typically focused on the "final touch" to the products to appeal to consumers. In process enhancement, front-line employees are given responsibilities for the continuous improvement of processes and products, while the development of new products and processes is still kept strictly in separate design units. In this phase, quality is becoming of crucial importance and professional designers are increasingly used to assist development projects with their particular insights. In mass customization, the customer is brought into the design process by being offered a possibility to put together "personalized" combinations of available standard components. Still in this phase, the development of completely new products and processes remains separate from the actual production. Feedback from custom-

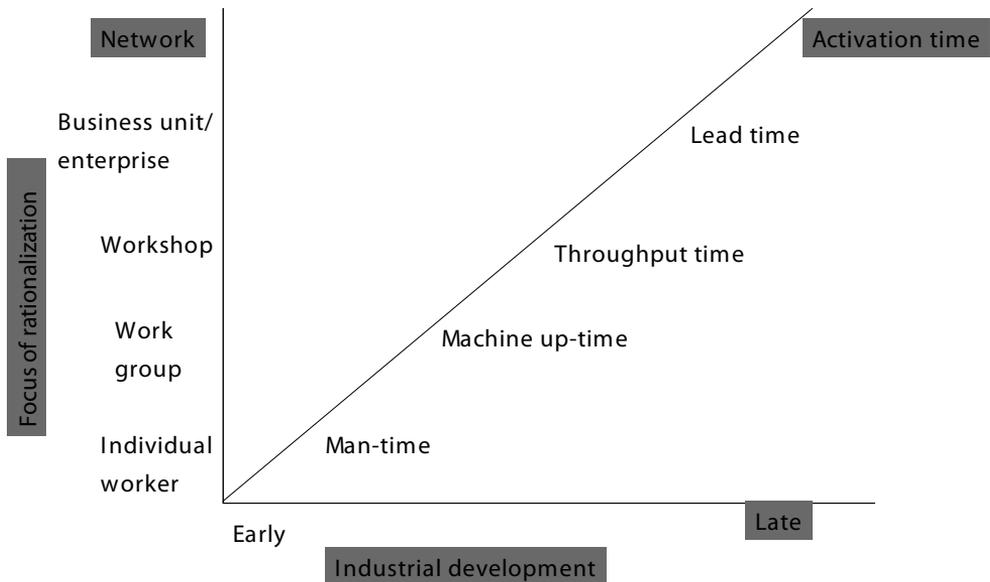
ers and customer choices, however, has a prompt and direct impact on the product and process development efforts. (Engeström, 2005b, Victor & Boynton, 1998, Da Silveira, 2001)

Victor and Boynton (1998) propose that the following developmental phase of product development will be *co-configuration* based on close collaboration between producers/design people and the customers/clients. Victor's and Boynton's examples of co-configuration firms are Oticon and Microsoft (ibid, pp. 193-194, 200-202). Mietinen (2005, p. 37) claims that the conceptualization of co-configuration work is currently a "vision of something emergent". In reality, he claims, in most product development processes, users do not participate in the product development to any significant extent. The developers (mainly engineers) continue to focus on the technical features of the products and show a poor understanding of user activities, which often leads to difficulties in the implementation of the product.

A critical prerequisite of co-configuration work is the creation of customer-intelligent products or services which adapt to the changing needs of the users. Co-configuration type of work requires flexible "knot working" in which no single actor has the sole, fixed authority – the centre does not hold. A precondition of successful co-configuration work is *dialogue* in which the parties rely on *real-time feedback of their activities*. The interpretation, negotiation and synthesizing of such information between parties requires new, dialogical and reflective knowledge tools as well as new, collaboratively constructed functional rules and infrastructures. (Engeström, 2004, Engeström, 2005b)

The work of co-configuration involves building and sustaining a fully integrated system that can sense, respond, and adapt to the individual experience of the customer. When a firm does co-configuration work, it creates a product that can learn and adapt, but it also builds an ongoing relationship between each customer-product pair and the customer... This design process requires the company to sense and respond to the individual customer's needs. But co-configuration work takes this relationship up one level – it brings the value of an intelligent and "adapting" product. The company then continues to work with this customer-product pair to make the product more responsive to each user. In this way, the customization work becomes continuous... Unlike previous work, co-configuration work never results in a "finished" product. Instead, a living, growing, network develops between customer, product and company... With co-configuration, there are no final products; no service is ultimately delivered. Instead the boundaries between learning and work, customer and product, customer and company disappear. What replace those boundaries are tightly coupled linkages, which feature constantly shared information, ideas and experiences around the product or service experience. (Victor & Boynton, 1998, p. 195, 207, underlining mine)

Related to the historical development of work itself, *Figure 2* shows how the *concept and meaning of time* has changed in the course of industrial development (Docherty et al., 2002, p. 7). The latest phase, the *activation time*, where the focus of rationalization is on the whole network, is relevant for co-configuration work (see *Figure 2*).



**Figure 2.** Shift in time focus of rationalization within industrial development (based on Docherty et al., 2002, p. 7)

In the early days of industrial development the focus of work rationalization was on the individual worker and how he/she can possibly work more efficiently. When machines were brought into the picture, the focus shifted to work groups and to the time the machines were up and running. Along with the assembly lines the focus shifted towards the whole workshops and the throughput time of a product. In the next phase the whole enterprises or business units in bigger enterprises were concerned with the lead time of products, i.e. how long it takes from the product definition phase until the product is on the market.

The activation time, i.e. the ability to activate the latent structure of the whole network into an efficient “concerted effort” to satisfy customer needs (Docherty et al., 2002, p. 6) is an important feature that drives towards a requirement to cross boundaries at an accelerating pace.<sup>2</sup> This concerns both collaboration with others as

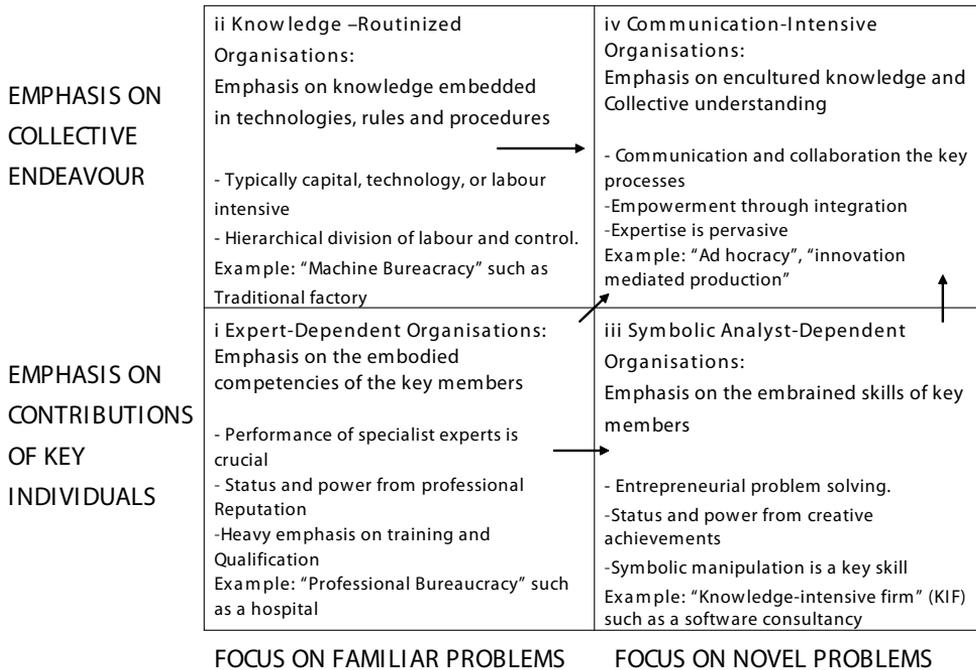
2. Docherty et al. (2002) are also pointing out that even if the meaning of time has changed, and new aspects have been introduced to workplaces, it does not mean that earlier aspects of time have been discarded. “They rather remain, affecting the operations simultaneously, peacefully coexisting or contradicting, causing often unique but always complex business situations – and highly intensive work systems.” (p. 7)

well as the boundaries of one's own job role. In the era of networks, there is no time to proceed in sequential steps or in the systematic order of process phases, when complex products and the complex networks developing them are in the focus of rationalization. The time to market of innovative products depends on the activation time of the whole network. What is needed is a toolbox to activate the whole network at the same instant. An extensive network working in parallel with various parts and issues related to the same product calls for efficient boundary practices.

Blackler (1995) has proposed a typology of organisations (see *Figure 3*) based on the importance of different knowledge types.<sup>3</sup> Blackler emphasises the fact that knowledge by nature is a complex phenomenon. He predominantly sees *knowledge as something people do*, not something they have. Thus, *knowing* is proposed as a main concept instead of knowledge. He underlines the fact that such an active approach to knowledge draws attention to the need to investigate ways in which the systems that mediate knowledge and action are changing and how they might be managed. His view is that the study of flexible organisations should be focusing on the nature of expertise and the changing systems through which the activities are enacted. The dimensions in the matrix are based on the *novelty of problems at hand* (familiar versus novel problems) and whether the emphasis is on *individual or collective contributions*.

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3. By adapting and extending Collins' (1993) categorization of knowledge types Blackler (1995) provides one good overview and classification to the complex concept of knowledge. *Embrained knowledge* (knowledge that) is dependent on conceptual skills and cognitive abilities (abilities to develop complex rules and to understand complex causations). *Embodied knowledge* is mostly tacit and action oriented (knowledge how, practical thinking). An employee's personal interpretations of technologies, their usage and interaction with them, is counted in this form of knowledge. *Encultured knowledge*, to a great extent dependent on language, refers to the processes of achieving shared understanding (story telling, values, metaphors, common language, common rules and ideologies, discussion forums). *Embedded knowledge* resides in systemic routines; it is embedded in technologies, products, roles, formal procedures and processes, and in emergent routines (organisational skills that are complex mixes of interpersonal, technological and socio-structural factors). *Encoded knowledge* is information conveyed by signs and symbols and found in books, manuals, web pages, databases and explicit codes of practice (Blackler, 1995). The distinction between tacit and explicit knowledge types is often taken up as a basis for many classifications (see e.g. Nonaka, 1995) based on Polanyi's (1967) original distinction. It needs to be borne in mind that any classification always reduces and simplifies the phenomenon it is dealing with. In reality different knowledge types exist and evolve in parallel. For example, tacit and explicit knowledge are mutually constituted and inseparable. Tsoukas (1996) describes organisational knowledge as being processual dispersed and inherently indeterminable.



**Figure 3.** Organisations and knowledge types (based on Blackler, 1995, p. 1030)<sup>4</sup>

In Blackler’s classification the borderline between symbolic analyst-dependent and communication-intensive organisations is especially interesting. They both deal with novel problems but the difference lies in the collective understanding and the emphasis on encultured knowledge (to a great extent dependent on language, refers to the processes of achieving shared understanding; story telling, values, metaphors, common language, common rules and ideologies, discussion forums). Blackler calls symbolic analyst-dependent organisations knowledge-intensive firms. Communication intensive firms are described as “*ad hocracies*” or “*innovation mediated production*”. It seems that in the case of communication intensive organisations, the role of collaboration is emphasised compared to the symbolic analyst-dependent organisations where the emphasis is on individuals’ capacity to deal with their own knowledge and skills. In communication-intensive organisations no doubt this kind of knowledge is also in a key role, but the key success factors are communication and collaboration processes; the integration of the actors and *pervasive expertise* are of primary importance. It is not enough that one symbol-analyst uses his/her knowledge and skills to solve problems; the whole network needs to be activated to work around common problems in parallel. From my perspective the case organisation of this study can be classified to

4. The arrows in the picture summarize the trends suggested in the knowledge work literature, i.e. the shift is away from dependence on the embodied and embedded knowledge towards embrained and encultured knowledge (Blackler, 1995).

the group of communication-intensive organisations. Therefore, a point that raises interest is the *ad hoc*cracy in the communication intensive organisations. Blackler does not specifically explain in detail what he means by ad hoccracy. In this study ad hoccracy is understood to be a feature of spontaneous self-organising that takes place in certain kinds of organisations where the conditions are optimal for this type of behaviour. The theme will be elaborated more in *Chapter 4*, especially *Section 4.2*.

## 2.2.2 ORGANISATIONS

Activation time is related to the agility of organisations. The word agile is indeed visible in the latest discourse whether it concerns organisations or processes. For business companies competitiveness is a constantly moving target. The challenge for organisations is to keep pace with a turbulent, highly unpredictable environment, changing marketplace and competitiveness requirements. Dyer & Ericksen (2005) state that *agile enterprises* strive to outmanoeuvre current and potential competitors by generating ever-changing portfolios of products, service offerings, or business models. These firms strive for a series of competitive advantages that add up to success over time. Docherty et al. (2002) also deal with agile enterprises and relate the need of creating sustainable work systems to agile organisations. Dyer & Shafer (2003, p. 9) define *dynamic organisations* as follows: dynamic organisations refer to firms specifically designed to be capable of surfing or competing on the edge of chaos. They are organisations that “deliberately seek to be infinitely innovative and adaptable in the marketplace by adopting loosely coupled organisational forms that harmoniously blend characteristics of chaos, fluidity, and flexibility on the one hand with a modicum of order, control, and predictability on the other”. In order to be successful individuals in these organisations must be able to cope with an unpredictable marketplace and chaotic change (Mannix & Peterson, 2003).

Based on Doz & Kosonen (2008a, 2008b) the *strategic agility* of companies results from the combination over time of three major capabilities: *strategic sensitivity*, *leadership unity/collective commitment* and *resource fluidity*. All three are required to enable a company to be strategically agile. Strategic sensitivity is about early on-time awareness of trends and forces emerging in the competitive environment. Leadership unity is about the ability of the top team to make bold decisions fast without politics. Resource fluidity involves the internal capability to reconfigure business systems and redeploy resources rapidly.

Work is often distributed in agile organisations. *Distributed work* can be understood as the organisation of work across tasks, processes, or production networks. In distributed work, employees from different departments, sites and often countries, cooperate on a single task, a chain of tasks, or a network of tasks. One of the most

important forms that distributed work takes is the cooperation in temporary project teams. (see e.g. Hinds & Kiesler, 2002)

In order to survive in today's competitive business environment a company needs to provide quality new products on time and at the right cost. *Speed to market* has become a paradigm of world-class manufacturing. *Globalisation* of the world market means that in global manufacturing, collaboration is a must. Globalisation has brought about many changes in the way business companies, especially the large ones, work; they are more and more susceptible to global economic fluctuation, they are more and more dependent on adding value to shareholders, their personnel is recruited from a global resource pool and the geographical distribution of production and work in general is dependent on the economic efficiency. Introducing and developing new products or processes within a global company will bring about several strategic challenging issues that need to be addressed, *extended enterprise* working mode being one of them. (see e.g. Boardman & Clegg, 2001) Extended enterprise can be defined as individual companies working together to form inter-enterprise networks across the product value chain in order to survive and achieve business success (Browne & Zhang, 1999). It is a challenge for the employees to work out the structures of global networks and understand their own and their organisation's role in these networks (Reich, 1995).

*Virtual enterprises* or *virtual organisations* are new organisational business forms that emerge with the application of information and communication infrastructures. They are built on the need to respond to rapidly changing business environments and opportunities. Virtual enterprises are based on stable business networks or "virtual communities" from which project specific, temporary collaborations of real enterprises are formed. On the level of business networks, real enterprises interact in multilateral fashion, identify their core competencies, invest in a common business understanding and presentation towards the outside, define innovative – often decentralized- management and organisational structures, and aim at developing a basis of mutual trust ("corporate culture"). On the project level, virtual enterprises make intensive use of information and communication technologies for cooperation, coordination and communication. (see e.g. Hausner et. al., 2003).

A term *mobile virtual enterprise* or *cyber world* has even been introduced. The former refers to the abilities to have access and operate virtual enterprise infrastructure from anywhere, and anytime. The latter can be defined as a virtual world, a parallel world created and sustained by the world of computers, wearable communication terminals and device-less interfaces. In the cyber world one can stay in touch with agents, knowledge, databases, communities, and use electronic services and transactions anytime and from anywhere. The word cyber can be associated with the world of intra-communication and networked devices, a world of advanced technology used for a better human interaction and knowledge change. (see e.g. Pulli et al., 2003)

*Agile methodologies* in their turn are a new class of methodologies for software development proposed at the end of the 90's. They are particularly appropriate when it is difficult to understand the system functionalities during the early phase of the process, due to continuously changing requirements, mutable environmental factors or mutable market conditions. Agile methodologies are goal-oriented: they allow adapting the process to all these changes, *reaching towards the changing goal at a time*, with frequent release cycles. They are in contrast to “heavy” methodologies like the well-known waterfall process model where process phases follow each other in a linear order from the system definition all the way to the system integration and verification (see e.g. Angionia et al., 2006).

Adjectives like blurry, porous or unbounded (as compared to bounded) are used to describe boundaries in the most recent types of organisations and working life. Boundaries are shifting, or they need to be crossed or spanned. Furthermore, words like flexible, fluid, shifting, transition and mobile are used to describe the emerging way of working.<sup>5</sup> The emergence of various names for a new kind of organisation shows that there is a fundamental change ongoing in how the organisations function. Docherty et al. (2002) and Dyer & Ericksen (2005) talk about *agile enterprises*. Hayes & Jaikumar (1988) talk about *intelligent organisations* formed when problems surface and dissolved when the problems are solved. *The structure they assume is based on how the problem is posed*. Zuboff evinces (1988, p. 414) *informed organisations* that rely on human capacities for teaching and learning, criticism and insight. It implies an approach to business improvement that rests upon the improvement and innovation made possible by the enhanced comprehensibility of the core processes. It reflects a fertile interdependence between the human mind and some of its most sophisticated productions. Lindbeck & Snower (2000) refer to *holistic organisations*. Powell (1990) refers to *network organisations* and to *project based organisations*. Eldridge & Nisar (2006) refer to *flexible work organisations*.

Hernes (2004) states that the idea of the boundary as stable and unambiguous has served organizational analysis for decades and has given impetus to the emergence of important schools, such as contingency theory. The metaphor “boundaryless company” was first used by the CEP of General Electric Jack Welsh who in 1990 annual report described his new organizational model to be a “boundaryless company... where we knock down the walls that separate us from each other inside and from our key constituencies on the outside” (Hirschhorn & Gilmore, 1992). Ashkenas & al. (1995) and Ashkenas (1999) refine further the concept “*boundaryless organization*”. In their book “Boundaryless Organisation” they suggest that organisations should indeed be

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5. *It needs to be noted, however, that even if there is an increasing requirement to cross the boundaries and make them more transparent, it is not possible or something to aspire to, to create an organisation completely without boundaries. An organisation, no matter how flat it is, always needs to be organised into some kind of entities based on some criteria. (see e.g. Goold & Campbell (2002, 2003) for a method on how to create and test organisational structures for various changing situations) The point is in making the boundaries as permeable as possible where needed and to make the boundaries of the organisation and all its parts capable of adapting to any needed changes.*

examined from the perspective of boundaries and how permeable they are. It encourages organisations and leaders to rescue to the metaphor of boundaryless organisation that would enable seamless functioning of the different entities of the organisation as well as external parties. The book does not build upon any specific theory but rather depicts a target state for an organisation, thus being more of a management normative guideline. Yan and Louis (1999) for their part state that organizational restructuring and system transformation increase the permeability of both intra- and interorganizational boundaries.

Hirschhorn & Gilmore (1992) claim that the new boundaries of the “boundaryless company” are different from the “traditional hard-wired boundaries of hierarchy, function and geography.” These new boundaries are more psychological than organizational. They tend to be invisible, yet they must be “enacted” over and over again in relationships between “bosses, subordinates and peers”. Hirschhorn & Gilmore (ibid) list *authority boundary*, *task boundary*, *political boundary* and *identity boundary*. Authority boundary poses the question “*who is in charge of what?*” The critical question for the task boundary is “*who does what?*” Political boundary is about representing “distinct interest groups with different needs and goals”. The question is “*what’s in it for us?*” The identity boundary raises the question “*who is – and isn’t – us?*” People at identity boundary “trust insiders but are wary of outsiders.” Knowing how to recognise these new boundaries and use them productively is the essence of management in flexible organizations. Hirschhorn & Gilmore (ibid) claim that managers must focus on *boundary management*: “they must teach people what new boundaries matter most, then how to recognize such boundaries in their relationships with others... Good *boundary managers* encourage employees to enact the right kind of boundaries at the right time.”

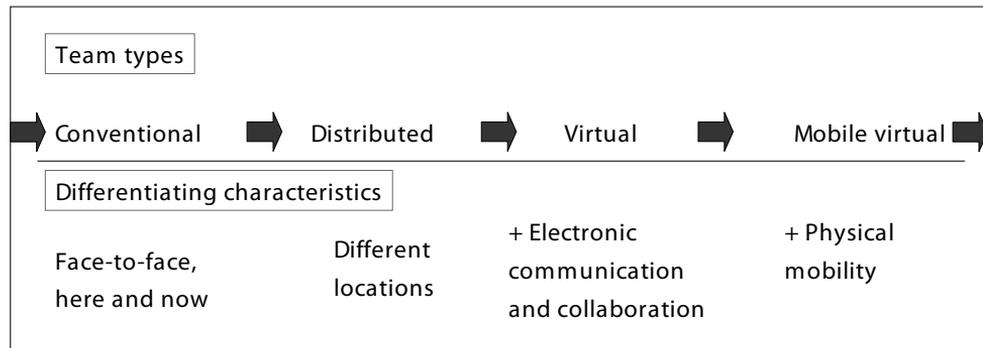
Hernes (2004) also criticizes those taking “boundarylessness” as a starting point. According to his view “what we might witness is a *proliferation of boundaries over time and space, as well as a quicker rate of change, but not the disappearance of boundaries.*” Hernes (2004) proposes that *researches should actually take boundary and its dynamics as a point of departure*. He sees that organisations operate within multiple sets of co-existing boundaries. These sets vary from organization to organization, in strength as well as in substance. Boundaries are central to organizations. Change processes in organizations are actually about creating, moving and consolidating boundaries. Boundary properties reflect the substance of the organization. Further, boundaries are constantly subject to construction and reconstruction. Some boundaries can remain relatively stable, while others might change more rapidly. The emergence of a social organization takes place through a series of distinction-drawing operations. Boundaries emerge and are reproduced through interactions.<sup>6</sup> Hernes (2004) proposes that organizational boundaries could be interpreted firstly from the *mental, social* and

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6. Hernes (2004) refers to Giddens (1984) when he claims that boundaries are reproduced through interactions.

physical boundary perspectives and secondly from the effect the boundaries have on the organization (ordering, distinction or threshold effect).<sup>7</sup> (Hernes, 2004)

Vartiainen et al. (2007) have differentiated the different types of teams based on the increasing complexity in the environment. See *Figure 4* below.



**Figure 4.** Types of groups and teams by increasing contextual complexity (Vartiainen et al., 2007, p. 25)

Traditional groups and teams differ from distributed, virtual and mobile virtual groups and teams specifically in three factors: the geographical distance between the members, the way collaboration takes place and physical movement. Traditional teams are local, communicate face-to-face and work towards a common goal here and now. The geographical distance gives rise to distributed teams. It becomes virtual, when the members communicate electronically and do not meet face-to-face. The physical movement of the members brings another new feature to the distributed virtual work. *Virtual mobile teams* are always distributed, but not all distributed virtual teams are mobile. In mobile virtual mode it is possible to work from various different locations and on the move. Virtual mobile teams are the most complex forms of teams to manage, lead and to work in (Vartiainen et al., 2007, p. 25). They are also the ones where many of the work-related boundaries are at their loosest.

Fleming & Spicer (2004) in their article “*You can checkout any time, but you can never leave*” investigated spatial work/non work boundaries in a high commitment organization. They claim that it has almost become commonplace to proclaim the “porosity of various boundaries that have traditionally separated the workplace from more private domains of life”. They present practices like outwork, homework, the

7. *Mental boundaries* refer to core ideas and concepts that are central and particular to the group or organization. *Social boundaries* refer to identity and social bonding tying the group or organization together. *Physical boundaries* refer to formal rules and physical structures regulating human action and interaction in the group or organization. *Ordering* refer to the extent to which boundaries regulate internal interaction. *Distinction* refers to the extent to which boundaries constitute a clear demarcation between the external and the internal spheres. *Threshold* refers to the extent to which boundaries regulate the flow of movement between the external and the internal spheres.

deskless office and alike that have blurred a number of typical differentiations between work and non-work spaces. Their main argument is about “*boundary control*”: in their opinion there is a “purposeful attempt to manipulate and control the boundaries between the inside and outside spaces of employment in a way which brings the outside space of consumption, leisure and spiritual development onto the site of production, and pushes the inside sphere of corporate culture out into other aspects of employees’ lives”.

All in all, the *informal organisation* is becoming increasingly important. The organisational charts and formal structures rarely represent the actual networks via which the work is actually accomplished in a company (Parker et al., 2001). Fluid organisations have a team-based structure and they are rapidly adaptable and extremely agile (Champy & Nohria, 1996). Those studying future options for organisations recommend *network* as the basic structure for renewing the organisation. Networked organisations with fuzzy boundaries can bring the needed flexibility to compete in the marketplace. The network stays viable and holds together on the basis of the relevant knowledge flows via personal connections and various information channelling tools (Stähle & Laento, 2000). Last but not least, for example, Laudon & Turner (1989, p. 4-5) point out that when dealing with organisations we should not only stick to the “venerable and sanguine” in them. There is much evidence that organisational action is partly determined by the outcome of political struggles among “factions and personalities” within organisations.

### 2.2.3 ORGANISATIONAL UNITS AND THEIR BOUNDARIES

Along with the modern notion of organisation even the boundaries related to the organisational units have been brought under the spotlight. Traditionally the focus of investigation has been on the bounded and formal units like a team or a fixed organisational entity or the whole organisation. Describing the organisational units and their boundaries is indeed much more complicated than has habitually been assumed by many organisational theorists. Under this title I have used Tuomi’s (1999) ideas on how bounded or open certain organisational units of analysis are. Tuomi (1999, p. 261) claims that organisations actually have a multitude of units of analysis that need to be taken into account and that several units of analysis need to be considered when intelligent organisations are discussed.<sup>8</sup> In the context of this study it is interesting to shed a light on what the boundaries of these different conceptualizations are like.

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8. *Tuomi’s (1999) attempt in his dissertation was basically to come up with a novel approach to organisational knowledge management. (Knowledge management in itself can be considered a rather contradictory concept; Knowledge is fluid and cannot be “managed”). He discusses how the views based on traditional information processing understanding dramatically lack views that bring into the picture the dynamism and unpredictability of organisational knowing. Tuomi combines phenomenological and constructivistic views on intelligence, sociohistorical and developmental views, social systems using autopoietic theory and Luhmann’s theory of social systems. He develops this idea through studying various conceptualizations of organisational knowledge creation communities.*

Table 2 shows one view of the bounded and open units of analysis on different levels proposed by Tuomi (1999, p. 261).

	<b>Bounded</b>	<b>Open</b>
<b>Unit</b>	Individual	Human-in-society
<b>Unit group</b>	Team	Community
<b>Meta-unit</b>	Organisation	Society

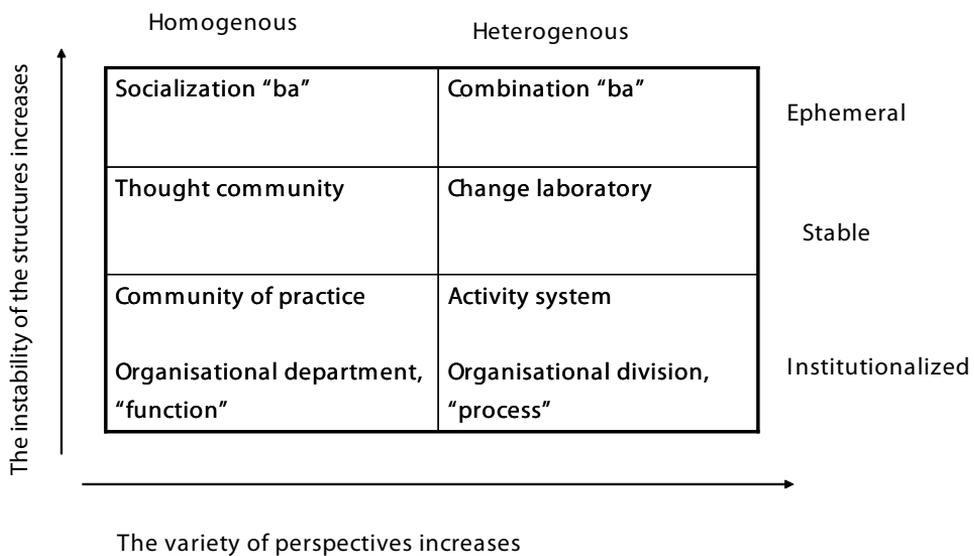
**Table 2.** Levels of analysis and bounded and open units (Tuomi, 1999, p. 261)

The table above suggests that some of the units are bounded, meaning that they are conceptualized as autonomous entities that are agents for action. *Such bounded units can be viewed as causal agents, and we can attribute responsibilities, goals and effects for them.* Open units are, by contrast, extended and unbounded. Their membership is fluid and not well defined, and they have fuzzy boundaries. In addition, open units are open because they “couple lower units with higher-order units.” Tuomi claims that open units are unbounded in two directions: “horizontally, as their membership is defined as various grades of centrality and peripheralality; and vertically, as they connect units and meta-level systems.” Tuomi writes that when people usually consider social agency, we normally use bounded constructs. Using them, people tend to emphasise social units as tools that are able to accomplish certain actions. He further claims that *fundamentally all units are open because even bounded units are essentially artificial abstractions from the underlying social systems.* Tuomi’s point in his dissertation was that when analyzing organisational intelligence and knowledge, we need to start predominantly from the unbounded concepts (ibid, pp. 261-262). Tuomi’s (p. 269) view is clearly that even communities of practice defined by Lave and Wenger (see e.g. Lave and Wenger, 1991) form part of the group of bounded communities. It is indeed true that Lave’s and Wenger’s interpretation of communities of practice leads to relatively stable communities, where knowledge creation is mainly about appropriating of already existing knowledge. In communities of practice, learning is about socialization to *existing* practices. Thus, “community” in Table 2 is a much wider concept than the bounded community of practice.

Tuomi defines a *social system* as an entity that comprises fractal communities or humans-in-society. A fractal community is an “entity that recursively consists of fractal communities or simple communities”. A minimal social system is a single community and in general a set of overlapping communities. A team is a group of more than one individual who share a common goal and who join their efforts to attain that goal. From the team members’ perspective, their common goals are motives that generate activity. Tuomi states *that the formation of bounded social units can be seen as a mechanism for intentional manipulation of the activity structure.* He points out that the bounded units like teams are not social units in the sense that they could be ele-

ments of a meaning processing system. Tuomi defines organisation as a community that has a legal identity and organisational motives. Although the organisation itself is not a social system, it exists in the ecology of communities that are components of social systems. The organisation itself is one community, that of its membership. (Tuomi, 1999, p. 262)

Tuomi's idea is to study the link between social communities and knowledge creation. He studies social units that underlie organisational knowledge creation and can be understood as different types of knowledge communities. Using Nonaka's & Konno's (1998) idea of *ba*, Lave's & Wenger's (1991) idea of community of practice, Fleck's (1979) idea of thought community, activity theoretical concepts (see e.g. Engeström, 1987) and change laboratory (see e.g. Virkkunen et al., 1997) he has come up with a classification of different types of knowledge creation communities (see *Figure 5*).



**Figure 5.** Different types of knowledge creation communities (adapted from Tuomi, 1999, p. 273)<sup>9</sup>

Tuomi (1999, p. 263-275) classifies the focal unit of knowledge creation according to two characteristics. First, the classification is done based on *whether the unit of knowledge creation is institutionalized, stable or transient*. Secondly, the communities may also be conceptualized *as homogenous or heterogeneous*. In the latter type of community the members have different areas of expertise and in the former type the members share the same type of expertise. In Tuomi's view, the more transient and uninstitutionalised the community, the more knowledge creation is bound to take place.

9. To Tuomi's picture (1999, p. 273) I have added the two main classes: the variety of perspectives and the instability of the structures (of knowledge creation communities).

*Communities of practice* are homogenous entities that maintain and reproduce “social stocks of knowledge” (Tuomi, 1999, p. 264). Newcomers are socialized into a specific community of practice through legitimate peripheral participation (Lave & Wenger, 1991). The idea of *thought community* is very similar to that of Lave and Wenger. A thought community (Fleck, 1979, pp. 102-104 in Tuomi, 1999, pp. 267-268) is created when a relatively stable structure of meaning is established. A thought community reproduces itself through its continuous regeneration of meaning. A thought community rejects meanings that do not fit with its thought style. *Ba is a dynamic interaction space where new knowledge emerges* (Nonaka & Konno, 1998, Nonaka et al., 2000). Their main interest is in institutionalizing the knowledge creation process itself. *Ba is a certain space and time for the concentration of resources to create new knowledge*. There are different types of *bas* and they may be either homogenous or heterogeneous. *Activity systems* are conceptualizations that have an underlying division of labour where subject, object and community are closely interrelated. Activity theoretic view focuses on the link between creativity, learning and practice (Engeström, 1987). *Change laboratory and developmental work research* (see e.g. Ahonen & Virkkunen, 2005) are interventionist situations that bring together representatives from several interrelated activity systems to identify contradictions between them and to develop novel tools and practices to enhance activity.

The characterization of communities based on homogenous and heterogeneous communities is important in practice, as it implies that members of a community either share or do not share a common system of meanings. In Bakhtinian term, a community of practice, for example, has a shared linguistic genre, whereas an activity system has to negotiate and translate between different genres. The Luhmannian social system can then be interpreted as a genre, or a homogenous community. Indeed, using the distinction between heterogeneous and homogenous communities we can see that whereas the Luhmannian concept of social meaning processing may enable us to explain what it is that happens inside a *ba*, it need to be combined with the idea of object related activity to explain productive social practice. (Tuomi, 1999, p. 275)

Tuomi’s compilation and comparison of various organisational units of analysis are brought to this study firstly to shed light on the boundaries around the various conceptualizations of organisational knowledge creation communities. The other reason is to show the interrelatedness of various levels of knowledge creation communities.<sup>10</sup>

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10. *Social systems are not visible in this table; they are societal systems that have developed to distinctive meaning processing systems along time. It is, however, possible that certain social systems are more visible in certain organisational functions, some organisational functions can even be organised around social systems. In that sense some organisational functions can be relatively homogenous on what comes to the communication and identity. One could even argue that activity systems in a single organisational function could be interpreted to be rather homogenous if deemed on a superficial level based on educational background. Naturally personal biographies entail a great deal of multivoicedness as emphasised by Engeström, 2001, for example.*

After dealing with the emerging boundaryless organisational contexts, I will move on to examine what “boundaryless work” is all about in *Chapter 3*. This is done by studying the very concept of boundary, boundary work and boundary practices. Moreover, the implications of increasing “boundarylessness” to people’s job roles, careers and features of expert work are dealt with.

### 3. TOWARDS THE CONCEPT OF BOUNDARYLESS WORK

In *Chapter 3* I will investigate in more depth what the concept of boundary means and areas where boundaries have presumably become more blurry in recent organisational and work contexts. Firstly the very idea of boundaries, boundary work and boundary practices is presented. The second section deals with integration over boundaries in the form of collaboration and networking. The other sections show how the blurring of boundaries has affected people's job roles, careers and expert work. In *Section 3.7* I will finally present what I mean by "boundaryless work" in this study.

#### 3.1 BOUNDARIES

In this study *boundaries* are defined as *visible or invisible distinctions and differences that shape people's everyday work*. People encounter this kind of distinctions and differences in their everyday work (in the practice and action they engage into) and in their job roles and careers. *Crossing a boundary* is defined in this study in relation to the definition of boundary: boundary crossing takes place when *an individual actor or a collectivity can work out, overcome or navigate in relevant manner a distinction or a difference that shapes their everyday work*.

Quite an extensive list of boundaries in product development work was listed by Orlikowski (2002). She explored globally dispersed, product development work of a large and successful multinational organisation. She focused on *boundaries embedded in everyday practices* mostly through interviews with an exploratory approach. As Orlikowski (2002) spent more time in the case organisation, she "became particularly aware of the importance of boundaries that people routinely traversed in their daily activities". In their descriptions of the distributed product development the research participants "repeatedly referred to a number of boundaries that shaped and challenged their everyday work". The salience of multiplicity of boundaries was clear. After

identifying seven such boundaries, she then focused her data collection explicitly on boundaries and sought to explore the nature, role, and consequences of boundaries in product development work with an emphasis on specific activities related to the descriptions of boundaries.

The boundaries that were identified were *temporal* (time zones and various weekly, monthly and quarterly schedules), *geographic* (various different locations of product development), *social* (hundreds of participants in joint product development), *cultural* (e.g. various different nationalities), *historical* (different versions of the same product), *technical* (complex software system running on a variety of different computer infrastructures and accommodating a variety of standards), and *political* (differing functional interests, product criteria and local versus global interests.) (Orlikowski, 2002) The boundaries evinced by Ashkenas et al. (1995) related more to the organisational structures: *vertical*, *horizontal* and *external* boundaries.<sup>1</sup>

Suchman (2002) in her study focused on the *boundary between design and use*. (The design and use boundary may transcend organisational boundaries or it may be a boundary within the same organisation.) She considers that the *unitary professional language and the practice of designers, the time pressures and the expectations of the management* as well as their *position in the enterprise*, make the establishment of genuine new forms of dialogue between design and use difficult. Her view is that the “boundaries that currently define professional practice are realized through institutionalized arrangements that are crafted precisely for their production... *In those cases where boundary crossing do occur, we discover that they involve encountering difference; entering onto a territory on which one is unfamiliar and, to a significant extent, therefore, unqualified to act.*” Suchman’s argument is that instead of reducing the meanings of technology to one universal language (the language of design), a more multivoiced conception based on “partial translations” of local knowledges is needed (p. 10). The professional expertise in this kind of situation is understood as something that is socially distributed, based on the dialogue of people representing different viewpoints, knowledge and expertise (Engeström et al., 1999). The idea of distributed expertise corresponds to the idea of complementarity of knowledge and resources in the study of networks and social capital (Miettinen, 2005, p. 38). Miettinen argues that the significance of practical knowledge of ordinary users should be recognised to a greater extent than it is now. Hasu (2001) in her study showed how a hospital nurse knew best the practical conditions of taking measurements with a high-technology imaging device and how she still remained largely unheard by the designers.<sup>2</sup> *Different actors have, owing to their social positions, a partial standpoint to various phenomena. To maximize objectivity, to achieve a valid, rich and workable conception of a product*

1. *The starting point of activity theorists is different; they take historically and culturally developing activity systems and boundaries between them as a starting point. Through collective dialogue it is possible to make boundaries visible, change and even transform them. The aim is to develop the way activity systems function and to learn as collectivities.*
2. *Those representing feminist standpoint epistemology have often taken this kind of situations as an important starting point in the research (see e.g. Harding, 1993).*

for instance, a *dialogue between the different standpoints is needed*. In order to cross boundaries, “new social forms of dialogue between multiple discontinuous worlds” is needed (Miettinen, 2005, p. 39).

Another example of a boundary, namely that between *management and operative units*, is described by Ahonen & Virkkunen (2005). This is an example of a vertical boundary within an organisation. Starting off from the object of the activity, they argue that the management and the operative units have partly the same given object of activity. Both activity systems construct the same given object differently, from their own respective perspectives. Management’s perspective focuses on the business model and is broader than that in the operative units, as the management needs also to consider the market, competitors, the whole system comprising several units and a longer time-span. The front-line team’s perspective, on the other hand, focuses on the work practice with its daily problems and improvement ideas concerning the processes as well as customer satisfaction. They further argue that the business model is normally not questioned by the front-line workers. Still, despite the differences in perspective, the fact that the object of activity is partly the same creates potential for dialogue and development.

A further argument of Ahonen & Virkkunen is that the historical development and transformation of the respective activities has complicated the dialogue. In a stable phase of the development, it has been possible to stick to the separate objects of activities and in the historically evolved forms of interaction between management and production. Ahonen & Virkkunen claim that “the perspectives of actors are coordinated, but at the same time relatively isolated and self-sufficient” (ibid p. 58). When the changes in business environment and technology become continuous, the need to recreate the forms of interaction between hierarchical levels increases. Due to uncertainty and instability more cross-hierarchical negotiations and dialogue are needed in order to construct new kinds of work practices and possibly new kinds of business models. Pure coordination in the confines of customary activities is not sufficient. There is a need to cooperate in terms of focusing on the same object of activity and develop it further through visibility to various perspectives. At its best the interaction between management and operative employees can turn into examining and developing the very script of interaction between the parties; at this point the level of interaction is shifted to communication. The strategic learning necessary for transforming business activities calls for new forms of ongoing dialogue between the management’s strategy work and the practitioners’ pursuits to develop their work practice. (Ahonen & Virkkunen, 2005)

## 3.2 BOUNDARY PRACTICES

Wenger (1998, p. 105) studied *boundary objects* and in the spirit of communities of practice introduced the concept of *broker*. He also studied *boundary encounters* such as meetings, conversations, visits; they are single or discrete events that provide connections. Boundary encounters can take various forms such as one-to-one conversations, immersions and delegations. If a boundary encounter becomes established and provides an ongoing forum for mutual engagement, a boundary practice becomes a form of collective brokering. Henderson (1991), Carlile (2002), Thompson (2005) and Bechky (2003) have equally studied *boundary objects*. According to Star (1989, p. 46) boundary objects are “both plastic enough to adapt to local needs and constraints of several parties employing them, yet robust enough to maintain a common identity across sites. Boundary objects can be for example physical product prototypes, design drawings, shared IT applications, engineering sketches, standardized reporting forms or even shared abstract constructs (Levina, 2005). Pawlowski & Robey (2004) proposed that IT professionals’ *brokering* activities would include gaining permission to cross organisational boundaries, surfacing and challenging assumptions made by IT users, translation and interpretation, and relinquishing ownership of knowledge. Hargadon (1998) suggested that even the whole companies could be regarded as *knowledge brokers*. Hinds & Kiesler (1995) and Levina & Vaast (2006) investigated *boundary spanning* and boundary crossings via the technology aided media. Brown & Duguid (1998) and Hargadon & Sutton (1997) studied *knowledge brokers* and *technology brokering*. Boland & Tenkasi (1995) have investigated the *cross-community communication forums*. However, Orlikowski (2002) criticises these approaches of treating knowledge as a thing that can be captured, stored or transmitted, as a stable disposition, or a static property. Intermediaries proposed by the above scholars, whether humans or artefacts, are seen necessary in the vein of thought where knowledge is “embedded” or “stuck” in particular situated practices. *According to Orlikowski (2002) it is the recognition of the stickiness of know-how that has led to various proposals for facilitating knowledge sharing across communities of practice.*<sup>3</sup>

In this vein of thought, knowledge brokers and other boundary practices, where the basic idea was to “broker” knowledge from one rigid bounded entity (e.g. organisational entity or a community of practice) to another rigid bounded entity can be regarded as one of the initial steps in describing how the knowledge transfer over boundaries takes place and should take place. However, we need to go even further in our thinking. When the very structures and boundaries in organisations have become more complex

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3. *Brown and Duguid (1998) stick to a typology between know-how and know-what in their definition of communities of practice. Orlikowski (2002) maintains that even if Brown and Duguid’s view of knowledge is emergent, they still retain a taxonomic classification of knowledge as a basis for their reasoning. In Brown and Duguid’s (1998) characteristics of community of practice “know-how” is a particular ability to put know-what into practice within a certain community of practice. The “know-how” is easily moved within a community of practice (or among communities with similar practices). But when it comes to moving “know-how” across communities of practice, it becomes “sticky” or difficult to move.*

and possibly more blurry and the integration is much more pervasive, completely new kinds of premises and concepts are needed to conceptualize boundaryless work. In the following sections I will address the importance of *practice* in the efficient boundary work. For example Bechky (2003) suggests that existing understandings of boundary spanning may not apply in dynamic conditions.

Orlikowski's (2002) claim is that even if much of the success of the company boils down to powerful leaders, competitive strategies, sophisticated technological infrastructures and excellent engineering skills, one should not miss the important aspect of how the employees collectively know how to make distributed product development and repeatedly enact this competence over time. She even proposes her view as an alternative interpretation of competence: *capabilities of an organisation are constituted every day in the ongoing situated practices of the organisation's members*. The focus should thus be on understanding the conditions (e.g. human, social, structural, financial, technological, and infrastructural) under which skilful performance is likely to be enacted. Cross et al. (2000) equally suggest that the need for "spanning, buffering, and bringing up boundaries" does not disappear as organizations become "boundaryless". Rather, *boundary activities increase in significance and shift to lower organizational levels*.

Orlikowski's (2002) point is that the salience of these *practices* lies in their capacity to help the employees to *navigate and negotiate the multiple boundaries through which they constitute their distributed product development work*. She proposed a certain set of themes that referred to activities that people engaged in their "boundary work", i.e. when they traversed boundaries of time, space, culture, history, technology, and politics that they routinely encountered in their work. These practices, presented in *Table 3*, were engaged in by the individuals as part of the ongoing structuring processes through which the organisation was then produced and reproduced. The case company in which these practices were identified, a globally distributed software company, is a good point of comparison to the case organisation of this study.<sup>4</sup>

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4. Note that Orlikowski conceptualizes practice and activity in a different way than activity theorists (see chapter 4.1 for activity theoretical conceptualizations).

Practice	Activities Comprising the Practice	Knowing Constituted in the Practice
<b>1. Sharing identity</b>	<ul style="list-style-type: none"> <li>- Engaging in common training and socialization</li> <li>- Using common orientation to do development work</li> <li>- Identifying with the organisation</li> </ul>	Knowing the organisation
<b>2. Interacting face-to-face</b>	<ul style="list-style-type: none"> <li>- Gaining trust, respect, credibility, and commitment</li> <li>- Sharing information</li> <li>- Building and sustaining social networks</li> </ul>	Knowing the players in the game
<b>3. Aligning effort</b>	<ul style="list-style-type: none"> <li>- Using common model, method and metrics</li> <li>- Contracting for expertise annually</li> <li>- Using standard metrics</li> </ul>	Knowing how to coordinate across time and space
<b>4. Learning by doing</b>	<ul style="list-style-type: none"> <li>- Investing in individual development</li> <li>- Mentoring employees in their careers</li> <li>- Rewarding, not punishing, effort</li> </ul>	Knowing how to develop capabilities
<b>5. Supporting participation</b>	<ul style="list-style-type: none"> <li>- Globally distributing product development work</li> <li>- Involving participants in project decisions</li> <li>- Initiating and supporting overseas assignments</li> </ul>	Knowing how to innovate

**Table 3.** Repertoire of practices, activities, and knowing in Orlikowski's case company, a globally distributed software company (Orlikowski, 2002, p. 257)

The first practice in Orlikowski's (2002) case company was about producing a distinctive and *shared company identity* with which most of the members identify and through which they orient their work. Common identification provides the basis for a continued and evolving sense of trust, respect and loyalty that the researcher found throughout the organisation. Common identity and a common way of doing things allow the developers to share a common vocabulary despite an abundance of nationalities, technical requirements and political priorities. Knowing the organisation through the process of shared identity construction does not guarantee that all the temporal geographic, technical, cultural or political boundaries are effectively crossed. It offers guidelines for articulating and engaging with these boundaries, while also providing some common ground if any redefinition or reconstruction of boundaries is deemed appropriate. Orlikowski proposes that organisational identity is an ongoing accomplishment, enacted and reinforced through situated practices. Kogut and Zander (1996) have also noted the strong relationship between the identification with an organisation, cooperation among the members and the additional efforts towards tasks contributing to co-workers and the organisation. They argue that organisations

can provide a sense of community by which discourse, coordination and learning are structured by shared identity.

The second practice emphasised the significance of *face-to-face interaction* and knowing the players in the game. The research participants underlined the importance of meeting people instead of videoconferencing, especially in building social relations and trust, and especially in difficult situations. Working with and through social networks the employees navigate and negotiate many challenges of working across temporal, geographic, cultural and political boundaries. Orlikowski (2002) actually talks about strong social networks and social capital (cf. Gratton's (2005) view on social capital) that provide the foundation for ongoing interaction and sharing information. It allows the developers to call on each other for help, advice, or ideas, any time any place.

The third practice was about *aligning effort*, i.e. knowing how to coordinate across time and space. Developing highly complex software systems in a dispersed environment demands effective and ongoing coordination. Orlikowski (2002) found that aligning of products, projects, and people across time and space was accomplished through the consistent use of a proprietary *project management model*, a *planning tool* and a *structured systems development methodology*. The annual contracting for work between employees was done via standard metrics between product organisations and local development units. The *common language of the project management model as well as the standard resource assignment contracts and metrics* allowed engaging with the boundaries of history, time, geography and technology. It also allowed for flexibility in renegotiating these boundaries if deadlines, priorities, technologies, or resources happened to change. According to Starbuck (1989, pp. 18-20) "programming"<sup>5</sup> is one of the most important learning mechanisms in organisations. Programs enable organisations to repeat the same activities over and over again. They stabilize behaviours and enable some habits and expectations to take root in the organisation. However, the downside is that people who act only on the basis of habits and predictably are not improving their behaviours or validating the appropriateness of their behaviour.

*Learning by doing* is the fourth practice in Orlikowski's (2002) list. In order to stay at the leading edge of product development and in order to retain highly skilled employees, organisations need to invest in individuals' ongoing learning and development, coach them in their career aspirations and reward their effort and trials.

Finally, knowing how to innovate through *supporting broad participation* was highlighted. This feature was about diversity and dispersion. Product development was deliberately dispersed to geographically remote parts of the world. All participants with diverse backgrounds were involved in project decision-making. Overseas assignments and the like were supported in order to foster dialogue and inclusion that facilitate the

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5. Starbuck's term "program" (1989, pp. 18-19) actually refers to what is referred to as projects and processes in this study. "Programs are written down as standard operating procedures. Programs afford the main means by which organisations accumulate experience, coordinate activities, and control actions."

crossing of cultural and language boundaries. The fact that multiplicity of voices and ideas were represented in discussions and decision-making ensures diversity of ideas which, in turn, enhances creativity. Distributed organisation also created flexibility in the face of changes in technologies and competitive challenges (ibid. 2002).

The practices are thus both individual (performed by actors in their everyday action) and organisational (because the actions of individuals are shaped by organisational norms and structures). *The boundary work was particularly about knowing how to navigate (i.e. articulate, attend to and engage with) as well as negotiate (i.e. redefine, reconstruct) the boundaries.* The practices Orlikowski (2002) brought about generated knowing how to be coherent, committed, cooperative, consistent, competent and creative across a variety of boundaries in the organisation

As the members of the organisation used this repertoire of practices<sup>6</sup> over time and across situations, they at the same time generated and sustained collective competence in distributed organising. While being *enabling*, this collective competence can also be *inhibiting*: sharing identity may become organisational groupthink, the need to interact excessively face-to-face may lead to burnout, especially if a great deal of travelling is involved, aligning effort may discourage improvisation, learning by doing may be lost through turnover, and supporting participation may be immobilizing due to interest conflicts and time delays. (Orlikowski, 2002) Thus, it is very much about balancing the assets and drawbacks of this kind of working. Orlikowski (2002) herself does indeed note that the organisation needs to continuously develop capabilities to offset possible negative consequences like organisational rigidity, emotional and physical exhaustion, limited improvisation, loss of skilled people, fragmentation, time delays and conflicts in priorities and interests.

Orlikowski (2002) claims that the inherent complexity, multiplicity, and dispersion of setting in distributed work complicates the way we can think about and study organisational knowing. She suggests that the notion of “stickiness”, at least if applied to “knowing how”, needs revision. *It is not enough to focus on the importance of knowledge transfer across boundaries and the value of generating a set of best practices that can be propagated through dispersed operations.* This kind of view provides too static and rigid a view of reality. If “knowing how” and practice are mutually constitutive, sharing knowledge cannot be regarded as a problem of knowledge transfer from one community of practice to another, with or without the mediating help of any boundary objects or the like. Rather, sharing knowledge (“knowing-how” in Orlikowski’s parlance) should be seen as a process of enabling others to learn the practice that entails that knowledge (“knowing-how”). For Orlikowski it is a process of helping others to develop the ability to enact the knowing in practice. From my perspective, it can as well be engaging in a shared practice with others and thus once again in the common

6. Orlikowski (2002) reminds the readers that the practices that she presents are not to be seen as either exhaustive or exclusive. On the contrary, they overlap and interact at the same time and over time. The classification is an analytic convenience only. The same goes for the concepts of practice and knowing; their usage is complicated by the fact that the language implies an ontological separation of the two when it is not intended (Orlikowski, 2002).

reproduction of the practice. The conceptualization of community of practice refers to a rather bounded entity, and thus it is not used as a stepping stone in this study.

All in all, Orlikowski (2002) highlights the *essential role of human action* in knowing how to get things done in complex organisational work. Her perspective is that *knowing* is not a static capability or stable disposition of actors but rather an *ongoing social accomplishment, constituted and reconstituted as actors engage in the world of practice*. The target of her case study was a geographically dispersed high-technology organisation. She maintains that the competence for global product development is both collective and distributed, grounded in the everyday practices of organisational members. *Knowledge* in this kind of environment is *effective action embedded in dynamically improvised practices*. Orlikowski's focus is on organisational knowing as an emerging form of ongoing and situated actions; she evinces an explanation grounded on what people do to get their work done.

Orlikowski was one of the authors of the article by Kellogg et al. (2006) that proposed an interesting view of the practices people engage in volatile environments. This view claims that *different communities interact across boundaries in the trading zone where the procedures of exchange have been agreed*. Otherwise they may engage in the needed practices within their own community. The idea is that the agreements on the overall standard procedures and protocols might be too big investments in rapidly changing environments. In this case Kellogg et al. (2006) studied an interactive marketing company as an example of a post-bureaucratic organisation. Their objective was to ascertain how members of different communities perform *boundary spanning coordination work* in conditions of high speed, uncertainty and rapid change. Their interest was in how cross-boundary coordination is accomplished in fast-paced and volatile workplaces. Even though marketing companies cannot be directly compared with R & D environments, the idea of *trading zones*, originally proposed by Galison (1997) is interesting. Kellogg et al. (2006) use this concept when studying practices of boundary-spanning coordination in volatile working conditions. Galison proposes an understanding of cross-disciplinary interaction where the local coordination of ideas and actions may take place despite differences in community purposes, norms, meanings, values, and performance criteria.

In Galison's analysis, enacting a trading zone does not require equivalence or similarity of interpretations or interests, nor does it assume stability or permanence of relations. Instead, members of different communities coordinate their actions temporarily and locally, navigating in their different norms, meanings, and interests only as needed. Engaging in a trading zone suggests that diverse groups can interact across boundaries by agreeing on the general procedures of exchange even while they may have local interpretations of the objects being exchanged, and may even disagree on the intent and meaning of the exchange itself. Such an understanding evokes a view of cross-boundary coordination as performative, as emergent in recurrent actions, and thus as a provisional and ongoing accomplish-

ment...Because the trading zone is “always in the making”, cross-boundary coordination is a contingent, emergent, and dynamic outcome that cannot be planned or prescribed, but is highly dependent on the situated activities of the various communities. (Kellog et al., 2006, p. 39, underlining mine)

The basic idea for Kellog et al. (2006) is to find something that transcends the ideas of boundary objects and boundary spanning. They criticise perspectives that “propose facilitating cross-boundary coordination through the construction of shared commitments (common ground or common knowledge) and the use of various boundary-spanning mechanisms (e.g. routines, languages, stories, repositories and models)”. They suspect that *forging agreement around standard procedures, shared protocols or boundary objects might be too big investments in form in volatile contexts. In non-hierarchical and shifting contexts investing in building “rigidity” might be less effective*; “the criteria of worth are contested” and “the areas of jurisdiction are blurred”.

Based on their (ibid. 2006) findings they suggest that *cross-boundary coordination* in heterarchic conditions is constituted by *practices of display, representation and assembly across community boundaries. The employees recurrently engaged in the practices in the trading zone to facilitate their dynamic, uncertain, and ongoing accommodation to each other and their clients. At the same time they retained commitments to their local identities, values and interests.* First, they *displayed work across boundaries*. They rendered their work visible and accessible to other communities and others on the project. They also made their schedules and plans available to others. As a consequence, the information and ideas were kept transparent, distributed authority was enhanced and the ongoing revision and alignment was supported. Second, they represented their work across boundaries. They expressed their work in a form that was comprehensible to other communities through the use of project genres like power point representations, discovery matrices and proof of concepts. As a consequence they facilitated the sharing of ideas and information through making it legible to others. They also embedded the flow of work and responsibilities in genres. Third, they assembled their separate contributions across boundaries into an emerging collage of diverse elements. They reused, revised, and aligned their work over time so as to keep it dynamically connected across multiple communities. The activities included juxtaposing existing work through modification and recomposition, reusing prior work and aligning effort through provisional settlements. As a consequence, diverse contributions were gathered together as a dynamic collage. Prior knowledge was leveraged and the work was kept adaptable through fluid agreements. Kellog et al. (2006) suggest that these practices, actually general procedures of exchange, afforded the employees flexibility and rapidity in their project work.

To get back to the organisational knowing, both Blackler’s (1995) and Orlikowski’s (2002) conclusion is that we should focus on the “knowledgeability of action”, that is

knowing rather than on knowledge.<sup>7</sup> Orlikowski continues that knowing cannot be understood as stable or enduring. Because knowing is highly situational, its existence is virtual and its status provisional. People's engagement in daily social practices is at the same time about the ongoing reproduction of the knowing that is actually generated in those practices. Continuity of provisional competence needs to be continuously achieved via the ongoing practice.

As people continually reconstitute their knowing over time and contexts, they also modify their knowing as they change their practices. "People improvise new practices as they invent, slip into or learn new ways of interpreting and experiencing the world... People learn to know differently as they use whatever means, motivation and opportunity they have at hand to reflect on, experiment with and improvise their practices." (Orlikowski, 2002) Weick (1998) also maintains that improvisation in practice is a powerful means of increasing organisational innovation, learning and change. For Giddens and Pierson (1998, p. 90) organisational life, is continually contingently reproduced by knowledgeable human agents, – which is what "gives it fixity and that's what also produces change". In *Sections 3.1 and 3.2* the boundaries and boundary practices were basically linked to the everyday practice in which people engage in the organisations they work in. *Section 3.3* focuses on how people integrate over boundaries through collaboration and network ties.

### 3.3 INTEGRATING OVER BOUNDARIES THROUGH COLLABORATION AND NETWORK TIES

When investigating boundaries and boundary work, collaboration and network ties need to be taken into account as essential elements. Boundary crossings involve collaboration between people in some way or other. Collaboration is indeed a typical way to organise work and requirements for collaboration skills have increased. A study commissioned by Technical Academics' Union elucidates the interaction among employees in the technical sector in Finland. In this study about 10% report that they constantly work in collaboration with others. 23% report that they work in collaboration with others for three quarters of their working hours, 29% report that they use half their working time to collaborate with others, 22% use one quarter and 14% less than one quarter of their work time in collaboration with others (Keski-Heikkilä, 2002, pp. 17, 49). Within engineering studies the communication process has been recognised as a key element to improve product development performance. Ghoshal and Bartelett (1990) found in their empirical study of multinational companies that subsidiaries

7. *Maturana's and Varela's (1980, 1988) theory of autopoiesis, self-production, was originally meant for the contexts of biological systems. It has lately been used as one perspective on organisational life. Orlikowski (2002), referring to Maturana & Varela (1998), states that the "mutual constitution of knowing and practice is a key premise underpinning Maturana and Varela's notion of autopoiesis".*

with higher levels of inter-unit communication were more effective in the creation, adoption and diffusion of innovations. McDonough et al. (1999) in their study of global new product development teams, found that the performance of a team was the better the more extensively they used a mix of multiple communication methods – a set consisting phone, fax, email, teleconferencing, face-to-face and company databases. Sosa et al. (2002) studied the way globally dispersed product development teams use various communication media (face-to-face, telephone and email). They found that distance had an inhibiting influence on communication but they also found that these negative effects might be mitigated by other factors such as recognising the interdependency of distributed team members, the existence of strong organisational bonds and the use of electronic communication media.

In most organisations people working in different functions differ regarding their background education and/or main field of expertise. Thus, one of the boundaries people need to cross in collaboration is the one between various “professions”, disciplines or expertise. An extensive number of studies have been conducted within the health care sector on multi-professional teamwork. According to Payne (2000) *multi-professional* (also multidisciplinary and multiagency) work implies that several professional groups and knowledge bases are drawn together in a structure to provide services. The concern is with collaboration within their defined roles, rather than seeking to cross boundaries. *Interprofessional*, interdisciplinary or interagency work implies that professional groups make adaptations in their roles to take account of and interact with the roles of others. They similarly adjust their knowledge and skill bases.

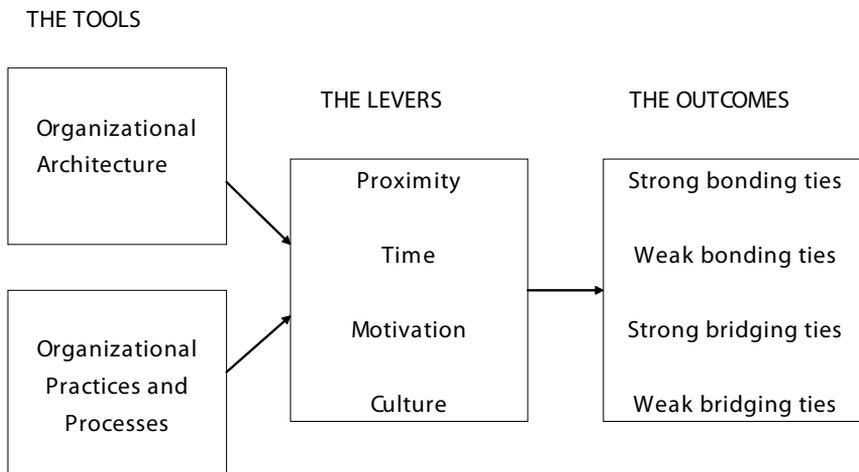
It is obvious that this kind of reasoning is needed in the social and health care sectors where it might be more difficult for more established professions to transcend the boundaries with other professions. In more recent fields like high-tech, the boundaries of various professions are not as established as in more traditional fields and often a certain educational diploma is not mandatory. Concurrent engineering or co-configuration work that has brought about the simultaneous activity has also brought about a need for more extensive *transprofessional and transdisciplinary work*. According to Orelove (1994) transdisciplinary teamwork requires the transfer of information, knowledge and skills across disciplinary boundaries and ultimately professionals taking on roles usually associated with another occupational group.

In research & development the multifunctional collaboration is more like a norm and necessity to optimize the activation time of all parts of the whole. *Multifunctional teams* unite the technical, business, financial and other functions of the company in an effort to create products that sell and that have the support of all sections of the company. In the case company this is also considered a competitive advantage: the former CEO of Nokia, Jorma Ollila, is cited by Gratton (2005) as telling “how the innovative capacity of the company increasingly springs from the multifunctional teams working together to bring new insights into products and services”. Collaboration in agile organisations is crystallised in the concept of *knotworking*. It is about different

and unique combinations of people, tasks and tools getting together for a relatively short duration. A knot refers to a “rapidly pulsating, distributed and partially improvised orchestration of collaborative performance between otherwise loosely connected actors and activity systems”. “Knotworking is characterized by a pulsating movement of tying, untying and retying together otherwise separated threads of activity,” This movement cannot be located to any specific individual or a fixed organizational entity as the centre of control. The locus of initiative varies from moment to moment within a “knotworking sequence”. Therefore, it is impossible to investigate any specific individual or an organizational entity; the unstable knot itself would need to be made the focus of analysis. (Engeström et al., 1999, pp. 345-347, Engeström, 2000)

Those studying organisations through the lenses of *social capital* are also dealing with collaboration. They are interested in increasing the effectiveness of the organisations and creating optimal circumstances for various kinds to network ties to emerge. Gratton (2005) brings about *four levers* (see *Figure 6*) to create space for network ties to occur. One of the case companies in her study is Nokia Corporation. Firstly, space for network tie creation can be created through active management of *proximity* (who meets whom), secondly through the *provision of time* (how much time people spend together), thirdly by crafting *motivation for people to work together through shared tasks* (what the people are working on), and finally, with a *culture of trust and respect* (how at ease people are with each other and what is their propensity to trust each other).

She then elaborates the *tools* (see *Figures 6 and 7*) that help to work out the above mentioned four levers. The first tool at Nokia was the *organisational structure* and the second were the *practices and processes* of the company that establish the day-to-day routines.



**Figure 6.** The model for considering network ties (based on Gratton, 2005, p. 154)

Gratton (2005) found that the first important tool was the *organisational architecture* of the company. The structural architecture establishes the power and decision-making structure of the organisation and also impacts the lever of motivation. The structural architecture influences the formation of teams and task forces and hence, the lever of proximity. Finally, the *frequency of changes in the organisational architecture determines the speed at which the teams and boundaries are reconfigured*. This last factor also affects the lever of time. Gratton claims that the structural architecture of Nokia makes a significant contribution to the creation of the so-called *adaptive field*. Adaptive field is a mix of both strong and weak bonding and bridging ties.<sup>8</sup> *To achieve this mix, the structural architecture of Nokia is essentially modular in form*. This kind of distinctive characteristic of the company is described as “avant-garde” and the kind that “fits the turbulence and an opportunity-rich environment”. It is re-configurable, modular and allows the re-use of capabilities.

Beneath this modularity lies a common global platform that delivers single systems for logistics, human resources, finances, and other transactions. Sitting on this common platforms are the modules that combine business groups and core horizontal processes. At the point of the study the company had four customer-oriented business areas and three horizontal entities. This structure consists of a large number of modular teams of people who remain within their teams but who can be reconfigured with other teams in change situations (Gratton, 2005). Changes are needed for example in order to avoid complacency that organisational success and familiarity easily breed (see e.g. Starbuck, 1989).

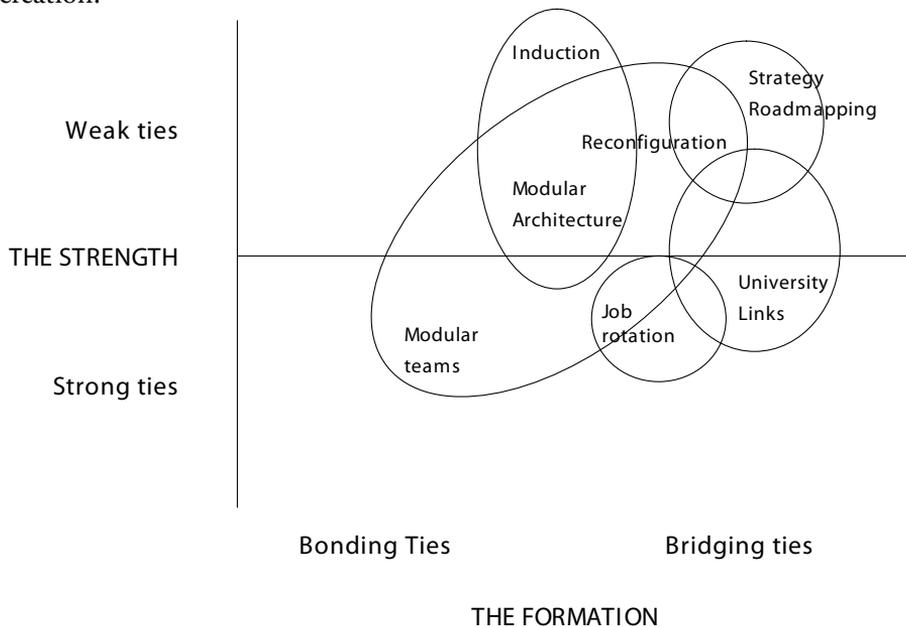
Despite the rapid pace of changes and reorganisations taking place in the company, the basic modular teams working on a certain aspect of the business remain the same. Thus, even in the midst of reorganisations, the strong bonding ties within the modular teams remain intact. These modular teams, which may be as small as 20 people for some sub-processes, have typically worked together for as little as six months and as long as 12 years. In a sense, these modular teams with strong bonding ties are the “guardians of the key process knowledge at Nokia”. (Gratton, 2005)

However, while the intact modular teams remain together for an extended period of time, the boundaries between the teams change as they are relocated. These relocations involve the modular teams working with people from other modular teams on a common process or a common task. So with each successive re-organisation, each member of the team leaves behind some of the old bridging ties he/she has established in the previous structure. Those relationships that are sufficiently strong may well remain as strong bridging ties. Others will decay over time as lack of proximity and a joint project erode the basis of the relationship. (Gratton, 2005)

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8. *Network ties begin as weak ties when people are merely acquaintances. Over time, some of these ties will remain weak or decay; others will strengthen and become strong ties as people have an opportunity to spend time with each other, are engaged in a shared task and start to trust each other. The network ties within groups are called bonding ties; those between groups are called bridging ties (Gratton, 2005).*

Gratton claims that the second important tool to enhance the creation of network ties is the *set of practices and processes that establish the day-to-day routines in the organisation* (see Figure 7). These can for example create the task forces and project teams that establish proximity and build motivation through an exciting, shared goal. Practices and processes also can build motivation to collaborate, for example in the form of remuneration systems enhancing collaboration through shared goals. In her study Gratton lists four practices and processes. It is obvious that this list is only a sub-set of organisational practices and processes that in reality support network tie creation.



**Figure 7.** Tools to enhance the formation of network ties at Nokia (Gratton, 2005, p. 156)

First, the *practice of strategy creation and roadmapping* brings together multifunctional teams from all over the company for a certain period of time to work on strategy themes identified by the executive team. The opportunity to work with each other intensely on a common topic over a relatively short period of time makes use of levers of proximity, time, and the motivation of a shared topic. During the course of a year, about 400 people across the company have the opportunity to create weak bridging ties with many other people, some of which may become strong ties later on. Second, Gratton lists the *strong linkages to universities* around the world. Third, a well organised *induction process* (running-in) facilitates the creation of network ties; managers are expected to introduce new members of their team to a number of people from within

and outside the team. Once again the ties with people outside the team begin as weak bridging ties but some may mature into strong bridging ties. Fourthly, Gratton brings about the *process of “job rotation”* that creates context in which new bridging ties can be created. The jumps across boundaries in turn help to establish new bridging and bonding ties. Next I will shed light on job roles, careers and expertise in the most recent types of organizations.

### 3.4 BOUNDARYLESS JOB ROLES

Engineering or R & D are fields where a formal diploma is usually not absolutely needed, i.e. there are no strict qualification requirements as is the case with many traditional professions like doctor, nurse, and lawyer.<sup>9</sup> Furthermore, the jobs in R & D are not usually split based on rigid classifications of professions.

Jobs emerged in the late 19th and early 20th centuries as a way to package work in settings where the same task was done repeatedly (Powell 1990, 2001). The need to organise human resources in innovative ways to give organisations a competitive advantage has focused attention on the question of job design. Bratton & Gold (2003, p. 117) define job design as “the process of combing tasks and responsibilities to form a complete job and the relationships of jobs in the organisation.” However, what we today consider as work is evolving in terms of how it is accomplished. Firstly, in companies where rapid technological change is commonplace and tightly-defined job ladders are not viable, a *project-based model for organising work* has evolved. Secondly, the trend is that *performance is replacing seniority* as the condition of employment. Thirdly, *learning and speed are replacing quantity as the metrics for evaluating organisations*. Consequently, the future organisation of work is likely to be much less frequently packaged into highly specified jobs. A horizontal employment model makes sense in many technology related fields, where each new generation of technology requires a different mix of skills. (Powell 1990, 2001)

Lindbeck & Snower (2000) identify four driving forces behind this restructuring process: advances in production technologies, advances in information technologies, changes in worker preferences in favour of varied work and advances in human capital that make workers more versatile. Greater emphasis is put on the ability to learn how the experience gained from one skill enhances another skill. All in all, the hallmark of the old was the compartmentalization of jobs; the core features of the new are interdependence and involvement. For workers, these developments mean accepting flexible job classifications and work rules agreeing to wage rates linked to profits and

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9. *Other qualification or diploma based occupations are for example: teacher, priest, pilot, airline stewards. Even if a formal diploma is not required in R & D or engineering, some organisation specific criteria may exist. In the U.K., in order to be able to occupy a position in some security related software areas one needs to have a certain qualification.*

productivity improvements and generally taking greater responsibility for the soundness and efficiency of the enterprise. (Reich, 1987, p. 83)

In Dyer's and Ericksen's (2005) human resources management model<sup>10</sup>, built on the idea of self-organising systems, the *basic idea is in creating favourable conditions that would allow discretionary work design where flexible job roles and flexible boundary crossings to new job roles are enabled*. An optimal system seeks to promote both freedom and flexibility and also enough discipline and order to keep the system viable. The goal is to create limitless opportunities for employee initiative, at the same time directing and restraining the chaos that can result from the pursuit of boundless opportunities. A fluid organisation is defined based on what everyone in the organisation does rather than a place where they all do it. Hierarchies should be minimized and instead leadership should be forced to emerge when and where it is needed. The mental model should be that of *emergence*, where employees constantly create, pursue and abandon new ventures that can be products, services or business models. Teams and "temporary alliances" (p. 185) should be constantly organised and reorganised. All temptations to draw statistic organisation charts should be resisted. In a self-organising company the work design should be discretionary. Dyer's & Ericksen's guidance actually encourages to eradicate jobs altogether in order to get rid of "that isn't my job" attitude. Work should be framed in terms of voluntarily assumed temporary assignments rather than domains based on hierarchies. The number of assigned tasks should be cut down to a minimum. Employees should be expected to determine what must be done in their "ever-expanding zones of discretion" (p. 185). "Soft-wired" rather than "hard-wired" business processes should be in place to allow this.<sup>11</sup> Dyer and Ericksen warn about confusing discretionary based work design with traditional notions of job enrichment or job empowerment in which "managers expand subordinates' jobs by assigning them a handful of previously forbidden activities or responsibilities" (p. 185). One could add also job rotation and job enlargement in their traditional rigid meaning to the same category (cf. Bratton & Gold, 2003, pp. 122-125).

Gratton (2006) also considered the process of "job rotation" that creates a context in which new bridging ties can be created. She uses the words of a senior executive to describe the hallmark of the internal job market in Nokia as a preference to "put people into coats that are much too large for them" (p. 156). She continues that the company abounds with stories of relatively young people assuming positions in which they have very limited experience. These jumps across boundaries in turn help in establishing new bridging and bonding ties.

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10. *Strategic human resources management is concerned with both what human resources strategies contribute to organisational success and how they do so* (Dyer & Shafer, 2001, p. 9).

11. *Victor et al. (2000) present a dual work design where individuals switch flexibly from productive work to production improvement and engage themselves regularly in activity of analysing and solving problems in production and work processes. They found out that this kind of dual work design can lead to greater job satisfaction.*

The philosophy is clear. After three to five years, most people are operating in their comfort zones, and it is time for them to do something completely different. These job leaps typically take place across countries, across functions, or across the processes of the company. Occasionally, they involve jumping all three boundaries at one time. (Gratton, 2006, p. 156)

Based on Dyer & Ericksen (2005) all *needs for talent should be openly posted* so that teams emerge, evolve, and die based on *requisite competencies*. All barriers to self-nominations and mobility should be minimized; there should be no restrictions on who can apply for what, nor limitations on buying and bidding related to term and condition negotiations. *Open discussions of career opportunities and aspirations* should be encouraged. All clustering, i.e. the tendency for the same people continuously to want to work together should be discouraged. *Relentless drive for development and learning* also contains *periods of incompetence*. In dynamic environments sticking to the old equals falling behind. For Dyer & Ericksen *serial incompetence* is predominantly caused by people themselves looking for new horizons and opportunities. The principle of *contextual clarity* is about understanding the *competitive realities*. People should understand how and why optimal human resources scalability matters. Contextual clarity makes it possible for employees to make wise choices when deciding where to put their attentions and efforts. All employees should have *personal accountability* as well as *ownership over the outcomes* of their assignments. With every major change the *commitment* of all parties should be authentically negotiated and re-negotiated. Ownership of outcomes helps to avoid situations “where everybody is responsible for everything and no one is responsible for anything”. Dyer and Ericksen conclude that “self-organising systems put accountability squarely on each individual”, however recognizing that trust is the essential bond that makes self-organising possible in the first place.

In this study *job role* refers to a combination of tasks and responsibilities assigned to and assumed by an employee at a certain point of time. *Job role boundary crossing* is defined as *a person's shift from one job role to a distinctly different job role*.

### 3.5 BOUNDARYLESS CAREERS

Job roles and careers are interrelated. A job is a view of one person's job or work role at a certain point in time whereas the chain of job roles constitutes one's career (horizontal view). *Career boundary crossing* in this study is defined as *a person's shift from one phase (job role) to the next phase in that chain of job roles*. A career includes various consecutive job roles and the transitions between them. In this section I will first present some background to career discussion and then two conceptualizations

that have become a standard part of recent career discussions; concepts of *boundaryless career* and *protean career*.

Observing people's lives in terms of career is one of the most remarkable aspects, especially of western societies. In Medieval Europe people's course of life was almost completely predetermined by birth. But from the Renaissance onwards individuals' lives have been increasingly considered variable and have become open to redesign even during the course of a person's lifetime (Becker & Haunschild, 2003). While aristocrats could simply refer to the destiny derived from their "natural dignity" to envisage their futures, other people – first particularly merchants, began to construct their lives as a series of steps or stages (Corsi, 1999). They began to organise the continuous flow of actions over their lifetime into social positions. Accordingly, the concept of career started to form. This development is closely related to that of modern organisations, which came out the stage of history at about the same time. Only organisations were able to provide society with such a large-scale pool of social positions that can be filled and re-filled (Becker & Haunschild, 2003). Career patterns, however, have gone through significant changes during the last couple of decades. The fading ability of large corporations to provide stable internal careers (Osterman, 1996, Hirsch & Stanley, 1996) as well as the concurrence of new models of organising, for example, networked organisations or project organisations (Powell, 1990) has led to an erosion of the preconditions for traditional hierarchical career patterns.

The renewed interest in careers (e.g. Arthur, 1994, Arthur and Rousseau, 1996b, Peiperl et al., 2000) stems from the widespread debate about the career implications of the changes described above and influenced how contemporary work and careers shape up. In response to the debate, an extensive body of literature has emerged addressing what has been described as a shift from 'organisational careers' to so-called "*boundaryless careers*" (Arthur and Rousseau, 1996ab) or "*protean careers*" (Hall, 1996) involving less predictable career trajectories. Much of the new career literature emphasises the individual and the personal "odyssey" involved.<sup>12</sup>

Two models of career have influenced the theory and research of careers over the last few years: the conceptualizations of *boundaryless career* and on the other hand, *protean career*. The first was introduced by Arthur (1994) and the latter by Hall (1976, 2002). These two concepts have become a standard part of the new career discussion. While once, and possibly still, considered radical, as Briscoe & Hall (2006) put it, they have ironically become a part of the new status quo.

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12. *There is also a wide body of research focusing on mobility and its effects. Mobility is looked upon as an opportunity to enhance both workers' employability and career success, whether voluntarily or compulsorily, because it enlarges the experience and with that the amount of learning of an individual employee. Mobility does not only include transfers between and within organisations, but is characterised in a less absolute sense by horizontal, vertical, diagonal and radical moves inter-organisationally. For example, Van der Heijden & Van der Heijde (2004) concluded that 'mobility between organisations' positively predicts objective career success in some instances and that the optimal period for transitions between organisations might be positioned in the mid-career stage (35-49 years).*

Dany et al. (2003) draw on the literature on boundaryless careers and conclude that boundaryless careers are claimed to bear at least three kinds of signs in organisations. First, *intra-organisational careers become less standardised and less predictable*. On top of that, the emergence of boundaryless careers *increases inter-organisational mobility*. Secondly, *idiosyncrasy of careers increases* and results in a myriad of different kinds of individual experiences. Thirdly, *individuals' aspirations mesh with company goals* leading possibly to innovative entrepreneurial projects which are supported by the company.

Though it is evident that the recent research on boundaryless careers has fruitfully overcome the narrowness of conventional research on careers, it has, on the other hand, developed its own limitations. One of the limitations points to the fact that at least the concept of boundaryless career puts too much emphasis on the inter-organisational career, rather than intra-organisational phenomena (Arthur, 1994) and the emphasis on the individuals' influence on career (Arthur et al., 1999). The critique of these concepts is also levelled at the fact that they still lack proper definitions and applications (Briscoe & Hall, 2006). One of the criticisms is that these concepts have led to very little research on what the consequences of boundaryless career are for organisations (Becker & Haunschild, 2003). The fact that most of the research has been done in U.S. has also been criticised (see e.g. Dany et al., 2003). Inkson (2006) claims that much of the power of boundaryless and protean career theories lies in their symbolism, in the power they offer as metaphors. Briscoe & Hall (2006) take the view that these concepts should be understood as a matter of degree and not in an either-or dichotomous way.

The boundaryless career and the protean career are interrelated, yet independent constructs. The boundaryless career has many meanings (Arthur & Rousseau, 1996b) but it is typically associated with careers that transcend organisational boundaries. A boundaryless career might be either perceived by the individual *subjectively* or defined by others *objectively*.

*The protean career explicitly defines independence and self-directed career behaviour* (Hall, 1976); subjective perception of the career actor is at the core of the protean career definition. Briscoe & Hall (2006) maintain that the implicit assumptions related to the actor are often true; "a self-directed, or a protean, career actor is more likely to cross career boundaries and that a boundaryless person is more likely to act in a protean fashion". Weick talks about improvisation in connection with careers as he talked in connection of the organisational life in self-organising organisations. (cf. Weick, 1996)

"Boundaryless career" as well as "protean career" as conceptualizations are still in an early phase of development. Briscoe & Hall (2006) call for the visualizations of boundaryless careers. I agree with them in the need for having new kinds of visual images in the contemporary employment context where job descriptions, organisations, work-home boundaries, and other career features seem to be dissolving or

reorganising themselves continuously. This kind of visualizations would also serve the purpose of affecting the mental images people have. Briscoe & Hall (2006) continue that the protean metaphor's (based upon the Greek god Proteus) changing shape is not easy to picture; it can be seen as an adaptive response to the volatile, uncertain, and ambiguous work environment. Even if the concept of protean career is not built on the understanding of self-organising systems, it fits in the picture of self-organising organisations surprisingly well.

Becker & Haunschild (2003) have developed a framework of how to combine the concept of boundaryless career with Niklas Luhmann's theory of social systems (see Luhmann, 1989, 1995). In their article they *elaborate Luhmann's ideas to investigate the effects of boundaryless career to the functioning of organisations*. Their main point is to elaborate Luhmann's perspective on careers to characterize the so-called *evaluative capacity of career* and to show how this feature facilitates *decision-making in organisations*. Further they show how boundaryless careers reduce the evaluative capacity of career and so endanger organisational decision-making. Their concern is how the organisations can cope with a world of boundaryless careers. The point is that the new boundaryless careers are as much of a puzzle to organisations as they are to individual employees.

One relevant finding related to the organisations where boundaryless work is pervasive, is the *identification with the organisation*. Many of the previously cited scholars have emphasised the strong shared identification with the organisation (see e.g. Orlikowski, 2002, Kogut & Zander, 1996, Dyer & Ericksen, 2005). On the other hand, the research on boundaryless careers has identified the weakening of the psychological contract between the employer and the employee. This might have an effect on how strongly the actors identify themselves with the organisation they are working in.

In situations where the context and requirements are constantly changing, the *work identity* is also in constant transition. Expertise and identities on transition have also been in the spotlight lately. Work identity<sup>13</sup> is not something given as are not contemporary job roles or careers; work identity is negotiated in a process where individuals balance values, positions, possibilities and restrictions offered to them by the work organisation and all other sources around them (Wenger, 1998). The new career theorists underline that *identity changes* are one constituent of contemporary careers (see e.g. Hall & associates, 1996). "As new career options open up boundaries around work, so also will they open up boundaries of identity" (Mirvis & Hall, 1994). Work identity is constructed and expressed via interaction and stories. For an individual it is continually formed in his/her job roles and during his/her career. Kuusipalo (2008) in her academic dissertation studied identities at work in a post-bureaucratic ICT or-

13. *Identity is a predominantly psychological concept (especially developed within psychology by the American Erik Erikson, 1968) and it is concerned with the way in which the individual perceives himself or herself and how he/she perceives being perceived by others. Work identity is specifically located on the individual level; it is something on the basis of which we actively think and act and learn (see e.g. Illeris, 2004, p. 438).*

ganization. She identified four different identity narratives: nostalgic, future-oriented, instrumental and chameleon. In her data the *older employees produced more coherent identity stories and seemed to be more committed to the organization. For younger employees the company did not appear as important; they seemed to be more committed to their own career, family or some other factors.* Kuusipalo concluded that the skilled employees might easily leave the organization if they feel they are not respected or if the organization does not support their personal careers. In this study identity is seen as something that is dynamic, relational and constantly re-negotiated in culturally constituted contexts. In the context of this study it is more natural to talk about work identity than of professional identity because a formal professional diploma is not required for R & D jobs (even though it often is a company internal recommendation).<sup>14</sup>

What is said about contemporary careers gives a rather contradictory picture. On the one hand, worker preferences have been said to have changed in favour of varied work (Lindbeck & Snower, 2000). Individuals are said to have broken free from the norms and rules of traditional objective careers to search for their subjective careers. Svejnová (2005) has described an *authentic career* of artists that could be thought to apply to non-artistic careers as well if people feel like being able to express themselves through their work. On the other hand, changed career behaviour can be interpreted as individuals' adaptive response (Briscoe & Hall, 2006) to the highly volatile work environment. Becker & Haunschild (2003) even claimed that boundaryless careers have endangered organisational activities by reducing the evaluative capacity of traditional career that earlier facilitated decision-making in organisations more than boundaryless careers. There is also evidence that traditional types of careers stick fast in many occupational fields and countries (see e.g. Dany et al., 2003). In activity theoretical terms, work life has developed historically to its present situation. Some fields, industries and organisations are further along the path of "boundaryless" or "protean" careers than others. With these transformations both organisations and individuals are challenged to deal with the continuing demands for flexibility. While companies are adapting their managing and organisational structures, demands on employees include continuous self-directed learning, adjusting to new ways to organise work and changing job profiles. Employees' ability to deal with those changes also largely determines their future employability (see e.g. Loogma et al., 2004). To adapt, organisations have developed and need to continuously develop new kinds of tools, concepts and processes to manage careers to respond to the changes. The possible changes in careers can be more dependent on the changes in individual behaviour, environmental changes or both.

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14. *For the birth of the engineering education and the development of the field of engineering in Finland, see Tulkki (1996, 1999) who studied the history of engineering and engineering education in Finland basing on Bourdieu's concept "field" (see e.g. Bourdieu, 1986).*

### 3.6 EXPERTISE AND EXPERT WORK IN BOUNDARYLESS ORGANISATIONS

In this section my objective is to highlight the implications of the latest developments of working life to the kind of expertise it requires from people. Much of learning and expertise or competence building research has traditionally been about investigating jobs where the professional skills are fairly stable and knowledge and expertise develop through small incremental steps, e.g. nursing, teaching and government authorities. Expertise in its traditional meaning: expert's concentration on a bounded area of expertise where he/she is developing his/her expertise further, are not the most momentous definitions of expertise in boundaryless contexts. Studying expertise in more rapidly-changing contexts makes it possible to uncover processes and structures that are more or less hidden in more stable circumstances. As people engage increasingly in "boundary work" (i.e. traverse boundaries of time, space, culture, history, technology, and politics) and "boundary practices" (Orlikowski, 2002), it also affects the expertise and expert work that emerges in boundaryless contexts. The focus is predominantly on research findings in the field of R & D. Many of the emerging features and requirements are related to the fact that R & D activities occur in parallel with each other (concurrent engineering or co-configuration work). Earlier in this study this was also referred to as the parallel activation of the whole system into an efficient effort to satisfy the customer needs (Docherty et al., 2002, p. 7).<sup>15</sup>

#### 3.6.1 PERVASIVE, HOLISTIC AND COLLECTIVE EXPERTISE

One important viewpoint is the shift of focus from one individual to the whole network. This shift has got huge implications to the expert work. Earlier it was mentioned that Orlikowski (2002) proposed that the capability and competencies of an organisation are constituted every day in the ongoing situated practices of the organisation's members; the focus should be on understanding the conditions under which skilful performance is likely to be enacted. Indeed knowledge is no longer seen as a property of an individual but of a group (see e.g. Bereiter & Scardamalia, 1993, p. 20). Launis & Engeström (1999) and Launis (1997) maintain that individually defined expertise is an artificial and meaningless construct in an environment where work is

15. See Isopahkala-Bouret (2005, pp. 43-46) for an extensive study on the perspectives of competence management, career theories and human resources development to expertise. These perspectives share the view that expertise refers to a superior competence or know-how on a particular topic or context. Moreover, it refers to a combination of theoretical knowledge and skilful performance. Competence management view emphasises connotations that make expertise a quantifiable and transferable asset of a company. Career theorists emphasise that expertise is an individual asset that an individual maintains, improves and sells for the best price in the employment market, as well as carries through different transitions. In the framework of HRM and HRD, expertise is associated with an individual's capability to make sense and interpret contextual meanings and thus perform according to high personal and professional standards. One of the biggest differences between Finnish and English terminology is that the Finnish term "asiantuntijuus" assumes a tight connection between expertness and professionalism. In the Finnish cultural context, experts presumably have a high-level professional education, preferably an academic one.

done increasingly within extensive networks. Fast-changing and complex problems at work require cooperation among the participants. Networks expand traditional organisational boundaries to involve experts and non-experts from different domains. *Expertise is understood as a part of holistic work processes and in terms of relationships rather than individual activities.* New ways to combine competencies, divide work, share responsibilities, to cooperate with partners and customers horizontally expands the qualifications needed at work. When considering work and how to develop it further and how to develop expertise further in the workplace, taking individual perspectives into account alone is not enough; the surrounding context needs to be taken into account as a whole (Engeström, 1987). Collin (2005), who investigated design engineers' and product developers' learning through their work, suggests that design practices and learning should be seen as shared, situated and contextualized. Furthermore, individual and social practice and learning in the workplace should be seen as interdependent and intertwined.

Activity theory reflects upon networks of interrelated elements such as subject and object of work, instruments (working methods and tools), communities, rules and division of labour. If individuals try to adapt to situational changes at work by developing their own competencies and skills, the task is overwhelming and ultimately useless. It is in the core of activity theory that a community should together focus on how the tools, methods, division of labour, and working rules in use have historically led to the current situation at hand and how to develop them further to adjust even better to the current situation (Engeström, 1987). It should be borne in mind, however, that even if the collectivity is the essential dynamo in distributed development work, excellent individual engineering skills still constitute the overall competitive advantage of the company (Orlikowski, 2002). Experts operate and move between multiple parallel activity contexts that demand and afford different, complementary and conflicting tools, rules and patterns of social interaction. The criteria for expert knowledge are different in different contexts and thus, the "experts face the challenge of negotiating and combining ingredients from different contexts to achieve hybrid solutions" (Engeström et al., 1995, p. 320).

### 3.6.2 COMPETENCIES, SKILLS AND ABILITIES IN A BOUNDARYLESS ENVIRONMENT

The competencies needed in boundaryless environments focus increasingly on the non-technical side (how) over and above world-class technology and engineering skills. Kuutti (1999, p. 370) lists features needed in new work organisations: flexibility, integration, continuous development, cooperation, planning and control of one's own work, theoretical thinking with models, better understanding of work, a large and flexible battery of skills and new motivation and responsibility for a larger area than one's own tasks.

Along with the shift from the individual to whole networks, *collaboration skills* have indeed become ever more important. Gratton (2005) emphasises the understanding of the importance of social capital and network ties as an area of organisational competence. Work is often organised around projects. To make the network ties work for the common good, a sound negotiation culture is needed. Brannen & Salk (2000) argue that actors from different functions and departments, even from different companies, often with different cultural, educational and other backgrounds come together for a fixed period of time to accomplish something. Traditional forms of hierarchy and authority do not exist in these systems. Complexity of products and conflicting interests are typically complications that people need to deal with. However, despite the conflicting interests the basic overall goal of the participants is essentially the same. The interaction is characterized by the simultaneity of conflict and cooperation as well as the power relations that can be symmetric or asymmetric (for instance between customers and their suppliers). The actors have to learn to deal with these contradictory elements of interaction. In this kind of environment, project participants have to find a basis for negotiation which brings them both closer to their goal while at the same time representing their particular interests (Brannen & Salk, 2000). Due to the limited time frame of work projects, *employees have to orient themselves to new work situations, tasks and social frameworks over and over again* (Hinds & Kiesler, 2002). An additional challenge is to be able to activate different types of competencies in the different phases of projects. At the beginning of a project, the participants shape and form the work process; they are in the exploratory phase. At various other times in the project, the project leader especially is called upon to build the consensus, moderate, make decisions, and control the process (Meil & Heidling, 2003). Another major requirement is the *ability to react and respond in critical or unclear situations*. In a project organisation, it is the participants who have to be in a position to make intelligent and timely decisions even in cases where information is incomplete (Hinds & Kiesler, 2002).

*In critical situations, experience, senses and intuition, as well as associative thought processes are a significant part of the work process.* In distributed work processes, critical situations arise so often that they assume a degree of normality. There are many types of critical situations: they come about due to last minute changes required by the customer, problems of communication or leadership, missing or incomplete information, conflicting priorities or the unwillingness to try out new solutions. Naturally companies try to use the lessons learned from critical situations to plan better, to predict where a critical situation may occur and take steps to prevent it, but still it is impossible to avoid them all. Complex interactions with the variety of actors, companies and technologies cause frequent unforeseen or unplanned situations. Not every critical situation is a consequence of diverging from pre-determined plans, nor does knowing the source of the problem ensure that it can be prevented. The challenge lies in giving the project participants the means to learn how to deal with

critical situations and convey problem-solving orientation. (Meil & Heidling, 2003) The kind of learning required in this kind of environment is in stark contrast to the embedded views concerning planning against unforeseen contingencies and a purely scientific-logical approach to problems and problem-solving. Hind's & Kiesler's (2002) idea of critical situations is close to the concept of crisis situations in self-organising systems (see e.g. Dyer & Ericksen, 2005) that leads people to improvise solutions to the problems at hand.

An important aspect for research and development work is the *ability to make mental images of projects and processes*, often by creating analogies to previous practice and experience. Project participants are responsible for one piece of a much larger product. They not only have to be in a position to envisage the steps of development of their own piece, but they have to foresee the integration of their piece in the total product. It is thus important to give people the opportunity to develop a comprehensive "process" competence. (Meil & Heidling, 2003)

Another aspect of distributed work involves *anticipation and openness*, in contrast to more categorical and formalized ways of thinking. Openness is especially significant because of the variety of different perspectives and ways of thinking that exist in a project group, and because the development process is not linear. Anticipation is important because the end results may be years away from the steps taken at a given time, steps that are nonetheless critical to the final result. (Meil & Heidling, 2003)

### 3.6.3 EXPERTISE IN TRANSITION

Engeström's (2003) three types of learning in collective systems of co-configuration type organisations are interesting. Firstly, *transformative learning* is about learning that radically broadens the shared objects of work by explicitly objectifying and articulating novel tools, models and concepts. *Horizontal<sup>16</sup> and dialogical learning* creates knowledge and transforms boundaries and "knots" between activity systems in multi-organisational terrains. This is the structure of the situationally constructed social spaces, arenas and encounters needed in new forms of expansive learning at work. The focus of research is on actions of *bridging*, *boundary crossing*, "*knot working*" and *negotiation*. Thirdly, *subterranean learning* studies the imperceptible cognitive trails (based on Cussins' conceptualization of cognitive trails) serving as stabilizing networks that ensure the viability of the new concepts, models and tools, thus making the multi-organisational terrains viable (Engeström, 2003, the idea of cognitive trails is based on Cussins, 1992). The activity-theoretical model is increasingly used to study and facilitate expansive learning processes in multi-organisational terrains of object-oriented activity. This type of developmental work research is radically different from traditional approaches that

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16. In some connections horizontal learning can be understood as being about helping people to learn from each other, from their peers, i.e. *people-to-people learning* as an alternative to the standard "top-down" "training" tools.

cherish a vertical view of competence and expertise. Characteristic of the traditional view is a discourse of ‘stages’ or ‘levels’ of knowledge and skill. Such a vertical image assumes a uniform, monolithic model of what counts as an ‘expert’ in a given field. However, the world of work is increasingly organised in ways that require horizontal movement and boundary crossing.

Döös et al. (2005) studied learning in a large mobile communications company in Sweden. They focused on the development engineers learning at the interface of two technologies, the old telecom and the new datacom. They identified three types of learning in which employees needed to engage so as to accomplish their tasks on the edge of a new technology: *learning basic knowledge*, *co-creating new knowledge* and *learning changing-knowledge*. Even though this classification is somewhat confusing from the overall perspective of workplace learning typologies, Döös et al.’s results provide an interesting insight into a telecom company crossing a boundary towards being a datacom company.<sup>17</sup> The elements of renewal, transition and change are dominant elements in her findings.

Learning basic knowledge took place especially with the introduction of new technologies when the old technologies were left behind. When a new technology was introduced into a company, it meant basically returning to “a state of knowing nothing” even for the experienced engineers. (Döös et al., 2005) This is one of the salient points where learning meets what was previously said about building expertise around learning and renewal (see e.g. Loogma et al., 2004, Isopahkala, 2005). The old skills and competencies simply do not remain for ever at the core of one’s expertise in a world where technologies and their applications do not live forever. The capability for continuous learning is a prime constituent of employees’ future employability, too. From an individual’s perspective the development of expertise in R & D environment is not a linear, straightforward process. For Dyer & Ericksen (2005) *serial incompetence* is predominantly caused by people themselves looking for new horizons and opportunities and thus changing jobs. However, people should be prepared for periods of “incompetence” even if they do not change jobs, for example in cases of technology or product changes in their current context. In Döös et al.’s (2005) case *learning basic knowledge* related to new technologies was about *frequent returning to a state of knowing nothing*.

In Döös et al.’s (2005) findings the *co-creation of new knowledge* implied close interaction processes while carrying out difficult work tasks. The outcome of the co-creation of new knowledge was knowledge that did not exist before in the organisation and, at times, not in the world – the latter being a consequence of working at the cutting edge of development. Mostly this type of co-creation took place in face-to-face situations, but there was also proof of more remote, slow and mediated co-creation

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17. Döös et al. (2005) call *learning basic knowledge*, *co-creating new knowledge* and *learning changing-knowledge* as *learning processes*. In my view, these are not learning processes, but rather different approaches to learning or different types of learning.

dialogues over the boundary of a mediating tool, e.g. mail conversation. From an activity theoretical perspective, this would refer to sense making and negotiation processes that take place in and between activity systems when working in the direction of the common object of activity. Expansive learning entails a great deal of creative reconstruction, questioning, confrontation and debate over defining what the actual object of activity is. (Engeström, 1999a, pp. 40-41)

*Learning changing-knowledge* questioned hitherto acquired knowledge through the necessity of taking in new facts and aspects in relation to already existing knowing. It was about searching for clues, being on the hunt for relevant information, saving ideas, solutions and contacts for future problem arrivals. Döös et al. (2005) describe this type of learning as a “continuous attuning” and the outcome is “knowledge under recurrent construction”. The products being developed and tested were unstable and the employees thus needed constantly to “shoot at a moving target to get hold of this moving thing for a moment”. Changes were so frequent that it was practically never possible for the testers to know exactly what was valid for the version currently being tested. People could never be confident that they fully understood how the systems being developed worked; everything was more or less “*in a loose state*”. The engineers were trying to “*catch*” the latest situation and to “*collect bits and pieces of information, and relations between them*”; they were constantly “*on the hunt*”. (Döös et al., 2005) What they are basically describing here is situated and constructive learning from an individual perspective. The activity described above is deeply embedded in common practice. What is interesting in Döös et al.’s findings is the vivid description of the “hectic search” and “hunt” that the research participants described. In Orlikowski’s (2002) words Döös et al.’s (2005) development engineers were traversing temporal, geographic, social, cultural, historical, technical and political boundaries while “learning changing knowledge”. They were also using various boundary practices in their activities. Constant state of flux is also one of the characteristics of the self-organising systems described in *Section 4.2*.

People networks were a major source of knowledge in Döös et al.’s results and people networks were global, timeless and partly non-situated, however, connected through the products and the problems that were to be solved. Individuals engaged in helping out others and sharing what they knew, knowing that no single person could have enough knowledge him/herself to perform the needed work tasks. Contact networks were joint constructions, they had to be taken care of and “one was not overexploit a useful contact”. Learning changing knowledge was the kind of learning Döös et al. count in the category of “frequently expanding the here and now-boundaries”. Written information and documents were also important for Döös et al.’s (2005) research participants. However, written information and documents were often difficult to locate and gain access to. The software engineers had difficulties in obtaining documents from other business units which may see them as proprietary or hold them as a source of income. They also had difficulties on the boundary of handover from one

stage of a project to the next in terms of other units not being willing to allocate time to do an adequate handover. (Döös et al., 2005)

Another perspective on expertise is *unlearning*, not staying within the boundaries of what has once been learned. According to Starbuck (1989, pp. 24-29), unlearning is more of an organisational characteristic than an individual one. He claims that individual human beings can learn without having to erase what they already know; they can record new knowledge on top of their current knowledge. Organisations, especially older ones, find it hard to ignore their current knowledge, because they have built up explicit rationalisations for why they are doing what they are doing and because they tend to associate specific people with specific policies. Thus organisations need to integrate their knowledge into very rigid and coherent structures where, in addition, political and intellectual elements fortify each other. Organisations can readily learn knowledge that is compatible with what they already believe, but they find it very difficult to learn knowledge that contradicts their current knowledge. Before they become willing to accept radically different knowledge, organisations actually have to unlearn what they know by dismantling their existing ideological and political structures. Organisations that constantly survive crises are good at unlearning. For such companies it is possible to “invent tomorrow”, which means that new alternative ideas or different strategies emerge from the organisation. In the activity theoretical framework “unlearning” would require investigating the historical developments of interrelated activity systems and negotiating possible changes or transformations in the current setup and practices (Engeström, 1987, 2001, 2003, Ahonen & Virkkunen, 2005).

Isopahkala-Bouret in her dissertation (2005) focused on *expertise under changing circumstances*. She revealed how *IT expertise and expert identity is linked to the organisational discourse of continuous learning and transitions*: the expert is a continuous learner and continuously in transition and is not complaining about it. The objective was to understand how professionals narratively make sense of expertise and how confusing role transitions impact on interpretations of expertise. The study presents “renewal” as a *struggle for professional recognition*. She showed how corporate competence management and development discourses impact on employees’ definition of expertise. Professionals had to negotiate the value of their experience and adjust to prevailing ways of presenting expertise. Her criticism is levelled specifically at *discourse that constructs a socially correct interpretation of how expertise is understood* and who are justified in declaring themselves as experts. *The fact that work was in a constant state of flux was lamented only if it prevented learning. Transitions and the acquisition of new responsibilities were seen as a necessary part of expertise*. However, for some research participants, the role transitions were simply about adjustment anticipation and the ensuring of one’s position in changing circumstances. Isopahkala claims that information technology professionals divide into two groups: those who have the right skills and a positive attitude towards learning (they are the experts) and those whose knowledge is no longer

needed and who do not have the means and resources to update their competence. Isopahkala concludes that negotiation about the status of expertise requires *acceptance of the prevailing developmental discourse and a definition of one's value in terms of project resourcing*. At the same time it is impossible to find words for expressing dissatisfaction – since no one wants to be taken as “change resistant and out-of-date.”

Casey (1995, pp. 190-192) concluded from her study in a large U.S. based technology that in the post industrial and “post-occupational” era people “opt” between three different strategies. The defensive ones would rather be somewhere else; they are the change-resistant ones. The colluded ones are “compulsively” optimistic; they “feel great”, they are “unleashed” to become winners for the corporation and for themselves. (In post-industrial era it is not enough to be just compliant and dedicated). In its ideal corporate form the character of the new corporate self is a colluded self: “over agreeable, compulsive in dedication and diligence, passionate about the product and the company”. The third type finds him/herself in capitulation. In capitulation, “the self negotiates a private psychic settlement with the corporate colonializing power”.

On the one hand, cynicism, ambivalence and contradiction constitute an important part of work and organisations as suggested by Whittle (2005). On the other hand, as shown by Casey (1995), Isopahkala (2005) and Järvensivu (2006) the expectation for optimism, acceptance of change, learning and renewal to be constituents of people's work identity and expertise, is already strongly institutionalized in today's working organisations. Dyer & Shafer (2003) argue that dynamic organisations compete through marketplace agility, which requires that employees at all levels engage in proactive, adaptive and generative behaviours (p. 7). This has deeply penetrating effects on the expert work, expertise and its renewal, too.

### 3.7 SUMMARY: DEFINITION OF BOUNDARYLESS WORK IN THIS STUDY

Boundaries and “boundarylessness” act as a perspective in this study that focuses on work practices, work environment and how work is organised in the case company. These concepts are used to delimit the subject field. The perspective was selected because it has been widely used lately in research and pragmatic literature, but often not very thoroughly defined. Another reason for perspective selection is that, at the end of the day at least metaphorically, loosening of boundaries describes well the changes that have taken place recently in many knowledge-based organisations. People need to reach out more and more extensively, e.g. in terms of how, when, and with whom they collaborate. It is also interesting to see how these fundamental changes have affected people's job roles, careers and the expert work.

In *Section 3.1*, mostly based on Orlikowski (2002) and Ashkenas et al. (1995), I provided a review of what kind of boundaries people routinely encounter in distributed

product development work. In order to traverse these boundaries people engaged in navigating and negotiating the boundaries, i.e. in boundary work. Orlikowski (2002) also introduced a *set of practices* that enable producing and sustaining collective and distributed knowing within a global product development company. Gratton's (2005) contribution was a *set of tools* to enhance creation and maintenance of network ties within another globally dispersed product development company. As it indeed seems, it is possible in organisations to set up a certain set of tools and practices to enhance efficient boundary work. In Gratton's list there were practices that employees can engage in but there were also organisational tools to promote chaos, change and dismantling of structures that had grown too rigid. However, as already pointed out by Orlikowski (2002), the practices people are involved in are so contextual and constantly being reconstructed that it is virtually impossible to make recommendations on best practices or any directly transferable lists of tools or recommendations for organisations or individuals. What is possible is to provide the right kind of conditions where efficient boundary work and boundary crossings are enabled. It is interesting to note that even if their philosophical underpinnings are different, both Orlikowski and Gratton emphasised the importance of *improvising* in efficient boundary work and network tie creation.<sup>18</sup>

Ericksen & Dyer (2005) presented a *set of principles* that would enhance optimal circumstances and conditions for self-organising to take place in an organisation. Self-organising in its turn advance activity like *improvising and spontaneous actions towards the common goal*. Self-organising is also a form of functioning that adapts to possible changes more easily than rigid hierarchical forms, e.g. possible changes in strategy, direction or products. All in all, the focus should be on *understanding the conditions under which skilful boundary work is likely to be enacted*.

In Gratton's (2005) study the HR professionals in Nokia had learned that *serendipity, lucky coincidences*, played an important role in network tie creation. This is a point where theories of self-organising systems and theories of social capital meet; I would contend that it is not mere serendipity or luck that the right people form the right kind of network ties; it is also a *consequence of self-organising in favourable conditions*. Gratton's perspective is the one of executive team and HR and what they can do about increasing the efficiency of organisations. She maintains that it is their role to create space and circumstances for serendipity to occur. I would definitely also add all other managers to the list of those seeking to create favourable conditions for serendipity to occur, and especially people themselves, who are active creative actors.

Briscoe & Hall (2006) stated that the changing shape evoked by the concept of "protean career" can be seen as an *adaptive response* to the volatile, uncertain, and

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18. Orlikowski's roots are in information systems study. She has, however, adopted views that emphasise the importance of practices through which new kinds of practice are generated. She has also adapted a view of world where not everything can be planned and managed. Gratton's and Ashkenas' roots are in human resources management studies, organisational perspective and in the tradition of improving and in making things more effective. They all have proposed frameworks that act as guidelines for improving the internal functioning of organisations.

ambiguous work environment. As such, protean careers could thus be seen as a self-organising response to the environmental changes. Even if the protean career concept is not built on the understanding of self-organising systems, it fits well in the overall picture.

In this study *boundaryless work* is defined as the kind of work emerging in a context where efficient boundary work is enabled and enhanced through various tools and practices. It does not mean that in such a context the boundaries are non-existent. Boundarylessness or boundedness is a continuum of conditions and features in different organisations. *The question concerns the extent to which people know how to navigate (articulate and engage with) and negotiate (redefine, reconstruct) the boundaries in a certain organisational context.* As a consequence of all the changes and developments described so far in this study, people's job roles, careers and expert work overall have likewise been compelled to change. They have become *more unbounded and amoeba-like*. In the previous sections, some effects of boundaryless work to these areas were explored. The dictionary definition of "boundaryless" is "boundless, unlimited or having no limit" (MOT dictionary, 2006). It should be noted that people's job roles, careers and expertise are areas where there is always an ultimate limit (for example mental capabilities, character, and life situation). *Boundaryless work refers to something that is more unbounded in a relative sense compared to work organisations in general. It refers to the kind of environment that requires and enables people to stretch and cross boundaries at least in their job roles and expertise.*

Boundaryless work as understood in this study does not necessarily emerge to a high degree in all kinds of organisational contexts. *Boundaryless type of work is likely to emerge in certain conditions and contexts.* It is likely to emerge in for-profit companies developing complex products when time to market, innovativeness and activation time of the whole network count. It is likely to emerge in organisations where the work, often knowledge work, is globally distributed. Such organisations are communication intensive and the work is often co-configuration type. Boundaryless work is not only sure to emerge more easily and to a higher degree in such contexts; *developing tools and practices to enable boundaryless work is an absolute must in order to remain competitive.* Boundaryless work is enabled by distributing development globally to a diverse pool of employees and providing excellent communication tools. Furthermore, a sense of common purpose, shared identity, trust and social capital are strong enablers of boundaryless work. Creating a fluid organisation with discretionary job design, agile methodologies and options for continuous learning and development are equally important in enabling boundaryless work.

Boundaryless work can be described with adjectives like dynamic, parallel, overlapping, shifting, flexible, agile, blurry, loose, porous and unpredictable compared to more traditional organisational contexts where features like well-defined, separate, consecutive, box-like, sequential, hierarchical, linear and predictable are more prevalent. New emerging boundaryless work contexts cannot be approached with the help

of traditional tools. The very nature of boundaryless work is about changes, shift, agility and unpredictability. For organisations boundaryless way of working can be a powerful enabling dynamo; however, it may turn into an inhibitor unless constantly kept viable (cf. Orlikowski, 2002). Dyer & Shafer (2003) report some experiments with agile tools in organisational contexts, for example in CapitalOne (a bank), Kriegel Inc. (a consultancy), and General Electric. Dyer & Ericksen (2005) note that experiments in self-organising create a number of human resources challenges that remain to be further studied.

From individual employees' perspective, boundaryless work demands the *willingness* and *adaptability* to stretch regarding discretionary job roles, "boundaryless careers" and flexible expertise. Boundaryless work is also rewarding to employees in providing interesting and challenging work, opportunities and learning in a volatile environment often at the cutting edge of the business concerned. In *Chapter 4* I will first present the theoretical approaches that will later be loosely used in describing the context in the case company and in data analysis.

#### 4. THEORETICAL APPROACHES TO STUDYING BOUNDARYLESS WORK

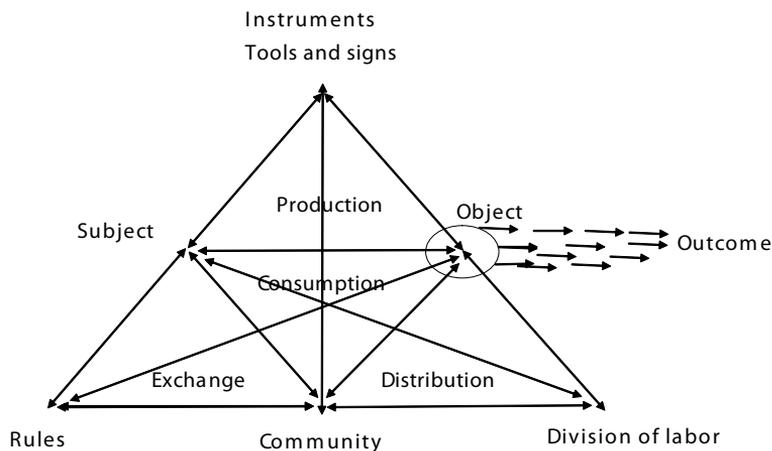
This chapter is concerned with the paradigmatic and theoretical frameworks that could support studying boundaryless work. In the course of the research process, where theoretical perspectives and data analysis intersect, I have selected three perspectives that best seem to support studying boundaryless work. As the building blocks of the proposal, I will use the *activity theoretical model*, the perspective of *self-organising systems* and the perspective of *network ties and social capital* (as means of integrating over boundaries). Basically the paradigmatic backgrounds of these theories are different but there are interfaces that touch upon each other. They all illuminate some angles of the phenomenon under study and the research results that they have produced lately seem to correspond well with how the reality revealed through this study. Even though my focus is on “boundaryless work” in an environment where the boundaries have presumably grown blurrier and more ephemeral, there are always some kinds of boundaries and structures that give an outline to the phenomena under study.

The first is the *activity theoretical frame* that has promoted the idea of developmental and transformative processes of activity systems with a common object of activity. It regards work contexts as dynamic, contradictory systems mediated by cultural artefacts. Human beings are seen as active creators of their activity contexts. Secondly, the perspective of *self-organising systems* that characterises organisations as complex, adaptive living systems “populated not by automatons, but by autonomous free agents who can and will, under right conditions, purposefully *improvise* to promote system survival” (Dyer & Ericksen, 2005). Creating conditions for self-organising is essential so that employees can act ad hoc and spontaneously and through improvisation direct the activity towards the common goal. The third perspective, the one of social capital, is more restricted and concentrates on the relationships and network ties between people as one primal constituent of organisations’ viability and also boundary work. In communication-intensive organisations (Blackler, 1995) extensive adaptive field of network ties (Gratton, 2005) is of paramount importance. These approaches will be loosely used as frames for analysing the data in this study.

## 4.1 ACTIVITY THEORETICAL FRAMEWORK

The activity theoretical model has been designed to investigate the *change and dynamics in networks of interconnected activity systems*. Activity theory has elaborated a conceptual apparatus for studying and mastering developmental work processes. It regards contexts as dynamic systems mediated by cultural artefacts. The activity context is seen as an internally contradictory formation, which implies and requires continuous transformation and development. Human beings are creators and re-constructors of their activity contexts; people are not mere subordinate parts of activity systems but have regained their role as active creators. Change and dynamics as such are moving objects; however, the activity theoretical model brings the perspective of clarity, vigour and consistency to the study of unstable phenomena. (Engeström, 1987, 2005b) The division of labour, rules, tools and signs in the activity theoretical model are clear, even regulated concepts. As apparatus they are suited to bringing visibility and systematics to complex work systems.

The basic thesis of the cultural historical activity theory is that man's active relation to his environment is culturally mediated, that is, the *form of man's activity is not biologically fixed but develops historically as a result of the cultural development*. Activity is mediated through cultural artefacts such as signs and tools, including both technical and psychological tools (Engeström, 1987, pp. 59-60).<sup>1</sup> Rules, communities and division of labour also mediate human actions (Leontjev, 1977, 1978). Engeström (1987) has developed, based on these general principles, a theory and model of an historically evolved societal system of object-oriented activity. An activity system (see *Figure 8*) illustrates the individual practitioner, the colleagues and co-workers of the workplace community, the conceptual practices and tools, and the shared objects of the activity as a unified dynamic whole (Ahonen & Virkkunen, 2005, p. 48).



**Figure 8.** The structure of human activity (adapted from Engeström, 1987, p. 78, Engeström, 2008, p. 257)

1. In connection with signs and tools Engeström refers to Vygotsky (1978).

The cultural-historical activity theory looks at artefacts and people as embedded in dynamic activity systems. The emergence of activity happens as a threefold formation. First, collective, object oriented *activity* is directed by *motives*. Secondly, *actions* are directed by *goals* that actors have in terms of objects and collective motives. Thirdly, *operations* are directed by the *circumstances* and *tools at hand*. (Engeström, 1987, pp. 66-67, Leontjev, 1978, pp. 63-67)<sup>2</sup>

There are four foundational sub-processes in every activity system: *production*, *consumption*, *distribution* and *exchange*. Animal activity has an adaptive nature; it does not have the capacity for making, utilizing and preserving tools systematically. The breakthrough to human cultural evolution and human form of activity happened when the “emerging mediators” became “unified determining factors”. At the same time what used to be ecological and natural became economic and historical. “What used to be adaptive activity is transformed into consumption and subordinate to the three dominant aspects of human activity – production, distribution and exchange (or communication).” The picture is not as simple as this: production is also consumption of individual’s abilities and of the means of production. Distribution is about distributing the outcome of production but also about distributing the instruments of production and the way members of the activity system are distributed to accomplish the production (division of labour). Exchange is about exchanging the outcomes of production but exchange is also found inside production in the form of communication, interaction and exchange of unfinished products between the producers. There is no activity without the component of *production*; production refers to both the whole activity system and to the “uppermost sub-triangle or action-type of that system”. In complex and differentiated societies a multitude of relatively independent activities exist, representing all the subtriangles. Still within any one activity system it is possible to find the same internal structure. (Engeström, 1987, pp. 74-80) For example, a project could be an example of the production sub-system, collective salary negotiations an example of the distribution sub-system and an idea sharing event an example of the exchange sub-system (Engeström, 2008).

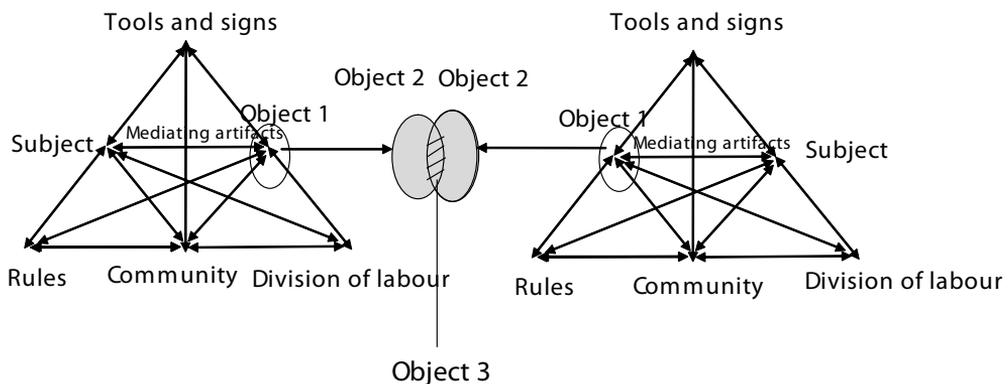
Engeström (2005b) takes a designer as an example: the designer is the subject of his/her design work, the initial object may be the idea, order or an assignment that triggers the design process. The initial object is always ambiguous and requires interpretation, negotiation and further conceptualization. The object is step-by-step iteratively developed guided by the personal sense of the designer, the cultural meaning and the common input from the community. The object goes through multiple transformations during the development phase until it stabilizes as a finished outcome, for example a prototype or even a commercial product. This process is only possible by means of mediating artefacts, both material tools and signs. The designer may use

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2. Engeström (2008) defines practice as a pattern of activity that consists of strings of actions (repetitive or unique). For him the notion of project is similar to the notion of practice because it refers to a longitudinal (unique, non-repetitive) string of actions.

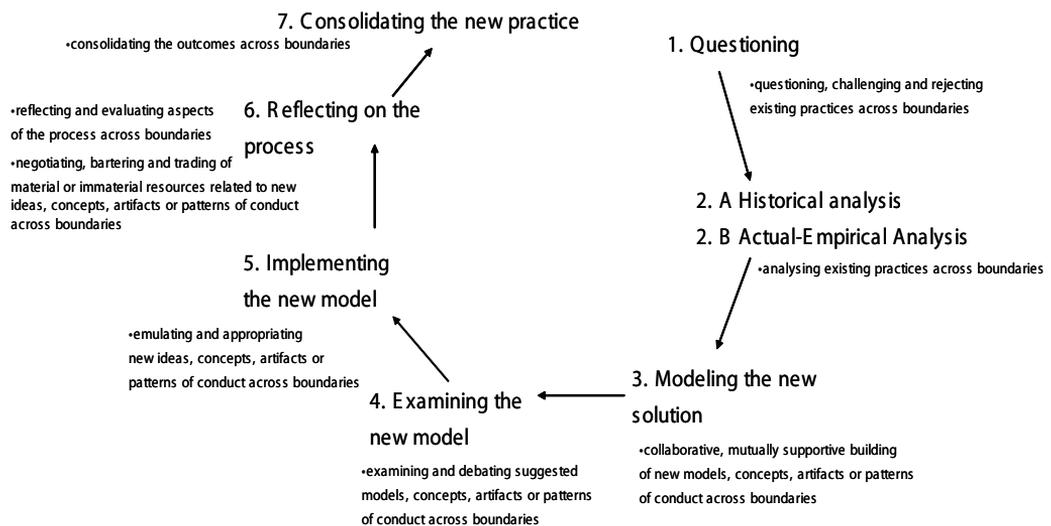
a pencil and paper, more often complex software systems, along with his/her internalized images and concepts that seem relevant for shaping the object. Sometimes the very process may generate entirely new mediating artefacts. This description can be regarded as depicting what can take place in the uppermost sub-triangle of the activity system depicted in *Figure 8*. The bottom part of the triangle draws attention to the work community of which the designer is a member, for instance a product development or R & D unit, be it an in-house design unit of a corporation or an independent design firm. The members of the community continuously negotiate their division of labour, including the distribution of rewards. (Engeström, 2005b)

An activity system is always a node in a complex network of independent activity systems that are connected to each other vertically and horizontally. The outcome of one activity is further used and elaborated in another activity, the actors are trained in educational activities and the tools used in the activity are elaborated in activities specialized in tool production and so forth. *The object of an historically developed activity system is continuously culturally constructed and reconstructed.* The historically evolving activity systems, the tools, concepts (used as both intellectual tools to organise the activity and as means for communicating), rules and principles of the division of labour mediate the construction of the given object into an object of activity. The object of an institutionalized activity system changes historically as, for example, the environmental conditions change. Moreover, the cultural concepts, tools and forms of cooperation that determine how the given object is constructed as an object of joint activity also change (Ahonen & Virkkunen, 2005, pp. 49-50). In the activity theoretical model, it is the objects of professional work and discourse that can keep distributed work and expertise together, coordinated and capable of acting in a synchronized way when needed. The *Figure 9* shows how two activity systems are negotiating about the same object of activity.



**Figure 9.** Two interacting activity systems as a minimum unit of analysis for expansive design (Engeström, 2001)

In activity theoretical thinking *contradictions* are sources of development and change. Contradictions are historically accumulated dynamic tensions between opposing forces in activity systems. (Engeström, 1999b, p. 178) The idea of *expansive learning* is important in the context of activity theory. Expansive learning processes are studied and facilitated by interventions in multi-organisational terrains of object oriented activity. “Such terrains are occupied by multiple activity systems which commonly do not collaborate very well although there are pressing societal needs for such a collaboration.” Engeström (2003, p. 154) talks about “divided terrains”. He claims that in such divided terrains, “expansive learning needs to take shape as re-negotiation and reorganisation of collaborative relations and practices between and within the activity systems involved”. He admits that the theory of expansive learning has mostly been used to investigate learning that transforms activity within single activity systems. He also admits that there is a need to complement the model with movement along the ever more important horizontal dimension, i.e. “the sideways movement between the various activity systems and actors involved” (p. 155). *Figure 10* (Engeström, 2001, 2003, pp. 156-157) shows the ideal-typical cycle of expansive learning specifically in horizontal boundary crossing situations.



**Figure 10.** Expansive learning actions as boundary-crossing actions (Engeström, 2001, 2003, pp. 156-157)

Expansive learning and in some cases transformations can take place in the *zone of proximal development of activity*. It is “the distance between the present everyday actions of the individuals and the historically new form of societal activity that can be col-

lectively generated as a solution to the double bind potentially embedded in everyday actions” (Engeström, 1987, p. 174).

Engeström (1987) calls “*learning activity*” an historical possibility for a new form of learning. In learning activity, *practitioners distance themselves temporarily from their daily work and indulge in collaborative inquiry and developmental effort to investigate and elaborate the system of their practice*. Joint reflection makes boundary crossings possible in Change Laboratory sessions (see e.g. Kerosuo, 2006). Ahonen & Virkkunen (2005) maintain that theoretical models and methodologies are needed in this kind of learning activity and that work-related learning activity does not exist anywhere as an institutionalized social practice. They argue that it is a theoretical hypothesis of an historically evolving possibility of a new kind of activity and new kind of learning that exists in modern production, a need for work-related learning activity. They evince Total Quality Management (TQM) and the Competence Laboratory based on activity theoretical and expansive learning models and methodologies as possible examples. Ahonen & Virkkunen (2005), however, criticise the TQM type of continuous process improvement for being confined to developing only the existing business model, and not developing and possibly transforming the business model itself.<sup>3</sup> A team uses the Competence Laboratory with the help of a researcher, who provokes learning actions by setting tasks and providing conceptual tools for the team to construct new knowledge about their work. In their example of the use of the Competence Laboratory in the dialogue between management and the operative teams the aim was to “institutionalize the dialogue and gradually build one aspect of the needed social capital, the vertical link” (Ahonen & Virkkunen, 2005, pp. 53-83). So-called developmental work research with its interventionist methodology is a relatively recent application of activity theory. (see also Engeström, 1995)

The vein of thought initiated by Engeström has generated an extensive set of research results in the field of boundary work and boundary crossings. The findings are related to how people collaborate (e.g. flexible knotworking); how people negotiate and have dialogue over boundaries (e.g. Hasu, 2001, Miettinen, 2005) and how learning over boundaries takes place (e.g. Engeström, 2003, Kerosuo, 2006). As such questioning and transforming boundaries of activity systems is a demanding learning challenge (Kerosuo, 2006, p. 110). It requires collective effort and negotiation, appropriate tools and sometimes interventionist methods. In this study I have not adopted purely activity theoretical approach. Yet, the activity system model is used to describe contextual factors brought forward by the research informants.

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3. *The idea behind Ahonen’s & Virkkunen’s (2005) claim is based on Tapscott (1996 in Ahonen and Virkkunen, 2005, pp. 46-47), who argues that, in the new economy, the starting point in analysing the operative work should not be the business process (as for example in TQM) but rather the business model, that is “a high-level abstraction of that the business is and could be about”.*

## 4.2 SELF-ORGANISING SYSTEMS

One of the most recent perspectives on studying organisations is self-organising systems. Recent years have witnessed an increasing interest in the study of *chaos*<sup>4</sup> and the science of *complexity* and their applications in various areas including business and organisational sciences. *When such insights are applied to real-world systems, e.g. to business organisations, they shed light on dynamic processes of adaptation and survival.* Seen through the lenses of chaos and complexity theories, business organisations come to be regarded as *dynamic open complex adaptive systems* (DOCAS), composed of inter-related parts, perhaps attaining a sustainable advantage, and in this whole process generating certain emergent phenomena.<sup>5</sup> Concepts such as self-organising phase transitions, co-evolutionary adaptation, and movements toward an optimal location at a performance peak on a changing fitness landscape (co-adaptation) spring to mind as ways of characterizing business phenomena like synergy in mergers and acquisitions or successful product innovations. (Holbrook, 2003)

The theory of autopoiesis – self-production – offers one perspective on changing and transforming organisational life. The theory was originally introduced by Maturana and Varela (1980, 1988). Living systems are systems that maintain themselves by producing components and organisation, that is, the system itself (Maturana & Varela, 1980, p. 79, Di Paolo, 2005, p. 434). *Structural couplings* are “encounters with the environment resulting in *perturbations* to the autopoietic dynamics without loss of organization”. The concept of structural coupling is the basis of all that autopoietic theory has to say about cognition. By nature structural couplings are *conservative*, not *improving* processes. (Di Paolo, 2005, pp. 436-437, Maturana, 1975 in Di Paolo, 2005, Beer, 2004) In this study, this biological view of self-organising; autopoiesis, or self-regulation, self-correction is not built upon. In my ontological understanding human consciousness and purpose-orientation need to be taken into account when considering communities consisting of human beings. They cannot be reduced to the mere automatic search for adaptation, equilibrium and the survival of an organism.<sup>6</sup> Cognition requires “a natural centre of activity in the world as well as a natural

4. *Chaos refers to the phenomenon wherein systems composed of inter-related parts or interdependent agents – each of which follows simple, regular rules of behaviour – generate outcomes that reflect these interactions and feedback effects in ways that are nonlinear and unpredictable. Because of nonlinearities that reflect interactions and feedback effects, tiny changes in inputs can make enormous differences in outputs. This concerns the sensitive dependence on initial conditions or the so-called butterfly effect.* (Holbrook, 2003, p. i)

5. See Schneider & Somers (2006) for a summary of complexity theory origins.

6. *The theory of Maturana & Varela (1980, 1988) was originally defined for the contexts of biological systems. In the literature on autopoietic systems, the question of the nature of social systems has received considerable attention and also created a great deal of confusion. Originally Maturana's and Varela's questions were about the nature of autonomous living units such as cells and multicellular organisms. In their view living systems are systems that maintain themselves by producing components and organisation, that is, the system itself (see Maturana & Varela, 1980, p. 79, Di Paolo, 2005, p. 434). Extending the theory of autopoiesis to social systems is problematic because social systems are not biological organisms (see Maula, 1999 for one application of autopoiesis to organisations). Tuomi (1999, p. 192) claims that there are basically two ways to apply autopoietic theory to social systems. Firstly, it is possible to argue that societies, properly conceptualized, are autopoietic systems. This is the view selected by Luhmann (1989), who deals with autopoietic social systems. Secondly, some fundamental aspects of societies may be understood in the light of the theory*

perspective to it". Structural coupling alone cannot ground the concept of activity and autopoiesis alone cannot ground the concept of perspective (Di Paolo, 2005, p. 443). Thus, I will use the terms *self-organising* or *self-steering* instead of self-regulation, self-correction or autopoiesis. (See e.g. Järvinen, 2004, pp. 132-134 about the classification of causal systems<sup>7</sup>)

In my view, some of the fundamental aspects of successful boundaryless work can be understood in light of self-organising. Conversely, successful boundaryless work requires certain features of self-organising. The boundaries in the organisation need to be flexible enough to allow self-organising to take place. Thus, the perspective of *self-organising systems* brings into the picture organisations that are well tuned to the outside world, and are thus better at uncovering and exploring potential opportunities and threats. In boundaryless contexts, the principle of self-organising brings the *aspect of freedom* into the picture. When the traditional hierarchies have eroded, *it is the people in self-organising systems who take charge of the agile coordination in the context of boundaryless work*. The vocabulary, and thus the mental models evoked and used in the studies arising from chaos and complexity theories are very different from the traditional linear understanding that has for so long been in active use and also the basis for organising work. Hatch (1998, p. 557) describes 21st century organisations using words like *flexible, adaptable, and responsive to the environment, loose boundaries and minimal hierarchy*. Mirvis (1998) describes the dialectical emergence in organisations in which "the new is latent in the old and seems to emerge naturally through the creative resolution of contrary forces".

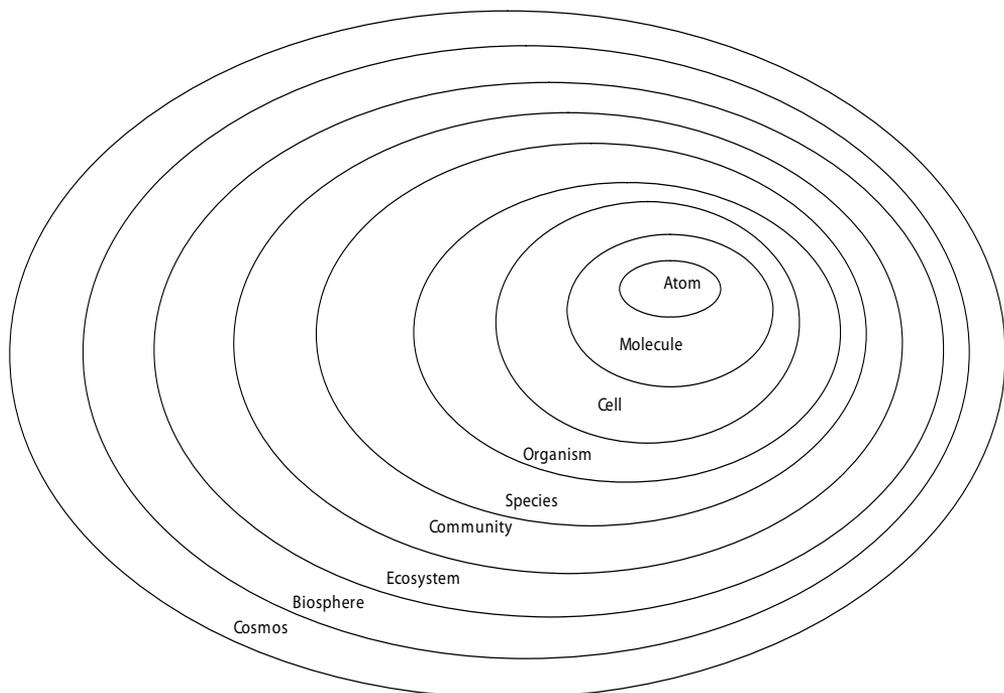
Indeed, when looking at the overall organisation through the lenses of chaos and complexity theories, business organisations come to be regarded as dynamic, open, complex, adaptive systems that are composed of inter-related parts interacting with its environment, subject to resulting feedback effects, evolving over time adaptively to fit the pressures imposed on it. In DOCAS (dynamic, open, complex, adaptive system) there are hierarchically nested levels. *Figure 11* features an example of hierarchically nested levels of a dynamic open complex adaptive system. The systems, networks, or holistic combinations can occur at any level of hierarchical organisation within an overall nested structure. At any given level of organisation, via the nesting of systems, a DOCAS will be composed of lower-level micro networks and will, in turn be em-

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*of autopoiesis. Maturana and Varela (1980, 1988) have opted for this view. Tuomi's (1999, p. 413) own conclusion and actually one of the major results of his dissertation is that the basic thesis of the autopoietic theory can not be right: living systems can not be strictly autopoietic. This also leads him to a question whether social systems can really be autopoietic. To overcome this problem he developed the idea of "almost autopoietic system" and defined a social system as a "self-maintaining meaning processing system". In my ontological understanding the concept of "almost autopoietic systems" cannot bridge the gap between the biological sense of finding equilibrium and human consciousness and purpose-orientation. Di Paolo (2005) in his article examines the mediacy between organism and environment, autopoiesis, adaptivity, sensemaking and cognition (see also Weber & Varela, 2002).*

7. *Systems with a full causal recursion can be divided into self-steering systems, self-regulating systems, and systems steerable from outside and disintegrating systems. Goal-oriented nature of thought process is typical of human consciousness. The causal process that takes place in human mind in an alert state is the self-steering process, whereas living organisms are self-regulating systems. (Järvinen, 2003, pp. 132-134)*

bedded within a higher-level macrostructure. The problem is to relate these multiple nested and interwoven systems so that, via modifications in the lower-level micro networks (the parts), the DOCAS (the whole) evolves to achieve a better fit with the higher-level macrostructure (the surrounding context) – which is in turn composed of other DOCAS-level networks giving rise to processes of co-evolutions. (Holbrook, 2003, p. 22) In Holbrook’s exposition of the nested levels, the collision of biology and understanding human being as a conscious and intelligent is again visible. The term “adaptive” is derived from biology, and thus not easily attached to human beings who are capable of improvising in order to move towards a certain target. Biological phenomena with their adaptive orientation towards equilibrium and survival are more predictable than human beings who, with their own consciousness, are more unpredictable. (The direction of the organisation or certain parts of it may be something other than equilibrium and survival if human beings so choose.) The nested levels in Holbrook’s picture depict well the interrelatedness and nested nature of various parts of the organisation (for Holbrook organism). However, even within this picture the biological concepts of atom, molecule, cell, organism, species, ecosystem, biosphere and cosmos are mixed with the concept of community that is a creation of human beings with the above described features of object-orientation. Thus, for me, human beings can choose how they behave and act; the behaviour and practices based on



**Figure 11.** Hierarchically nested levels in DOCAS (dynamic, open, complex, adaptive system) (Holbrook, 2003, p. 23)

improvisation is not thus involuntary, automatic behaviour but rather a consciously selected way to behave and act.<sup>8</sup>

There are many claims concerning the superiority of self-organising systems when it comes to turbulent and chaotic business companies. However, as noted earlier, attempts to organise work based on these principles are still rare (cf. Dyer & Ericksen, 2005). For example, Foster & Kaplan (2001) claim that in turbulent and unpredictable environments, self-organising systems are superior to top-down organisations at allocating resources to their most productive uses. They are supposedly also relatively unemotional and apolitical about abandoning legacy commitments that no longer make sense.

Barrett (1998) guides managers in constantly evolving complex adaptive systems to escape all limits of their own patterned routines, to embrace errors and turn them into opportunities, to establish minimal structures that permit maximum flexibility, to achieve a state of dynamic synchronization, to combine materials into retrospective sense-making and finally to play both leading and supportive roles. Barrett's guidance is for contexts where a "group of diverse specialists live in a chaotic turbulent environment; making fast, irreversible decisions; highly interdependent on one another to interpret equivocal information". They "fabricate and invent novel responses without a pre-scripted plan and without certainty of outcomes; discovering the future that their action creates as it unfolds". Weick (1998) uses the word *improvisation* about "order and control that are breached *extemporaneously* while the new order is being created." His conjecture is that improvisation may indeed be part of the infrastructure present in all organisations. Crossan (1998) ties the role of improvisation directly to the nature of chaos: "The value of improvisation is in the potential it holds to enhance the quality of spontaneous action... Improvisation is one of the few concepts and tools we have to develop to be innovative in the moment – a key requirement of organizations in the twenty-first century". For Crossan (1998) improvisation is more than a metaphor. It is an orientation and a technique to enhance the strategic renewal of an organisation. It is an extension of more traditional skills.

In self-organising systems "quick and novel out-of-the-box responses are more fruitful than slower and more conventional in-the box approaches" (Holbrook, 2003, p. 7) Based on Chelaniu et al. (2002, p. 146) improvisation is a more suitable response to rapidly changing environments than planning. "In uncertain, complex and rapidly changing environments detailed planning may be a waste of time and resources... dangerous... perilous." (Chelaniu et al., 2002, p. 146) I agree with Chelaniu to a certain

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8. See for activity theoretical explanation for the difference between the adaptation in biological sense and human activity in chapter 4.1. Animal activity has an adaptive nature; it does not have the capacity for making, utilizing and preserving tools systematically. The breakthrough to human cultural evolution and human form of activity happened when the "emerging mediators" became "unified determining factors". At the same time what used to be ecological and natural became economic and historical. "What used to be adaptive activity is transformed into consumption and subordinate to the three dominant aspects of human activity – production, distribution and exchange (or communication)." (Engeström, 1987, pp. 74-80)

degree but also concede the importance of high-level plans and a certain level of clarity on the organizational goals. Plans are needed for coordination but there still needs to be a capability to change, adapt and renew plans based on the need and situation. What is needed is the continuous alignment of effort. In Orlikowski's (2002) case study, development work in distributed environment calls for efficient and continually ongoing coordination. In her case the alignment was done via consistent use of proprietary project management models and tools. Too much planning might discourage improvisation. Balancing between planning and improvisation is indeed about aligning effort.

Moorman & Miner (1998, pp. 1-5) define improvisation in product development as a "convergence of composition and execution where planning and performance or *design and implementation occur simultaneously*. It is about a *collective system of interaction that creates and enacts the scene simultaneously*... The joint activities of individual people create a *collective system of improvisational action*. The occurrence and effectiveness of such improvisation are likely to reflect the impact of environmental turbulence and timely information flows concerning internal or external surprises." This view is related to the parallel activation of the whole network to an efficient "concerted effort" (cf. Docherty et al. 2002, p. 6).

The *emergence* of self-organising systems is often observed in environments characterized by *crisis*: in hospital emergency rooms, among electricity teams after a hurricane or ice storm, and in the military units cut off from their normal chains of command (Pascale et al., 2000, pp. 135-147).<sup>9</sup> Dyer & Ericksen (2005) state that very similar crisis situation behaviours should take place in agile organisations. In such situations, the people involved are expected to take *personal responsibility for determining and deciding what needs to be done and how*. Their behaviours may include *improvising solutions* to remove unanticipated obstacles, obtaining necessary information and resources, *focusing "furiously" on the task at hand*, and *disengaging when their contributions are no longer required*. Further their behaviours may include spontaneous collaboration with other people who happen to be needed to complete the task or to find some relevant information.<sup>10</sup> This concurs with Orlikowski's (2002) collective recreation of knowing in practice. It is equally compatible with Döös et al.'s (2005) results from an R & D company also described as a "loose state", where the engineers were trying to "catch" the latest situation and to "collect bits and pieces of information and relations between them." Even Blackler (1995), when introducing his typology of organisations based on various types of knowledge, maintained that "ad hococracy" is a feature of communication-intensive organisations. Ad hococracy as a way of work-

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9. More recently the U.S. army has started to use this approach as a routine way of operating in certain combat conditions. (Pascale et al., 2000, p. 135-147). See also Sonnenwald & Pierce (2000) for situational awareness in battle situations.

10. One needs to add to Dyer & Ericksen's reasoning that the people involved need to have attained a certain level of maturity to be able to act in a self-organising manner.

ing is close to the mental models evoked by the improvisation and spontaneity of self-organising systems.<sup>11</sup>

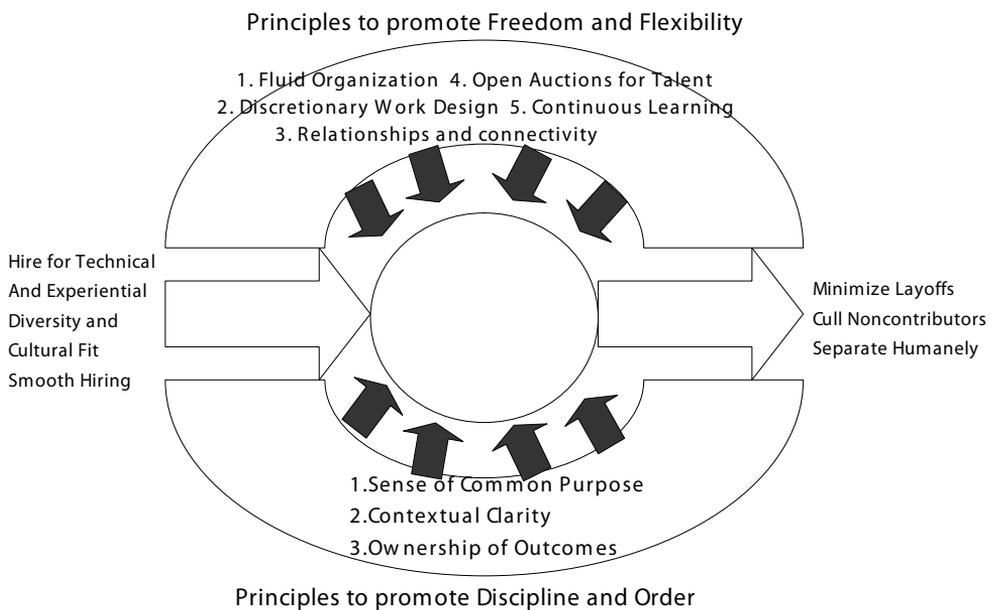
I will next present Dyer's and Ericksen's (2005) framework and principles for "managing" human resources in an organisation based on self-organising. Their idea is to present a model for human resource scalability that is based on the idea of self-organising system. (In the context of self-organising systems the verb "manage" should be understood as creating conditions for the right kind of behaviour.) They base their reasoning on the efficiency and flexibility of self-organising systems. The basic idea is in creating *favourable conditions* that would allow discretionary work design where flexible job roles and flexible boundary crossings to new job roles are enabled. An optimal system seeks to promote both freedom and flexibility and also enough discipline and order to keep the system viable. The goal is to create limitless opportunities for employee initiative, at the same time directing and restraining the chaos that can result from the pursuit of boundless opportunities. Dyer's and Ericksen's (2005) model (see *Figure 12*) is one of the rare attempts to apply the principles of self-organising to how to organise work in a firm. They themselves call their attempt "modest, tentative and somewhat ephemeral" and call for more real-life experimentation as well as research into self-organising systems. This model seems also to contain many features of a learning organisation (cf. Argyris, 1999, Argyris & Schön, 1978). Kontoghiorghes & al.'s (2005) study suggests that organisational designs based on the principles of connectivity, redundancy, and self-organisation facilitate innovation and rapid change adaptation.

For Dyer & Ericksen (2005, p. 184) *optimizing internal fluidity* is the main issue in the human resources management in self-organising systems. Internal fluidity refers to the *ease and speed with which the continuous self-allocation of existing talent and effort occurs*. Self-organising systems "cannot be managed or directed, only nudged and disturbed". This type of *emergence* happens best when the system is operating "*at the edge of chaos*". This concept needs to be perceived as a *state attained when forces favouring initiative, spontaneity, and improvisation are delicately but paradoxically balanced with forces favouring focus and direction*. The task of management is to provide and continuously revise a bare minimum of guiding principles that both promote freedom and flexibility and at the same time provide enough discipline and order to keep the system from spinning out of control. Thus, self-organising is not automatic, non-voluntary behaviour; there are always human beings with their consciousness behind the nudging, disturbing and improvising. Tharumarajah (2003) is aligned with Dyer & Ericksen's thinking when saying that "if we are to design enterprises that are highly adaptable and self-organising, consideration should be given to the *design that brings out such behaviours*." Doz & Kosonen (2008a) look at the same thing from the

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11. Duxya & Crossan (2005) remind that improvisation does not always lead to positive performance. They also remind that improvisation is spontaneous but spontaneity tends to be overemphasized; improvisation relies on rules and routines pre-established in the organisation.

strategic and managerial perspective: “fast decisions in complex environments call for *rapid resource deployment* for their implementation. Since choices and commitments cannot be decided and planned well ahead of time, *reactivity is needed: resource commitments need to be sudden and vigorous*” (p. 29). They further state that resources like funding and investments are much easier to reallocate compared to for example competencies that actually are sticky both in location (cannot be moved easily) and in time (cannot be grown or redeployed fast) (pp. 31-32).<sup>12</sup>



**Figure 12.** Context for fostering human resource scalability in an organisation based on self-organising (Dyer & Ericksen, 2005, p. 185)

The first of Dyer’s and Ericksen’s guiding principles is based on the idea that the *fluid organisation is defined according to what everyone in the organisation does rather than a place where they all do it*. Hierarchies should be minimized and instead leadership should be forced to emerge when and where it is needed. The mental model should be the one of *emergence*, where employees constantly create, pursue and abandon new ventures that may be products, services or business models. Teams and “temporary alliances” (p. 185) should be constantly organised and reorganised. All temptations to draw static organisation charts should be resisted.

12. Doz & Kosonen’s (2008a) tools for *people mobility* are: establishing measurable targets for job rotation, using systematic leadership reviews, providing an open job market where “jobs can find you”, providing visibility for individual career development opportunities, considering moving teams, not just individuals and paying attention to fairness and track record in personnel evaluation (*ibid* pp. 107-111).

Secondly, in a self-organising company, the *work design* should be *discretionary* as already explained in connection with job roles. Thirdly, based on the *relationships and connectivity* principle, all barriers to free and open communication should be removed. The formation and reformation of “in-groups” and “fringe” or unofficial groups should be encouraged. In the vocabulary of social capital the former would contain bonding ties and the latter bridging ties. Moreover, physical and conceptual proximity should be mixed up so as to avoid “coagulation”, i.e. teams settling down and getting stable. According to Gratton (2005) the reconfigurability and modularity of teams at Nokia had eased the mixing up of teams and reconfiguring the organization anew. Ericksen & Dyer (2005) add that workplaces should be designed to be adaptable and expansive with a variety of spaces for informal social interactions; modular buildings, open offices, nomadic workstations etc. All electronic linkages should also be enhanced with advanced distributive information systems.

Fourthly, all *needs for talent should be openly posted* so that teams emerge, evolve, and die based on requisite competencies. All barriers to self-nominations and mobility should be minimized; there should be no restrictions on who can apply for what, nor limitations on buying and bidding related to terms and condition negotiations. *Open discussions on career opportunities and aspirations* should be encouraged. All clustering, i.e. tendency for the same people continuously to want to work together should be discouraged.

Finally, *relentless drive for development and learning* also contains *periods of incompetence*. In dynamic environments sticking to the old equals falling behind. For Dyer & Ericksen *serial incompetence* is predominantly caused by people themselves looking for new horizons and opportunities. Errors should be treated as learning opportunities. Team memberships should be shuffled in long-standing ventures. “Communities of practice”<sup>13</sup> should be established to link those with common interests so that they can help each other to keep up with the pace of development. In this context one can ask whether in an organisation based on self-organising, relevant communities also emerge by the initiative of creative actors, not by management establishment. In the spirit of this study it should actually be transient socialization and combination *bas*, dynamic interaction spaces where new knowledge emerges (Nonaka & Konno, 1998) and that are created in a self-organising way.

A self-organising system cannot, however, function without a proper amount of discipline and order. The first guiding principle to promote *discipline and order* is the *sense of common purpose* that should be deeply embedded in the organisation. The *core values* of the organisation should also be deeply embedded. A small set of *common performance metrics* should be in place and rewards should be partly based on them. A sense of common purpose is a powerful tool in creating a common identity among the employees and gives impetus to a strong natural pull to act in the best interests of the entire enterprise.

13. Note that Dyer & Ericksen (2005) use the concept of “community of practice” even if earlier in this study it was stated that CoPs are rather bounded and the knowledge created in them “sticky” and that it does not thus optimally suit the context of this study. The word “team” also basically refers to a bounded entity in an organisation. (cf. Tuomi, 1999, p. 269)

The second guiding principle, *contextual clarity*, is about understanding the competitive realities. People should understand how and why optimal human resources scalability matters. (There should also be systematic performance measures for human resources scalability.) Contextual clarity makes it possible for employees to make wise choices when deciding where to devote their attention and efforts.

Thirdly, people should have *personal accountability* as well as *ownership over the outcomes* of their assignments. Along with every major change the *commitment* of all parties should be authentically negotiated and re-negotiated. Ownership of outcomes helps to avoid situations “where everybody is responsible for everything and no one is responsible for anything” (p. 187). Dyer and Ericksen conclude that “self-organizing systems put accountability squarely on each individual” recognizing, however, that *trust* is the essential bond that makes self-organising possible in the first place.

In Dyer’s and Ericksen’s “model” numerical flexibility is an integral component of human resource scalability. Adding and releasing people should be done in a way that disrupts the internal fluidity of the organisation only minimally. On the one hand, newcomers are needed to avoid the tendency towards groupthink. On the other hand, too much “churn” undermines the mutual understanding and trust that allows internal fluidity. When hiring people, technical and experiential diversity should be looked for. Applicants comfortable with ambiguity and change should be selected. Layoffs should be minimized to avoid “tearing the social fabric” and bringing in mistrust. All involuntary separations should be conducted with fairness and respect to avoid trauma and “risk aversion” among those who remain. Non-contributors should be systematically “culled” to keep the damage of misfits to the self-organising system at a minimum. Introducing some “churn” in non-growth situations is encouraged.

Dyer & Ericksen (2005) make an attempt to study the challenges of agile organisations have in their constant pursuit of marketplace agility requiring an “ability to make rapid and seamless transitions from one configuration of human resources to another, and then another and another, ad infinitum” (p. 184). They call this challenge *human resource scalability*, by which they mean an “organisation’s capacity to get the right types of people to the right places at the right time” (p. 183). For them human resource scalability means both *internal fluidity* and *numerical flexibility*. The interesting thing is that Dyer and Ericksen attempt to take the self-organising systems’ perspective as their background paradigm. Their objective is to contribute to organisations’ quest for practices and ways of organising that bring competitive advantage over their competitors. In this sense the objective is exactly the same as Gratton’s (2005).

Dyer and Ericksen (2005) claim that they know no organisation that has succeeded in finding any kind of solution to the human resource scalability challenge and thus “there is a potential to be a source of competitive advantage for those that are first to figure it out” (p. 184). According to Gratton, however, Nokia had found elements of organisational re-configurability and modularity to rise to the challenge.

In this study I have emphasised the views that bring forward the idea of adapting to change, fluidity and improvisation, self-organising. There are also studies that have taken a more static view of the self-organising in sticking to the idea of autopoiesis as an inbuilt tendency to maintain the structure of a system. The German sociologist Niklas Luhmann (1989) has written about the *communication of different social systems that have evolved over time*. He has adopted the view that social systems are autopoietic in the real meaning of the word and develops the idea of how social systems can be conceptualized in terms of autopoietic social systems. The basic building block of Luhmann's theory is the concept of social system; each social system has got a distinctive *identity* that is constantly reproduced in its *communication*. The interior of the social system is a zone of reduced complexity. *Social systems are bounded and can be separated from other systems; these systems have their own identity and code of communication.*<sup>14</sup>

According to Luhmann, along with societal development, "systems" like law, economy, science, politics, religion, and education have differentiated so that we now have well *established systems that each communicate using their own language, which is based on the specific code they use – and which outsiders cannot competently share*. Luhmann (1989, p. 125) calls these "function systems". Social systems can be identified as constituting themselves self-referentially through the development of their own separated "symbolically generalized media of communication" for example money/economy, power/politics, love/family, truth/science. In this vein of thinking only the law system and its sub-systems can handle the binary code legal/illegal competently. "Function systems" structure their communication through binary codes that divide the world into two values (for example true/false, legal/illegal, power/lack of power). (Luhmann, 1989, pp. 36-41, Luhmann, 1990, p. 176, Sevänen, 2001) A social system emerges when communication develops from communication (Luhmann, 2006).<sup>15</sup> The *function system of science* is focused on the "consciousness of selection and technology". The selection is done in reference to still-indeterminate recombination of possibilities and technology as already determinate and realizable." Other functions systems like law or economy have a task of sorting out what is usable and what is not. Only a fraction of what is scientifically possible is ever realised. Most is not feasible economically, legally or politically. (ibid, p. 83)<sup>16</sup>

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14. Luhmann sees that the concept of action does not meet the necessary requirements for functioning as a system producing type of operation. For him the concept of action presupposes an agent to whom the action can be ascribed. Further, in his view, the concept of action cannot easily be tailored specifically for sociality (Luhmann, 2006).

15. Systems reproduce themselves via communication. A system has to be capable of controlling its own conditions of connectivity. It does not, however, mean individuals with their psychic structure, although it may be true for them as well. (Luhmann, 2006)

16. Baecker (2006) suggest that firms could also be conceptualised as social systems: "the firm is a social system, which consists of people who forgo certain interests (to spend their day as they would prefer, for instance) in the interests of the organization and who accept rules of behaviour that would surprise anyone observing such behaviour outside the organization... Any enterprise, firm or company has to find a way to organize itself, which simply means being able to communicate in its own way of work with respect to the identity of the firm and the social and natural environment."

It needs to be borne in mind that change in social systems is only possible by communication. Social systems can adapt to their environment through structural changes (Luhmann, 1995, p. 350-351). Initially Luhmann pointed out that even if communication across system-boundaries is impossible in the strict sense of sharing the code, it is possible for systems to *co-evolve*, *adapt* and to *resonate* in each other (Luhmann, 1989, pp. 11-21, Luhmann, 1990, p. 198). Luhmann's theory explains the evolution of meaning processing systems towards increasingly complex forms, the inherent tensions within social systems and mechanisms that release these tensions. Later, social systems and their relations have increasingly been studied in terms of structural couplings and perturbations (see e.g. Di Paolo, 2005).

*In Luhmann's theory of social systems, organisations are understood as a specific kind of social system.* According to Luhmann, each of these phenomena can be considered as a *nexus of communications referring to each other and differentiating themselves from the environment*. It is important not to confuse Luhmann's concept of the social system with other concepts of a system, for example technical systems. A social system in Luhmann's sense is neither a static relation of given elements, nor primarily a structural concept (though social systems do also have structures). Social systems are neither mechanical nor deterministic, not do they basically tend towards stability, adaptation or a specific direction in whatever manner). They spend their lives on autopoietically producing elements from elements. (Becker & Haunschild, 2003) In Becker's and Haunschild's view, Luhmann's concept of organisation as a specific kind of social system must be understood as a reaction to the tradition of classical organisational theories where (e.g. Weber, 1922 in Becker and Haunschild, 2003) organisations were conceived of as rational entities, serving a final organisational purpose, provided by a division of labour practised within a hierarchical structure, with means-end relations parallel to lines of authority. In Becker's and Haunschild's (2003) view this idealistic concept of organisation has been found more and more inadequate due to man's limited rationality, the anarchical aspects of organisations, power games, difficulties in ensuring the acceptance of decisions and cultural heterogeneity.<sup>17</sup> Following Luhmann's (1989) claim about system boundaries like law, economy, science and education being closed in the strict sense of sharing a code due to their heavily divergent communication codes was already mentioned above. How do the different "systems" then co-evolve and resonate in each other if they come in contact with each other. One theoretical tool is the so-called *structural coupling*. Structural coupling is a social system's encounter with the environment resulting in perturbations in the dynamics of the system, without loss of organization though. (Di Paolo, 2005, pp. 436-437) The structural couplings between social systems and tracks of perturbation can be observed system-to-system or system-to-environment. When the perturbation stabilizes it can lead to

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17. Becker and Haunschild's (2002) references are as follows: *man's limited rationality*: Simon (1945), *anarchical aspects of organisation* (Cohen et al., 1972), *difficulties in ensuring the acceptance of decisions*: Brunsson (1982) and *cultural heterogeneity*: Sackmann (1992).

new options for further communication. The degree of complexity and intensity of structural coupling varies.

In this study I have used Luhmann's concept, social system, in the sense of a community having its own identity and code of communication. It has been relevant especially when identifying on the one hand the social system of R & D/engineering and on the other hand the R & D boundary roles. I do not, however, subscribe to the biological understanding of social systems. Luhmann's focus is basically on the *higher level systems* and structures where the individual people with the characteristics of consciousness are not really paid attention to. In Luhmann's theory human beings are positioned outside the social system (part of the environment) and social systems are autopoietically closed (and rely on resources from their environment). Structural coupling takes place when the environment (including people) influences the social system. The relationship of human beings to social systems is that of *interpenetration*. Interpenetration is reciprocal; two "systems enable each other by introducing their own already-constituted complexity into each other." (Luhmann, 1995, p. 210-254) Persons cannot emerge and continue to exist without social systems, nor can social systems without persons. "Psychic and social systems have evolved together" (ibid, p. 59). In this study the significance of individual people, their purpose-orientation and improvisation for a cause, is more emphasised. The phenomena related to boundaries and boundaryless work cannot be captured purely with the study of high-level organisational units and systems. The human being with his/her consciousness challenges the very predictability of purely biological autopoietic systems searching for equilibrium and survival. Next, I will move on to consider how integration over boundaries takes place over the network ties and using so-called social capital.

### 4.3 INTEGRATING OVER BOUNDARIES: NETWORK TIES AND SOCIAL CAPITAL

From the perspective of this study the interest lies in integrating over boundaries through network ties. Network ties and the related concept, social capital, have recently been in the focus of research. Researchers in economics have shown increasingly interest in the newly important forms of capital, namely *intellectual capital*, *human capital* and *social capital*. A growing number of sociologists, political scientists and organisational theorists have found social capital a fruitful starting point for their studies. Social capital is extremely interesting and at the same time challenging as it deals with the *value of networks and network ties*. Gratton (2005) maintains that her research shows that in the high-performing organisations, one of which was the case company of this study, the executive team believed that the "capacity to work cooperatively across borders" was one key to the success of their company. Social capital is to an extent related to

the expanded scope and need for collaboration and network ties in communication intensive organisations (cf. Blackler, 1995). Network ties, and therefore social capital, are an important means to succeed in boundary work. The ultimate aim of social capital studies is to improve organisational effectiveness. Through the lenses of social capital, organisations are seen as complex networks of acquaintances and friendships, some of which bridge or cross boundaries across groups. Thus, the interest lies in the *type and extent of these positive, cooperative relationships* (Gratton, 2005) *that enable horizontal boundary crossings.*

Social capital is also related to the parallel activation of the whole system; the character of network ties, conditions under which they form and their effects and role between people is investigated.<sup>18</sup> Adler & Kwon (2004) criticise social capital for being a typical umbrella concept that is used to gather together very different phenomena. Adler & Kwon (2002) criticise too optimistic usage of the concept of social capital. In their extensive review of social capital studies they refer to numerous studies that have found social capital to be a powerful explanatory factor for actors' success in a number of work-related arenas. Their list starts with social capital influencing career success and executive compensation. Social capital helps workers find jobs and creates a richer pool for firms. It facilitates inter-unit resource exchange and product innovation, the creation of intellectual capital, and cross-functional team effectiveness. Social capital reduces turnover rates and organisational dissolution rates. It facilitates entrepreneurship and the formation of start-up companies. Finally, it strengthens supplier relations, regional production networks and inter-firm learning.

Engeström & Ahonen (2005, p. i) call social capital a “curious hybrid concept that cannot be easily placed within the confines of any single traditional discipline.” Miettinen (2005) when discussing the linkage between social capital and innovations, states that social capital connects the problems of economic development to the classical sociological problems of social cohesion and integration in society. The social capital theory attempts to combine sociological and economic theories. For Miettinen, social capital is the glue that enables the effective operation of economic institutions. The essence of the concept is that it draws attention to the value-creation potential of social networks and ties.

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18. *It is not in the scope of this study to take a stand on the debate whether social capital can in the first place be called capital. For more discussion on this please refer to e.g. Adler & Kwon (2002). Their summary is that social capital falls squarely within the broad and heterogeneous family of resources commonly called “capital”. In some respects, the term is used metaphorically “but such metaphorical uses are very widespread, and it is difficult to see what harm they do” (p. 22). For Engeström (2003, p. i) “it is not clear just how far this hybrid will take us and how viable it can be. By marrying the notion of social with the notion of capital, it unashamedly suggests that capital can be looked at as a social phenomenon, and the sociality of human beings and communities can somehow be understood as capital”. Other forms of capital are physical capital referring to physical objects and human capital and intellectual capital that refer to properties of individuals (see e.g. Bowles & Gintis, 1975, Stewart, 1997). Bourdieu (1986) brought up also the cultural capital as one aspect that could explain e.g. the school achievement of pupils coming from different social classes.*

Social capital can be differentiated from other types of resources by the specific dimension of social structure underlying it; *social capital is the resource available to actors as a function of their location in the structure of their social relations*. Adler & Kwon (2002) propose three different types of social relations. First there are *market relations*, in which products and services are exchanged for money or barter-traded. Secondly there are *hierarchical relations*, where obedience to authority is exchanged for material and spiritual security. Thirdly there are *social relations* in which favours and gifts are exchanged. The market and social relations are described as symmetrical. Hierarchical relations are described as asymmetrical where hierarchy is a form of domination. In the case of the symmetrical exchange of social relations, the time horizon is not specified, nor explicit, but generally the favours are eventually returned. In market and hierarchical relations the terms of exchange are made explicit, whereas in social relations the terms of exchange are tacit, i.e. a favour to someone else is done in the tacit understanding that it will be returned some day. Adler & Kwon (2002) concede that this typification is much debated and contribute their own perspectives to the debate by stating that any concrete relations are likely to involve a mix of all three types. Secondly, real-world market and hierarchical relations give rise to social relations under conditions of repeated interactions.

There is an abundance of definitions for social capital (for a good summary see e.g. Adler & Kwon, 2002) and the definitions vary depending on whether they focus on the *substance*, the *sources* or the *effects* of social capital. Further, the definitions vary depending on whether their focus is primarily on the *relations an actor maintains with other actors*, the *structure of relations among actors within a collectivity* or *both types of linkages*.

Firstly, the definitions focusing on *external relations* reflect the so-called bridging forms of social capital. The *bridging views* focus on social capital as a resource inherent in the social network tying a focal actor to other actors. Following this view, social capital can help to explain the differential success of individuals and firms in rivalry: the actions of individuals and groups can be greatly facilitated by their direct and indirect links to other actors in social networks. Secondly, definitions focusing on internal ties within collectivities stress *bonding forms* of social capital. In contrast to the external view of social capital as a resource located in the external linkages of a focal actor, the bonding views focus on collective actors' internal characteristics. On these views, the social capital of a collectivity (organisation, community, nation, and so forth) is in its internal structure – in the linkages among individuals or groups within the collectivity and especially in those features that give the collectivity cohesion and thereby facilitate the pursuit of collective goals (Adler & Kwon, 2002). A collective goal facilitates network tie creation if and when all actors recognise and acknowledge the importance of working for the common good. As a consequence network ties also facilitate group cohesion. In any case network ties are an essential pre-requisite to keep an organisation viable. The third group of definitions is neutral regarding

the internal/external dimension. Adler & Kwon (2002) find this third approach the most feasible one because the distinction between the external and internal views is very much a matter of perspective and unit of analysis: for example, the relations between an employee and his/her colleagues are external to the employee but internal to the organisation. Furthermore, the internal and external views are not mutually exclusive. The “behaviour of a collective actor” like an organisation, is influenced by its external linkages to other organisations and by the fabric of its internal linkages: the capacity of an organisation for effective action is a function of both internal and external linkages.

The *substance of social capital* ranges from cooperative relationships, social structure and networks to shared norms and values. The substance is also defined as a certain kind of culture, people’s ability, trust between people, expectations for action, and voluntary means and processes. The definitions use verbs like facilitate, permit, emerge, affect and promote. The *effects and consequences of social capital* are articulated as actions and resolving collective action problems, working together for a common purpose, cooperation, voluntary associations, goal-seeking behaviour, and coordination for mutual benefit and the development of the collective whole. In the context of this study, *social capital is indeed the glue that facilitates, promotes and permits relevant actions in the organisational context*. In these definitions the goal and common purpose are emphasised. (Adler & Kwon, 2002, p. 20)

For Gratton (2005) *cross-boundary work* is essentially about the quality and extent of the relationships among people. She represents the third view of social capital researchers, who take into account both internal and external dimensions of network ties. For her the building blocks of network ties are the relationship ties that develop initially between two people. She adds to the bridging and bonding ties the dimension weak-strong. Network ties begin as *weak ties* when people are merely acquaintances. Over time, some of these ties will remain weak or decay; others will strengthen and become *strong ties* as people have an opportunity to spend time with each other, are engaged in a shared task and start to trust each other. The network ties within groups are called *bonding ties*; those between groups are called *bridging ties*. Gratton’s findings support the idea that it is the *extent and combination of strong and weak bridging ties that are essential to the cooperative, cross-boundary work*. (ibid, 2005)

However, there is no optimal structure of network ties for all organisations; it depends on the specific tasks of the group and the pace of change. The company goals need in all cases be the starting point for considering the network ties. The company culture needs to be sufficiently respectful and trusting for people to naturally cooperate with each other. Moreover, the tasks people are engaged in need to be sufficiently exciting and the goals clear for people to want to collaborate with each other. (ibid, 2005)

Even if there is not an optimal structure of network ties, there are several indicative parameters concerning the optimal situation. Strong bonding ties are most appropriate in groups where the task is to share and develop complex and tacit knowledge. Strong

bridging ties are essential where there is a need for complex information to be shared between groups. Weak bridging ties enable what has been termed an adaptive field to emerge where there are also many bridging ties across the boundaries of the company. Gratton (2005) found this type of *adaptive fields* especially at Nokia, where the network ties both inside and outside the company to partners and research institutions worldwide enabled the company to adapt quickly to the fast-changing environment in which the company operates. Gratton (2005) maintains that for companies operating in dynamic environments the combination of strong and weak bridging ties (the adaptive field) may be crucial to their success.

Gratton's (2005) perspective was that of management; how human resources personnel and managers, especially executives and senior managers, can manage the processes and practices of a company in such a way that the creation of network ties can take place. However, she admits herself that the very nature of social capital, and the network ties of which it is created, poses a big challenge. *Social capital is essentially a by-product of other processes. It arises through serendipity (i.e. fortunate coincidences) not as a result of mechanistic interventions.*

Another definition of social capital shows how self-organising systems and social capital are related: social capital is about "naturally occurring social relationships among persons which promote or assist the acquisition of skills and traits valued in the marketplace" (Loury, 1992, p. 100 in Adler & Kwon, 2002, p. 20). The formation and use of network ties is an essential feature of an organisation. In certain conditions these network ties emerge on a needs basis, being one feature of a self-organising system. Features of self-organising as well as conditions (culture, values, processes, practices) that allow self-organising are vitally important, especially in organisations where simultaneous activation of the whole organisation is needed. Network tie creation, tools such as modular organisational architecture (Gratton, 2005) or discretionary job design (Dyer & Ericksen, 2005) are all instruments to make the system viable.

Engeström (2005a, p. 1) defines social capital as the "*glue that makes communities more than a sum total of their individual members*". Social capital is a "collective good", not the private property of those who benefit from it. Thus their view is socio-centric and focuses on questions like: what makes communities work? What enables collective actors to sustain themselves and to perform beyond routine expectations and to reorganise themselves when needed? Engeström (2005a, pp. 1-15) emphasises that social capital is firmly rooted in and practically inseparable from certain tangible material structures and artefacts. The formation of social capital needs infrastructures that are located in human practice, in activity systems. These infrastructures are so embedded in everyday life that they tend to become so self-evident that they ultimately disappear. His argument is that social capital in organisations is "foundationally dependent on and partially engraved in infrastructures". Infrastructures of distribution are about service networks. Infrastructures of exchange are about rule collections and infrastructures of production are about tool constellations.

Even if social capital formation is materially rooted it does not mean that it lacks mental elements and locus. The point Engeström is making is about the nature of social capital and how it is rooted in the contexts and activity systems, also materially, and should thus be studied as a part of overall activity systems and not separately from it. A prototypical material foundation of distribution in human activity systems is the public works that provide water and power to lodgings or intranet applications within organisations. Engeström (2005a, pp. 6-11) claims that the more concretely the work community connects the infrastructure to the object of productive activity, the more likely it is that the infrastructure will contribute effectively to the formation of the social capital. An obvious type of distribution network is that of an intranet application designed to distribute company information throughout the organisation.

The infrastructures of exchange consist of rules and procedural norms of social interaction. (An example from everyday life would be a speed bump as a tangible part of the collection of traffic rules.) In organisations the material carriers of rules may be, for example, visual signs as well as written formulations of rules. The production infrastructure consists of configurations of ideas, the implements and materials needed to perform a task. Constellations are typically textual representations or instructions that display a standard sequence of steps to be taken when performing a task. (ibid, 2003, pp. 12-14)

An important point is the general temporal dynamics of social capital. Engeström's (2005a pp. 15-17) hypothesis is that *in particular new organisations and units face pressures of infrastructure formation as they struggle to establish themselves as coherent and sustainable communities. At this stage, infrastructures are necessarily articulated. The very lack of needed infrastructures and the very act of building them also make them visible.* Infrastructures also necessarily become visible when a community is falling apart. The "disappearance" (the process of them becoming so obvious to people that they no longer see the infrastructures) of infrastructures starts at the point they are conceptualized and articulated. He emphasises the fact that there are two different kinds of motivations when building up and introducing new infrastructures. First, infrastructures can be introduced as "ends in themselves, as representatives of moral and ideological values, or as support for cohesion for the sake of cohesion". The other, and obviously more efficient, motivation is to introduce infrastructures as "ways to facilitate the community's work on its object". Engeström continues that in the latter case, it is easier to articulate infrastructures in a more matter-of-fact way. The latter type of motivation also facilitates the introduction of new infrastructures. People pay then less attention if the new infrastructures are directly related to the object of activity.

Engeström (2005a, pp. 16-17) further proposes that social capital could be depicted as a cyclic movement from motivation to formation, from formation to routinisation and from routinisation to maintenance. The point is that assessing social capital as cycles of infrastructure formation would make it more of a dynamic process rather than a structural property. He proposes that it might be useful to analyse social capital

in organisations as a process of infrastructural evolution with distinctive steps and actions that can be monitored and deliberately shaped.

Economists and organisational scientists have taken a more utilitarian view than Engeström, who proposes that the infrastructure creation related to social capital should be tied to the object of activity and taken as a central focus of forming, reutilising and maintaining the infrastructure that supports social capital. For example, Adler & Kwon (2002) proposed that from an individual's perspective social capital might influence career success and help people in finding jobs. Gratton (2006) underlines the organisational perspective by strongly linking organisational innovations (products, services, practices and processes) with boundaryless co-operation as well as with company overall success. When saying that "as innovation becomes *the* most crucial challenge facing executives, increasingly they will be called to build the strong relationships that criss-cross the company. This will require them to be able to both support the practices and processes of networks, and to role model and champion purposeful conversation" Gratton actually already links her view to that of Engeström; it is important to build and develop materially rooted practices and processes, the infrastructures to support network tie creation. From the perspective of a globally distributed organisation the material groundings of social capital in the form e.g. of software meeting systems, intranets and conference call systems seems quite self-evident. Viewing social capital as a dynamic process rooted in infrastructures rather than as a structural property is definitely well grounded, especially when seen from the perspective of a certain community. However, it is as much justifiable to study social capital from other perspectives: for example, the type and role of network ties, social capital from individuals' perspective and the role of social capital in innovation.

Miettinen (2005, p. 26) criticises the way *trust* is being used as an explanatory concept for social capital embedded in networks. He (ibid., pp. 23-24) emphasises the fact that, when examining social capital in the context of for-profit business, companies and networks, we should not take trust as an initial explanation. This kind of trust is rooted in networks of civic engagement or historically developed regional and local trust and it is based much on informal discussions in bars, associations and the like. Miettinen's point is that pre-industrial community relationships do not fit as a model for modern social capital. We should rather understand trust as an aspect of institutional economic collaboration. For Cohen & Fields (1999, p. 108) trust is based on the reliance on expertise and connections of key institutional actors in a specific activity. In Silicon Valley, for example, it is the commercialization of new ideas. This kind of trust is *performance-based*, commercially valuable trust, not a quality of community relationships. Miettinen (2005, pp. 24-25) further underlines the fact that the *motive* and *content* of network collaboration should always be in focus when talking about social capital. Therefore, trust should be studied as to how it is created and reproduced in shared projects and activities. Trust that emerges from concrete historical activity is *activity-based* and *object-related*. Miettinen (2005, pp.

25-26) argues that the reciprocity of distributed specialized knowledge, expertise and learning has a vital role in modern collaboration and that it is radically different from the nature and content of community relationships of the pre-industrial era or the era of mass-production systems. His argument is that the dynamics of new, horizontal, boundary-crossing, networked collaboration based on the common object of activity should be studied more to gain a better understanding of the nature of social capital. The development of Linux computer operating system provides an excellent example of this type of object-based trust and reciprocity of distributed specialized knowledge. The Linux community and new open model of developing software products are prime examples of object-driven collaboration based on mutual professional interests and the emerging needs and potentials of new technologies. Miettinen's (2005, p. 26) "activity-theoretical interpretation of trust" suggests that trust should be studied concretely as it emerges and develops in collaborations of local activity systems. Trust should not be considered an explanation but "something that emerges and is reconstructed in collaboration, dependent on particular motives and resources of the actors as well as on the object and content of the collaboration amenable to change". Productive trust and the opportunity to learn emerge when the partners share a motive for developing something new together and use their complementary resources and know-how for this purpose. Miettinen emphasises that innovation-related, modern social capital is much more fragile and unstable than pre-capitalist trust based on strong community ties. (ibid, pp. 27-29) Ilmonen (2000) suggests that there may be an alternative social capital emerging: namely *trust-based social networks* that are *project-like* and *constantly changing*.

In this study, social capital brings a welcome addition to the *clarity and consistency* of the activity theoretical model and to the *freedom and flexibility* of self-organising systems. Social capital is the element that brings along the aspiration and legitimacy to work together for a common goal. Social capital is the mental glue that makes people identify themselves with the same community. As a concept, social capital is almost a *normative concept*; collaboration and communality are valued. The paybacks and benefits of social capital to the individual, to the community and to the whole organisation are intertwined.

To summarize, relationships and connectivity were one of Ericksen's & Dyer's (2005) principles for promoting freedom and flexibility. Building and sustaining social networks was one of the activities comprising practice in Orlikowski's (2002) findings. The knowing that is constituted in this type of practice is about getting to "know the players in the game." In self-organising systems it is about spontaneous collaboration with other people who happen to be needed to complete the task (Dyer & Ericksen, 2005). As the situations where other people happen to be needed often emerge ad hoc (cf. Blackler's, 1995, "ad hococracy" in communication-intensive organisations), a strong adaptive field, a mix of both strong and weak bonding and bridging network ties (cf. Gratton, 2005) is needed. The strong adaptive field guarantees that the

system adapts to changing situations and that network ties can be used in the most appropriate way in volatile environments. With organisational means it is impossible to compel network tie creation, maintenance and usage. Organisations can only create the conditions and principles under which efficient self-organising can take place (Ericksen & Dyer, 2005). Thus it is possible to create conditions where “serendipity” (cf. Gratton, 2005) is more likely to occur than in some other kinds of conditions. When taking this view, it is no longer only fortunate coincidences but the order rising from chaos, order that is different from the systematics and linearity of traditional hierarchical organisations.

#### 4.4 SUMMARY

Organisations are still typically, often instinctively, premised on traditional mechanistic and linear assumptions descending from Newtonian physics and two millennia of various bureaucratic forms (Dyer & Ericksen, 2005) not to mention Tayloristic, scientific management. The mental model is traditionally that of linearity, rigidity and systematic order. Because there are no established theoretical frameworks to study boundaryless work, I have selected various theoretical approaches that allow approaching the phenomenon from different angles. I have thus included elements of *activity theory*, *self-organising systems* and *network ties/social capital* in the theory part of the study. They will be loosely used to analyse different angles of the phenomenon, which will be done in *Chapter 8*.

*Activity theoretical framework* shows well all the elements around individual actors that need to be taken into account. The concept of self-organising has been included because it is suited for describing the “how” part in boundaryless work. Social systems are systems that have their own identity and code of communication. Therefore, I will deal with the two separately. *Social capital* or rather *network ties* are essential when integrating over boundaries. To conclude, the activity theoretical framework brings the needed *clarity, vigour and consistency* to the study of boundaryless work. The principles of self-organising bring the required perspective of *flexibility and freedom*, a freedom to improvise and transcend the existing boundaries on the need basis. Social capital brings the perspective of social and normative *glue* in the way people collaboratively work together towards a common goal. All these windows are selected to approach the phenomenon of boundaryless work.

In this study the *main focus is on how the research participants perceive their work and work environment*. In order to *set the scene and context* I will first describe the case organisation by using the frameworks of activity systems, DOCASs (dynamic, open, complex, adaptive systems) and social systems. (One might claim that these are to a great extent bounded units. However, together they provide a view of how

the organisation is built up. The results as a whole are meant to show what kind of a context the case organisation is and how bounded or unbounded certain things are.) I will then explore what kind of boundaries can possibly be identified in the context of the case organisation and what is the nature and dynamics of the boundaries. I will further investigate the nature and dynamics of boundaries possibly related to job roles, careers and expert work in the context of the case organisation.

## 5. RESEARCH QUESTIONS

The focus and perspective of this study are on boundaries and the nature and dynamics of boundaries in R & D work. Firstly, my aim in this study is to investigate the very concept of boundaries, whether they exist and if they do, their nature and dynamics. Secondly, my aim is to delve into the job roles, careers and expert work as described by people working in the case organisation and to study whether any boundaryless features exist in these and if so, to ascertain their nature and dynamics. This qualitative case study will focus on one high-technology company and mostly one business group within that company (Nokia Networks). The focus is limited to the R & D/product development work. (Most interviewees were located in Tampere.)

There are thus two research questions that this study aims to answer:

1. What kind of boundaries can be identified in the context of the case organisation? What is the nature and dynamics of the boundaries?
2. What kind of job role, career and expert work boundaries can be identified in the context of the case organisation? What is the nature and dynamics of boundaries related to job roles, careers and expert work?

## 6. CONDUCTING THE RESEARCH

In *Chapter 6* I will first discuss the philosophical underpinnings of this study. This discussion will include the ontological and epistemological viewpoints as well as the overall research setting in this case study. Secondly, I will describe my own views and limitations as a researcher. The third section will focus on the methodology and data gathering methods. I will conclude by discussing the analysis of the data.

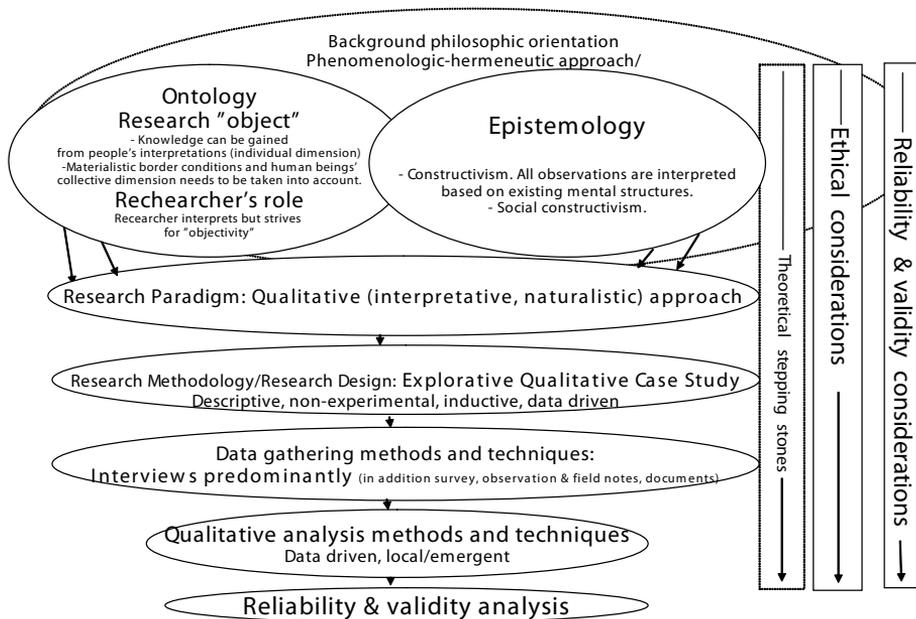
### 6.1 PHILOSOPHICAL UNDERPINNING: THE PHENOMENOLOGICAL-HERMENEUTIC APPROACH

#### 6.1.1 ONTOLOGY AND EPISTEMOLOGY

The objective of this study in the first place was to understand a certain phenomenon and shed more light on it by exploring the phenomenon with an open mind, not from a pre-set starting point. The research approach of this study can be described as an *explorative, qualitative case study*. One of the characteristics of the study is that the research process was anything but linear in nature. The original starting point, the research questions and the plans were flexible and adapted to the changes in the process. The very feature of hermeneutic spiral, continuous interaction between empiric observations and theoretical perspectives, was indeed a prevalent characteristic of the research process in this study. Hermeneutic spiral is the learning process where the researcher incrementally approaches a deeper understanding of the topic and research questions, fed in turn by theory and empirical findings. It is a characteristic of an explorative qualitative research that the *data reveals the important observations*. The aim is not to prove a pre-defined hypothesis. (See e.g. Alasuutari, 1993, Denzin & Lincoln, 1994, Hirsjärvi et al., 1997, pp. 160-168, Varto, 1992, p. 69)

The ontological understanding by which the researcher understands the world and the research object in this study is something that needs to be discussed. The object of this study is predominantly the *work* and more specifically *boundaries* and *boundary crossings* in one case organisation as described by the research informants. Theoretical approaches are used to a certain extent in describing the context and in the analysis of the data. The focal point is the *individuals as part of the collective work system*. The basic starting point for this study was a qualitative and explorative approach.<sup>1</sup> Understanding human beings as active constructors of their environment together with others is in line with *social constructivism* (see e.g. Tynjälä, 1999).

In qualitative research, the basic concepts, theories and concrete choices concerning the case, like methods, are based on the ontological and epistemological understanding of the researcher. Epistemology is concerned with what distinguishes different kinds of knowledge claims – specifically with the criteria that allow distinctions between “knowledge” and “non-knowledge” to be made. Epistemology is interested in the source of knowledge, how it is possible to “know” anything and how any given knowledge can be considered credible. Ontology, on the other hand, is about what exists, the nature of the world and reality. Epistemological and ontological questions are related to each other since claims about what exists in the world imply claims about how “what exists” may be known. *Figure 13* compiles the background orientation and commitments made in this study.



**Figure 13.** Background orientation and commitments in this study

1. *The action research or interventionist approach would have been practically impossible with that starting point idea, with the limited practical resources and the hectic, constantly changing environment in the case organisation.*

The basic initial assumption in this study is that human beings are capable of interpreting the events taking place in their environment, of making sense of the world and of forming meanings accordingly. The experiences and personal interpretations of the research participants and interviewees are valued. Human beings understand the world and gain knowledge about it through their experiences and in interaction with others; the contact with reality is indirect and processed through people's minds. Human beings are regarded as being active and intentional; they have feelings, and plans and they value things from their own perspective. Cultures are created as a consequence of human activity and they, in turn, transform and shape people. Human behaviour and activity are rational compared to animal's instinctive activity. Human language provides a means for both communication and thinking. (see e.g. Syrjälä et al., 1995, pp. 74-78)

In my view, human beings have a great potential for learning, reflection and development. My understanding of learning is based on the *constructivist view*; this paradigm prevails in modern thinking and educational sciences and emphasises the fact that new knowledge is built on existing knowledge structures. Creative and reflective aspects of learning are taken into account too compared to the more traditional knowledge processing paradigms. Knowledge gained of reality does not correspond to reality; it depicts reality but is not a copy of it. The biggest differences between various schools within the constructivist approach concern the perspective: individual, group or more extensive social contexts. In this study I have adopted the perspective provided by *social constructivism*.<sup>2</sup>

2. *According to the socio-cultural approach, (in this study presented through Engeström's activity theoretical model and its background) people always act in cultural contexts. Their activity is mediated by language and other symbol systems. Knowledge creation and learning are basically social phenomena and cannot thus be studied in isolation from their social, cultural and historical situation and development. The research object is primarily social activity and interaction. (This is where my approach differs slightly from the activity-theoretical orientation.) This activity can best be understood in its historical context. Engeström built his model mostly on the theories of Vygotsky and Leontjev who represent the cultural-historical school having critical or Marxist philosophical roots. Engeström (2008) writes that "activity theory was built on the foundation of Marxist analysis of history and society... In a work activity in a capitalist firm, the workers are alienated from the overall object, motive and product of their labour. The gap between actions and activity is not only caused by elaborate division of labour but, above all, by the private ownership of the object. This is magnified in the era of financialization and shareholder value, when the concrete outcomes of work seem to have nothing to do with the success and destiny of the company. Profit motive is the dominant management motive, not unproblematically appropriated and shared by workers. If activity theory is stripped of its historical analysis of contradictions of capitalism, the theory becomes either another management toolkit or another psychological approach without potential for radical transformations." In my view activity theoretical framework belongs to the critical studies since it presupposes dissensus (and not consensus) and the research concepts are brought to the research by the researcher and held static through the research process. (see Deetz, 1996 and Järvinen, 2004, pp. 36-37) Likewise Lave & Wenger's (1991) theory of situated learning can also be categorized as a socio-cultural constructivist approach like proposed by Blackler (1995): "Contemporary versions of activity theory take a variety of forms. However, they are all explicit in their attempts to develop a unified account of knowing and doing, and all emphasise the collective, situated and tentative nature of knowing. Some, like Lave and Wenger concentrate on the processes through which people develop shared conceptions of their activities. Others like Engeström model relationships that exist between a community's conceptions of its activities and the material, mental and social resources through which it enacts them. While the former approach develops a model of learning as socialization, the latter explores the circumstance in which communities may enact new conceptions of their activities". (Blackler 1995, p. 1035) According to symbolic interactionism, first developed by Mead (1934) and Blumer (1969), meaning is a social and symbolic product that is created in the interpretative interaction between people. Symbolic interactionism can be traced back to the pragmatic philosophy of John Dewey (1966). In*

According to the holistic view of human beings, they are individual “whole” entities that need always be understood within a certain context (see e.g. Rauhala, 1983). There are two dimensions in my understanding of the human being. First, based on the traditional hermeneutic-phenomenological philosophic orientation, there is an (unexplored) mental dimension in every human being and every human being is basically one harmonious entity. This is my understanding of the human being and his/her *individual dimension*. However, an individual’s *collective dimension* is very much affected by materialistic border conditions that have a great effect on how they behave in collective contexts. In my view, a human being is always an entity in which different parts of the wholeness affect others. When it comes to human beings’ collective dimension, existentialist and cultural elements step in and mix with the essentialist view by letting human beings partly decide what they want to be and by bringing in the cultural and materialistic border conditions that can partly define what human beings can be (see e.g. Hirsjärvi, 1987).

The very research object of this study is the complex modern work context that is characterized with extensive use of modern technologies and requires a strong distributed cognition (see e.g. Boland et al., 1994, Brown, 2000). However, I still believe that there is an individual dimension in every human being even if they are parts of complex work related networks. This individual dimension gives them a power to reflect on what is going on in their own life or in their surroundings and to make decisions accordingly. When it comes to understanding and explaining human activity, an essential philosophical choice and commitment has to be made between *idealism* (e.g. Rauhala 1989) and *materialism* (Ollinheimo 1997, 1998). I have opted for a sort of dualism and hold the view that not all human activity and all conceptualisations related to it can be redirected to certain materialistic premises or reasons. However, I do think that the changing environment in workplaces and organisations poses challenges to the idealistic philosophy when combined with phenomenological-hermeneutic

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*this approach individual interpretation is emphasised even if it is made within given social conditions and structures. Socio-cultural and cognitive (individual) constructivism should not be understood as mutually exclusive but as mutually complementary; both individual knowledge constructing and the social dynamics should be taken into account. All in all, symbolic interactionism gives more autonomy to the individual than the socio-cultural approaches. However, as Bereiter (1994) puts it: “there is no contradiction between the various approaches within the constructivist approach. Still, in research one has to choose a perspective”. Cognitive (individual) constructivism is always about social constructivism, too; the individuals in any case build up their reality together with others in interaction and in social arenas (see Tynjälä 1999, pp. 28-71). In this study my perspective is close to the socio-cultural approaches and the symbolic interactionism. In contrast my thinking differs from the social constructionism (the most sociological of constructivist approaches). In Berger’s & Luckman’s (1966) theory of Social Construction of Reality, reality is understood to be a social construct created through interaction. People produce societies; reality is maintained and transformed through the conversations and negotiations people have. Their roots are in post-modern philosophy and the emphasis social sciences have lately given to language/textuality. Their world view, like a literary text, is open to multiple interpretations. This view is post-epistemic in abandoning the traditional view according to which we have to consider how people gain knowledge of the world. Those behind social constructionism maintain that people and their knowledge need to be seen as part of the world, not as a separate entity. By placing knowledge and knowledge creation in language itself, social constructionists abandon dualistic mind of a human being. The difference from Vygotskian thinking is that social constructionists are not interested in psychological processes between people (see Tynjälä 1999).*

orientation. People are simply restricted by materialistic mediators in organisational contexts, let alone virtual organisational contexts where the very interaction between people is technologically mediated.

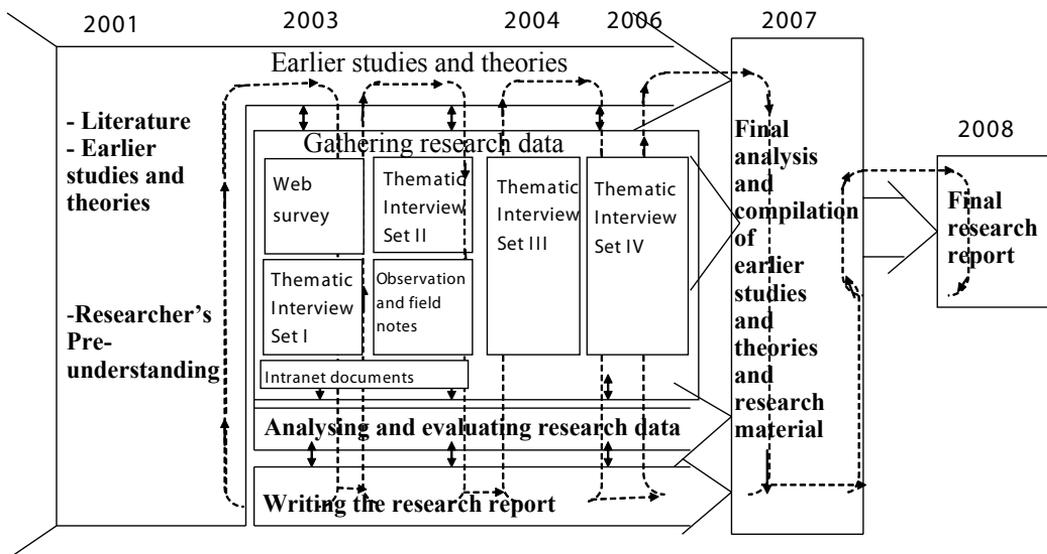
In my study, the research questions centre on individuals being part of complex constantly changing environments. Knowledge is sought from individuals who are a part of the work-related context. In phenomenologically oriented research the starting point for the analysis is always a discourse structuring culture that is language (Ulvinen, 1996, pp. 6-7). My hermeneutic understanding is *realistic* in the sense that in my opinion the *researcher's target is to strive for objective research findings* even if it is not possible to end up with even an interim final truth or an objective depiction of reality. The researcher always interprets through his/her mental structures. The pursuit of optimally objective research findings is achieved by being critical about everything related to the research process, reflecting on one's pre-understanding and biases, careful selection of research methods and their detailed description in the report.

The basic idea in the qualitative research paradigm is to take into account how the subjects of the research interpret situations, because their interpretation guides their actions. The knowledge that the researcher seeks and finds is also subjective and value-based. Creativity as a basic feature of human activity is based on conscious or unconscious decision-making based on interpretations that are constantly formed in social interaction. *Knowledge is restricted to a certain given moment and place and it is tied to the social and cultural situation in question.* People use their existing knowledge when they create new social and cultural patterns. Yet the knowledge cannot be used to predict coming things since life itself is unexpected. *Knowledge produced by research is not primarily targeted to increase the predictability of certain phenomena but rather to add up to an understanding of social processes and to possibly find new ideas or concepts and encourage discussion.* The objective of research is to pursue an understanding of the meanings behind actions. It assumes that reality can be investigated from multiple perspectives – that the world is not an objective thing out there but a function of personal interaction and perception. Out of these multiple realities qualitative research strives to understand how all the parts work together to form a whole. In this paradigm, there are *no fixed hypotheses and no restrictions on the end product.* (See e. g. Usher et al. 1997, pp. 18-22, Silverman 1995, pp. 47-51, Denzin & Lincoln, 1994, Syrjälä et al. 1995, p. 76).<sup>3</sup>

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3. *Even if the basic assumptions behind this research and me as a researcher are based on the research tradition of humanistic sciences, there are phenomena that modern information technologies, for example, have brought about and in my view should be taken into account when researching modern organisations. Firstly, modern working environments encompassing various technology-based devices leading to the fact that they cannot be understood as mere interaction systems between people. This concerns both asynchronous and synchronous virtual collaborative environments. People involved in various activities do not only process cognitive actions in their minds or in interaction with each other. They are more and more intensively part of complex technology-based activity systems. Secondly, my ontological orientation justifies knowledge engineering efforts, attempting to arrive at semantic ontologies and metadata systems for different kinds of information systems or IT/ICT environments so that they would best meet the human user requirements. Thirdly, I have to consider the historical era western societies are living in, whether it is described as post-modernism or*

### 6.1.2 RESEARCH SETTING IN THIS CASE STUDY

Qualitative approach was chosen for this research predominantly for three reasons. First, it suits well for investigating human notions and understanding of a certain phenomenon. Secondly, there is a need to take people's natural environments or surroundings into account and describe comprehensively the quality of the phenomena presented in research questions. Thirdly, I wanted to possibly discover new emerging issues related to the phenomenon under investigation. The overall research setting and process of this study is described in *Figure 14*. Exploratory studies are conducted to investigate little-understood phenomena, to discover important variables or to generate hypotheses for further research. Case study as a research strategy and a mix of data gathering methods suit well this approach. (see e.g. Marshall & Rossman, 1995, p. 41, Järvinen, 2004, p. 74, Syrjälä et al., 1995)



**Figure 14.** Overall research setting and process

It would have been possible to choose a more quantitative approach and to develop the survey and the interviews in that direction. However, I wanted to take a more explorative approach and to endeavour to see *how it really happens and what people's insights concerning it are, how they interpret their environment and how they feel about*

*as high modernism (see e.g. Usher et al., 1997 and Giddens, 1991). In post-modern societies universalisms of any kind are losing their traditional efficacy, leading to a situation in which individuals must choose between a range of lifestyle options and ethical dilemmas. While offering new opportunities for self-definition it has also created a situation in which the self is in a constant state of crisis. However, even if this is acknowledged as a new emerging societal feature, this study does not want to take a post-modern approach to making research (deconstruction, non-bolistic understanding of the nature of human being).*

*working in a possibly boundaryless environment.* A qualitative approach is a good option if one wants to discover something that is not yet coded in pre-defined categorisations. The basic approach has been to use the most relevant parts of various data gathering methods flexibly if they are deemed to serve the purpose and objectives of this study. Even if the overall approach is qualitative, some quantitative data was gathered and will be used partly to describe the phenomenon; this is mostly in the form of descriptive basic facts and figures. The hermeneutic approach enabled me to study and evaluate existing literature and existing theories, my own understanding of the phenomenon, research data and further possibilities and needs for the data to take place in a cyclical manner. These phases intertwined in the research process. Also, the writing of the research report progressed alongside with the above-mentioned steps.

Case study – and, in particular, qualitative case study – as a research design in its own right can be regarded as an approach that is distinct from other approaches to a research problem. The philosophical assumptions underlying the case study most often draw on the qualitative research paradigm. *A qualitative case study is an intensive, holistic description and analysis of a single instance, phenomenon, or social unit.* The main emphasis is on description and interpretation within a certain context. Case studies are particularistic in that they focus on a specific situation or phenomenon; they are descriptive and they are heuristic – that is, they offer insights into the phenomenon under study. Qualitative inquiry is inductive – focusing on process, understanding, and interpretation – rather than deductive or experimental. As Yin (1984) observes, case study is a design particularly suited to situations where it is impossible to separate the phenomenon's variables from their context. Stake (1981) claims that knowledge learned from a case study is different from other research knowledge in four important ways: it is more concrete and more contextual; it is more developed by reader interpretation as readers bring in their own experience and understanding, which lead to generalizations when new data for the case are added to old data. Stake continues by maintaining that it is based more on reference populations determined by the reader, because, unlike in traditional research, the reader participates in extending generalizations to reference populations. Any and all methods of gathering data can be used in a case study. Fieldwork is usually involved; one must physically go to the people, setting, site or institution, in order to observe behaviour in its natural setting. (see e.g. Merriam 1989, pp. 1-21)

It is possible to categorize case studies into descriptive, interpretive and evaluative studies (Järvinen & Järvinen 2000, p. 81). In reality these three are often intertwined. My target was possibly to find new kinds of typologies based on the research data; thus, I aimed at predominantly describing and the phenomenon and only after that possibly evaluating it.

This particular case, described more in detail in *Chapter 7*, has been chosen on the one hand, because it features many new phenomena, concepts, problems and advantages of modern knowledge-based organisations that might become more com-

mon in organisations in general and on the other hand, because the researcher had an easy access to the organisation. In the beginning of the research process I assumed that the case would prove out to be interesting from the boundaryless type of work perspective. (See e.g. Marshall & Rossman, 1995, p. 51)

## 6.2 MY PERSPECTIVES AND BOUNDARIES

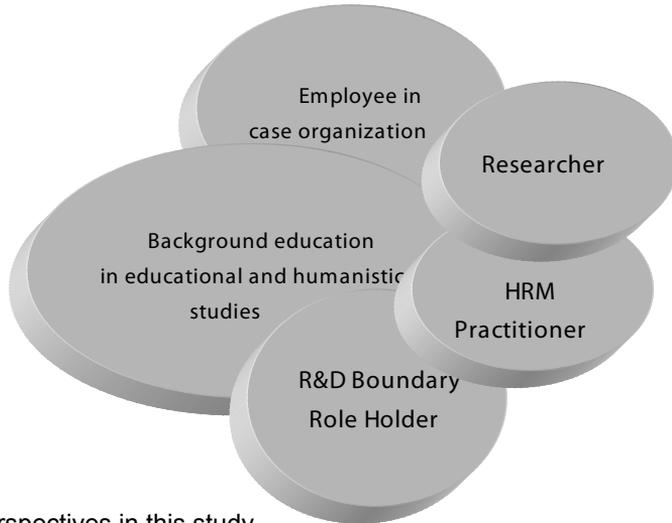
The qualitative researcher is interested in how people make sense of their lives, what they experience, how they interpret these experiences and how they structure their social worlds. The researcher is the primary instrument for data collection and analysis. Data are mediated through this human instrument rather than simply through some inanimate questionnaire or machine. The researcher can adapt techniques to the circumstances, which makes the research process flexible to new emerging issues. For the same reason it may also be very demanding to the researcher. The more intensive and open the interaction between the researcher and research subjects or participants is, the more credible the results will be. The importance of language in research is emphasised. In qualitative research one always has to take the values and priorities of the researcher into account since these have an effect on his/her choices, be it consciously or unconsciously. The researcher, too, is an active human being with his/her own personality, values and history that give shape to the research setting and choices he/she makes. Hence it is important for the researcher be aware of these commitments; to analyse and document both his/her ontological and epistemological assumptions and the whole research process so that the readers can form their own understanding of the research process and possibly compare it with other cases under different circumstances. (see e.g. Silverman 1995, pp. 47-51, Syrjälä et al. 1995, p. 76)

Concerning this study I am relatively closely involved in the case organisation as an employee of the case company. As a consequence, I have my personal inside perspective and understanding of the case organisation. I have been involved in the kind of work situations under investigation, which has also been one of the basic originating impulses in the choice of subject. This can be partly considered an advantage by giving insight into the case, making it easier to formulate research questions, methods and techniques and to access appropriate research data. Another advantage is to be able to understand to a certain extent the common language and concepts used within the company. However, it can also be regarded as a disadvantage if the researcher cannot take sufficient distance from her case, especially during the analysis phase.

As a researcher I have been responsible for the progress, validity, credibility and results, both to the supervising university and to the case company. Supervisors have been nominated in both organisations. It has been my right and responsibility to aim at truthfulness in the results of the study. The final report in the form of a doctoral

dissertation is intended for readers within the research community and the case organisation.

The perspectives through which I have approached research topic, research questions, analysis frame and interpretations are always coloured by past experiences. My perspectives developed through past experiences contain at least five perspectives on the subject matter in this study (see *Figure 15*).



**Figure 15.** Roles and perspectives in this study

In this case it is a question of my multiple roles and lenses through which I have seen the research topic. I am and have been engaged in various roles that need to be taken into account. I have been and still am an *employee* of the case organisation, an employee in a constant flux and transition like all the other employees of the case company. I have been and currently am an *HR practitioner*, whose main focus is on strategic human resource management and development. The third role is that of *researcher*. In this role my perspective is multidisciplinary. Having started this study on the boundary of practice and academia, it has been easy to adopt a multidisciplinary view so that my researcher's perspective unites the perspectives of adult education, organisational sciences, management studies and sociological perspectives. In the role of a researcher it has been of utmost importance to be able to temporarily detach myself completely from the work related roles and to concentrate exclusively on the research perspective. This happened twice during the research process; first when gathering the data (2003) and second, when analyzing the data and writing the main part of the research report (2006). The fourth perspective is that of my background education that has focused on humanistic and educational studies (foreign languages and cultures, philology, didactics, adult education). The fifth perspective is that of R & D boundary roles;

before moving to human resources management (HRM), I was employed in customer documentation and strategic competence development in the case organisation.

## 6.3 METHODOLOGY AND DATA GATHERING METHODS

### 6.3.1 OVERALL VIEW OF DATA GATHERING METHODS

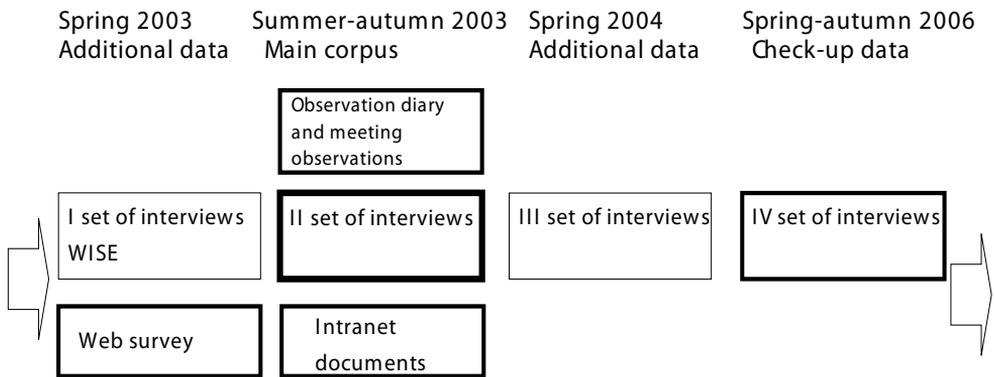
As this research was intended to be a *case study* from the very start, it was considered important to gather the research data using various and multiple research methods. The objective was to both describe the phenomenon under investigation and to give reasons and explanations for it. The study was conducted in the field and the data gathering was done in close relation to the case under investigation and to the natural possibilities it offered for research data sourcing. As a researcher, I have been involved in a constant discussion with human resource specialists and other employees in the organisation on the overall results of the study, which is also a means of *pragmatic validation* of the results throughout the study (Kvale, 1995). In this sense there are also elements of action research or collaboration research involved.

As already described, the dominant epistemology in my study is hermeneutic or interpretive. Hermeneutic epistemology is influential in social research along with the more traditional positivist/empiricist epistemology. The former argues that knowledge is not concerned with generalisations, prediction or control but rather with *interpretation, meaning and illumination*. In my understanding, it is impossible to investigate social processes and interaction merely by using statistical methods due to the fact that the situational factors keep changing in a kaleidoscopic manner, nor is it possible to specify interactive relationships and related results in a detailed manner. However, it is quite possible to *combine qualitative and quantitative data gathering methods* if they are considered necessary to elucidate different sides of a phenomenon. Many educational scientists have criticised *methodological eclecticism* harshly. (see e.g. Siljander 1988, 1992) Also, there have been attempts to synthesise methodological fundamentalism and eclecticism. Suoranta (1993, pp. 43-45) identifies a list of common features in the two above-mentioned extremes of a continuum; they are socially founded, context is taken into account and the place of language is central. My opinion is that if one wants to describe the phenomenon from various perspectives, more than one method only imbues the data with more spectral colours. In this study a great deal of data was gathered that is ultimately not directly visible in the results. Even if the research “economy” was not good, i.e. there is a great deal of unused data, the abundance of data was such that it gave me the confidence to proceed in the direction selected. Another perspective is that a large number of direct quotes from the interviewees are presented

in the results; this was done on purpose to give the reader an intimate feeling of the context, i.e. to make the description thick.

The critics of methodological eclecticism, Siljander (1992) being one example, stick to the notion that eclecticism harms the researcher's definition of the basic research unit or object. Siljander maintains that the ontology of research should be consistent with the basic analysis unit/object and that, in its turn, defines the methods to be used. However, Perttula (1995) admits that combining methods is recommended if ontological analysis reveals that the research questions can be answered by a combination of certain methods. This adds up to the credibility and validity of the research. When choosing the method, the researcher has to know what he/she can and will attain with that specific method. The same method does not, for example, reach both qualitative and quantitative dimensions of the research phenomenon.

In this study the main data gathering method is focused on the subject-subject idea and the confidentiality between the researcher and research participant is emphasised (Siljander 1992, p. 20). Using different methods in my study does not mean I am researching different phenomena with them. As this is a case study and the research questions address a very complicated phenomenon, the researcher has felt a need to approach the same phenomenon from many angles and several selected data gathering methods have been used. In any case, the data from different perspectives has definitely been useful and, in my opinion, enhanced the validity and credibility of the research. *Figure 16* shows the data sources of this study on a time line.



**Figure 16.** Data sources and their timing in this study

The empirical data was collected firstly through a *survey*, secondly from *thematic interviews* and thirdly by *observing, recording and gathering documents from team situations* in the case organisation. A fourth means to gather additional data were the *company-wide documents and information in the intranet*. Material providing access to new insights

Research Object/unit	Dimensions of work context	Data gathering method	Status of data source	Raw data for a analysis	Outcome	How the outcome benefits the analysis	Research questions to be tackled
Individual and his/her interpretation of being part of social practice in boundaryless context		Web survey	Additional data	Answers to open questions Basic statistics	Personal interpretation (surface level). Not feasible to clarify problematic points. Wide number of answers. Background facts on how people work collaboratively	Description (Interpretation)	Background knowledge to boundaries and job roles
		Thematic interviews	Main data	Transcribed audio-recordings	Personal, deeper interpretation. More limited sample. Findings not attached to individual persons but more general patterns looked for.	Description Interpretation	What kind of boundaries & boundary dynamics can be identified? What kind of boundaries are there related to roles, careers and expert work?
Social practice		Observation diary and meeting observations	Additional data	Transcribed Audio recordings Documents e.g. meeting memos Field notes based on observation	What really happens on group level (verbal data) What is documented from group level sessions What really happens on group level (other aspects than verbal data)	Description Interpretation (Description)	Background knowledge to boundaries, job roles and expertise
Hints of work context/ official view		Intranet documents	Additional data	Documents and text in organisational intranet	What are the official statements in the related areas	Description	Basic facts of the case organisation Background knowledge to job roles, careers and competence development in the case company

**Figure 17.** Outline of data gathering methods and expected outcomes

(transcribed thematic interviews) serve as the *primary source* for the researcher and material only contributing to the description (quantitative data in the web survey, documents and observation data) serve as the *secondary source*. *Figure 17* outlines the data gathering methods and techniques and the expected outcomes.

The survey provided data from individuals in bulk and the interviews gave a deeper insight into fewer individuals' interpretations. The interviewees were abstracted from the collective work situations for the interviews. This entails a question whether one can gain knowledge of social practice from individuals. The research phenomenon itself is complex, complicated and constantly changing and evolving. My view is that one can gain knowledge about it by interviewing individuals, but this knowledge is limited. In this study it is still considered a good method to gain insight into a phenomenon that has not yet been extensively studied. Other additional methods are also used for reasons of validity.

There are two basic types of sampling: probability and non-probability sampling. Both types have been used in case study research, but usually non-probability sampling is the method of choice in qualitative study. Probability sampling allows the investigator to generalize the results of the study from the sample to the population from which it was drawn. However, as generalization in a statistical sense is not a goal of qualitative research, probabilistic sampling is not necessary in qualitative research (Merriam 1989, pp. 47-48). In the descriptive part of my study, I want to be able to answer some basic questions of type "how much" and "how often" and that has partly triggered the use of survey as one method.

The interview data, on the other hand, were sampled in a non-probabilistic or purposeful way. Purposeful sampling is based on the assumption that one wants to discover, understand and gain insight and therefore one needs to select a sample from which one can learn the most. Goetz & LeCompte (1984) call purposeful sampling criterion-based sampling. I have tried to find cases that could elucidate the phenomenon as much as possible from their own perspective (typical case selection) and I have also partly used network selection in which each successive participant is named by a preceding individual. The typical case selection concerns a few interviewees who were picked due to their radical career boundary crossing steps. Network selection was used when the council members interviewed recommended more interviewees.

### 6.3.2 WEB SURVEY

The web-based pre-survey was planned in cooperation with the organisation's human resources and competence development personnel and was linked to the so-called "2003 Year of Teams" activities. The emphasis of the "Year of Teams" was on the enhancement of existing teamwork improvement tools and on the promotion of virtual team training. Some human resources and competence development specialists were

involved in planning, implementing, analysing and evaluating of the survey results and in the actions taken as a consequence of the results. The objective was partly to improve the understanding of current team and networking practices, to find solutions to problems in everyday activities and to improve the existing mode of working. The survey was conducted so as to gain wider insight into how people collaborate, and how extensively they cross boundaries towards other occupational groups, other geographical locations and the external world. The responses to the open questions answers were to shed light on what people considered to be the major impediment to their collaborative work (major boundaries and major enhancing factors.) The word *team* was selected because in the company idiolect team can refer to a small or very big group of people working on the same project or with the same product. The survey respondents were given the chance to familiarise themselves with the final results of the survey and with the promotion material and links sent with the web survey.

The survey data was gathered as questionnaire responses from individual employees working for the case company in August 2003. The survey featured a set of pre-defined questions as well as open questions. The questionnaire was prepared with company human resources and human resources development specialists to eliminate as much ambiguity as possible from the questions. The survey was tested with a pilot that was sent to thirty respondents. The responses to the open questions were partly analysed qualitatively for internal purposes. Three reports were prepared by the researcher for three different organisational entities soon after the survey was completed. Fixed questions were analysed quantitatively with Excel and SPSS software. These are not reported here as they did not reveal anything crucial from the research questions' perspective. This revealed the fact that in the first phases of the study I had not yet developed a good enough view of the possible parameters related to the topic of this study. They were based on the parameters typically used in the case organisation but did not reveal too much statistically. Given the chance, I would reduce the number of categories. The respondents came from several locations in Finland and from several locations in other countries. (The variety of respondents is more extensive geographically and business group wise in the survey than in the interviews.) They were mostly from the same business group, NET, as the interviewees. There was one group of respondents from the devices side (Multimedia/Imaging Business Unit). There were no great differences between NET respondents and this group. Their answers are included in the statistical part but no open answers were taken as examples for the report. There were respondents from various functional/process phase groups.

The target was to have approximately 400 responses and in reality this number was significantly exceeded (951). The target response rate was approximately 40% due to the survey being optional, people being very busy with product development projects, the summer holiday season and because there are other surveys to be answered quite often. This target was reached reasonably well, too (56%), taking into account the

problems with the web interface due to the organisation-wide updates of web format during the survey opening period.<sup>4</sup> The survey results were used as additional data to shed light on the research topics. The open answers were partly analysed qualitatively. Not very much of the survey data was used in the research report. This is because a survey can only yield a superficial understanding of a phenomenon that is explicatively approached. The survey data was, however, important so as to gain insight on a larger scale into certain features of boundaryless work, e.g. how often people change the function or process phase in which they work.

### 6.3.3 THEMATIC INTERVIEWS

Thematic interviews were selected in order to give space for the interviewees to concentrate on the themes and issues they consider important but within selected themes (Eskola & Suoranta, 1998, p. 88). Qualitative interviews are more like conversations than formal events with predetermined response categories. The interviewer is a central and active participant in the interaction (Rapley, 2001). The researcher explores a few general themes to help uncover the participants' meaning perspectives, but otherwise respects how the participants frame their responses (Marshall & Rossman, 1995, p. 80). All in all, qualitative interviews are suited for explorative research approach: they "permit us to see that which is not ordinarily on view and examine that which is looked at but seldom seen" (Rubin & Rubin, 2005, p. vii). Four sets of transcribed thematic interviews have been used as the data in this study. *Table 4* describes how the four sets of thematic interviews were conducted and what the main focus areas were. The lists of the interviewees, their job role and gender can be found in the appendices.

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4. The survey was sent altogether to 1413 employees. 80% of the respondents were male and 20% female. 31% were between 20-30 years, 48% between 31-40 years, 16% between 41-50 years and 5% were over 50 years. 70% of the respondents had studied engineering/ technology, 17% had studied computing sciences, 4% economics, 4% humanities, 3% natural sciences, 1% management, 0.5% social sciences and 0.5% remained "undefined". 81% of the respondents were located in Finland, 18% in other European locations, 1% in various other locations (e.g. Japan and U.S.). The location does not tell about the nationalities of the respondents. 3% of the respondents had been with the company for less than 1 year, 10% between 1-3 years, 41% between 3-6 years, 25% between 6-9 years and 21% over 9 years. 81% of the respondents worked in R & D, 7% in product marketing/ product management or marketing, 3% in process, tool or quality development, 5% in support (e.g. in assistance or HD/HRD) and 4% in delivery operations. 62% of respondents worked in specialist type of tasks, 31% were of management, 1% worked in support and 6% remained "undefined".

Interview set	Interview questions prepared by	Timing	Main Topic	Interviews and transcribing conducted by	Number of interviews	Pages of transcribed data	Location of interviews
<b>Set I Interviews (WISE)</b>	WISE EU funded research consortium members (the present author as one member)	Spring 2003	-Work practices - Knowledge creation, sharing, codifying, distributing and retrieving	Interviews: WISE consortium members (professional researchers) The present author identified and organised the interviewees + participated in 3 interviews conducted in Tampere  Transcribing: WISE consortium members (professional researchers)	13	195	Helsinki, Espoo, Tampere
<b>Set II Interviews</b>	The present author	Summer-autumn 2003	- Collaborative work practices - Job roles - Careers -Expert work	Interviews: The present author  Transcription: Master's student of the University of Tampere	24	391	Tampere
<b>Set III Interviews</b>	Master's student of the University of Tampere (the present author being the supervisor from the case company)	Spring 2004	- Workplace learning - Competence development - Expertise	Interviews: Master's student of the University of Tampere  Transcription: Master's student of the University of Tampere	9	148	Tampere
<b>Set IV Interviews</b>	The present author	Spring-autumn 2006	- Careers - Boundaries	Interviews: The present author  Transcription: The present author	7	27	Tampere

**Table 4.** Description of the four sets of interviews

*Set I* interviews were conducted as part of a European Union IST (Information Society Technologies) research project and both sociological and tool improvement related research themes were included. The overall perspective was knowledge creation, sharing, codifying and retrieving with a special focus on partner interface. This data was partly expected to provide knowledge of the type of boundaries in the organisation and possible boundaries between different organisations. The interviewees came from Helsinki University of Technology and the interviews were conducted both in Tampere and in Helsinki/Espoo area. All 13 interviews were recorded with Windows Media Encoder and transcribed by the same researchers. The present author was one member of the team that prepared the thematic questions and also acted as the overall project manager for the whole IST project in the case company. I participated in the interviews conducted in Tampere.

*Set II* interviews were prepared based on what knowledge had already been gathered from the set I questions. The perspective in the set II themes was collaborative work practices, job roles, careers and expert work. 24 thematic interviews were conducted by the researcher and recorded with a Minidisc device. The *Set II* interviews were transcribed by a Tampere University Master's level student who was working on her own master's thesis in the case company.

The *Set III* interviews were conducted by the same student who transcribed the *Set II* interviews. They formed the corpus of her master's thesis (Kankaanpää, 2004) and acted as an additional input to this study. I acted as the supervisor of the master's thesis on behalf of the company. It was separately confirmed with all *Set III* interviewees that it was possible to use the data in this dissertation.

The *Set IV* interviews were fewer than the other sets. With this final set I wanted to gather further insights into the careers and boundaries in the case organisation. In these areas the data gathered previously did not seem sufficient. The interviewees were mostly the same people as in sets II and III. There was one new interviewee in set IV. The check interviews conducted in 2006 focused on the careers and boundaries but they also enabled me to check some issues and findings related to the earlier material. In this phase of the study the focus areas had already been sharpened so that there were no longer questions on multi-professional collaboration which had not brought out any valuable output in the previous sets.

The author of this study arranged to recruit all the interviewees for all four sets. The interviewees were from different functions and process phases in R & D. There were 14 projects managers, 11 engineers, eight senior managers, nine managers, four specialists and one assistant. 25 interviewees were females and 22 males. Four interviewees in set I were from partnering companies working closely with Nokia. 16 had been or were in R & D boundary roles at the time of the interviews. Two interviewees in set II had recently been employed by the case company but were employed by another organisation at the time of the interviews. Their contribution was equally important; their insights on the case company were fresh because they had just recently stepped

over the organisational boundary. The intention was to gather data to the point when there is no remarkable new information arising from them (saturation point.) The interviews yielded important data related to the boundary practices, job roles, careers, expert work, expertise and features of self-organising. The research topic was relatively challenging and quite extensive. For some points it seemed as if the saturation point was reached but for some others it did not seem to saturate. The interviews proved to be the most valuable source of results compared to the survey, observation data and the documents. There were several external readers who familiarized themselves either with the data or the research report. The student of adult education who transcribed the *Set II* interviews wrote a summary of her findings on the interaction between the interviewer and the interviewees (Kankaanpää, 2003). During the process one person from the case company has read through the report several times and commented on the findings. Two more have read through the report at different phases of the process and provided some additional comments.

All interviews were conducted in meeting rooms on Nokia premises, very close to where the interviewees engage in their normal everyday work practices. The length of the face-to-face interviews was from one hour to two hours. The open-ended thematic questions were planned to give space to the interviewees' associations and thoughts about the topics. In interview sets II and IV the theme was first given to the interviewee to consider and talk about. The more specific questions were available in the interview frame if needed. The interviews were more like free discussions around the selected topics rather than structured interviews around a fixed questionnaire. The master's thesis worker who transcribed the *Set II* interviews concluded that the interviewees seemed to talk very openly about both advantages and drawbacks of their work environment when they noticed that the interviewer was also familiar with the environment. The other remark was that in some cases the interviewer stuck to some familiar common touching points, like products, and got to grips on them, possibly leading the conversation in a direction of the common interface (Kankaanpää, 2003).

#### 6.3.4 OBSERVATION AND FIELD NOTES

The purpose of team situation observations and audio recordings was to gain a more in-depth view of how the boundary crossings actually take place in real-life situations. In the planning phase the main focus was set on highly interactive team meetings like specification or design workshops or brainstorming sessions where there should be people representing a range of different professional/process phase groups or organisational functions. Eventually, three "team meetings" were observed and audio-recorded. The recorded meetings were Product Information and Learning Solutions team for Business Area X (22 Sept 2003) and two Tampere Site R & D Product Line Council meetings (5 Nov and 3 Dec 2003). The participants of the latter were included in the

*Set II* interviewees. Audio-recording was used after careful consideration; it obviously disturbed the ongoing team discussion very little since people are used to attending phone conferences and do not mind a Minidisc on the table along with the conference phone. A video would have been available but after discussing with several participants, the researcher opted for audio recording.

Observation notes were collected in these meeting situations freely covering notes on the setting of the situation, the participants, activities and interactions, frequency and duration and subtle factors like informal and unplanned activities and non-verbal communication (see Merriam 1989, pp. 90-91). Field notes were also made during the first research leave when going around in the coffee rooms and open spaces. A collection of pictures is also included in the observation diary; two of them are included in the final report. Perhaps the most valuable part of the observation and field notes were the tentative ideas of the emerging themes and patterns that I had developed in my mind during the observations. They were the outcomes of the hermeneutic process intertwining observations, data gathered or being gathered and research literature.

It proved extremely difficult to find relevant observation situations and it seems indeed that the established “teams” are more like steering groups or presentation forums with fixed agendas. This observation strengthened the view of complex networks and flexible knot-working. It seems to be very hard to get to grips with flexible knotworking even if the researcher is in the same organisation. It soon occurred to me that if I wanted to concentrate on an activity theoretical research from an activity theoretical perspective I would need to build up a completely different research setting. The two meetings selected were not the best ones to gain insight into the boundaries and boundary practices. They were institutionalized meetings (one homogenous and the other one heterogeneous). A much wider set of interconnected activity systems should have been brought into the picture. I would have needed to get my hands on the knots and other setups that were not institutionalized but set up on a needs basis. (The “workshops” described by the interviewees and interpreted as being institutionalized learning activity gatherings would probably provide especially valuable data for a researcher.) The data from the observation and field notes were not used extensively. It is rather used as additional support data.

### 6.3.5 INTRANET DOCUMENTS

The intranet documents were likewise used as background support. They were used for *Chapter 7*, where the case company is presented. They were used to evince the official statements related to the research topics and to describe the case organisation.

## 6.4 ANALYSIS OF THE DATA

In *Section 6.4.1* I will introduce the path that led towards the final focus of the study, i.e. the side paths and the itinerary towards the final topics in the research report. In *Section 6.4.2* I will present the analysis and interpretation of the data, i.e. the process that led to the selected topics, themes, interpretations and conclusions. I will focus on the analysis and interpretation of the main data source, namely the interviews. The additional data (survey data, observation diary, meeting observations and intranet documents) was used to clarify, support and complement the topics, themes, interpretations and conclusions predominantly based on the main data corpus.

### 6.4.1 FINDING THE RIGHT PATH AND FOCUS

In the course of the research process several directions were rejected. In the very beginning the *action research approach* was discarded because small-scale research interventions are difficult in the type of company where changes are so recurrent and where the engagement of people themselves in the initiation and development of work transformations is encouraged. A small-scale outside intervention, where the final research results would be available long after the start did not seem feasible. Also, the exploratory approach to the subject matter required more of a hermeneutic qualitative study than action research. This does not mean that the results of this study would not have served the purpose of providing new knowledge for the case organisation. This is achieved in several ways: I gathered and condensed the results of the survey questionnaire per answering organisation and provided for further analysis and discussions to respective organisational entities. Moreover, the interim results have been presented and discussed in intra-organisational sessions. Also, a few employees of the organisation read the final report as the research process progressed; these readers provided valuable comments on the report and the cross-checkers themselves obtained ideas for their own work. The final report will also be available to the people in case organisation.

Secondly, one of the original candidates for research topics, *multi-professional teamwork*, was omitted. At the beginning of the research process I tended to emphasise myself the existing boundaries and the boundaries to be crossed between different professional groups. In the course of the research process, the whole concept of *boundary* proved to be a much wider and multi-faceted phenomenon than my original strict perception allowed me to assume. It did not seem feasible to approach the phenomenon solely from the "multi-professional" perspective; Payne's (2000)<sup>5</sup> approach, probably viable in health care and social work contexts, did not provide a solid explanation for the phenomenon of boundaries in this study. Thirdly, an *ethnographic approach* was

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5. For example Payne (2002) and Beyers (1998) have studied health care professionals in multi-professional teamwork, where the roles have traditionally been rather bounded.

abandoned because being an employee in the case organisation is too close a position to the context to study it purely ethnographically.

Fourthly, interaction in meetings in the form of purely discourse analysis was rejected. One part of the data of this study consists of recordings of work council meetings and of one R & D sub-project meeting. During my first study leave and in the role of a researcher I realised that formal meetings tend to have a formal agenda and be more information sharing situations than knowledge creation situations. In order to have a wide enough perspective I should also have participated in other forms of interactions that I know exist from the interview scripts (and from my own personal experience, too): all kinds of ad hoc sessions, creative non-regular workshops and many more. If this study was to be an exploratory one, investigating the very nature of boundaries in the case organisation, then a pure discourse analysis of a series of (official) meetings was not going to be enough. I came to understand best about the nature of boundaries and boundary work when listening to how the research participants told about their work in the course of the interviews.

Fifthly, there would have been an opportunity to report only the quantitative analysis of the survey data. However, this approach was soon discarded when I realised that there were no great differences in the extent of collaboration (crossing the boundaries) between the people working in different process phases and functions that had been selected as the starting point for the survey background information. (Process phases and functions are often used as a starting point in other kinds of studies within the company.) Also, when comparing the quantitative data and qualitative data it was easy to see that the qualitative data provided a more multifaceted view of the phenomenon compared to the structured survey. This confirmed my choice of *taking the interview data and the qualitative, exploratory approach as the main line of approach in this study*, although I did indeed use all other data as additional data in the compilation of the final results.

Sixth, the vein of thought based on purely (cognitive) biological thinking of *autopoiesis* was rejected as it contradicted the very ontology of my thinking. Also, for me Tuomi's bridge between the biological thinking of autopoiesis and the communities consisting of humans, "almost autopoietic" systems, is not enough. However, I acknowledge that using Luhmann's conceptualization of social system (own identity and code of communication) poses a threat to the coherence of the ontology in this study. I use social system as a conceptualization on a system or community level, referring mostly to the functions in the organisation that have their own identity and code of communication that have developed over the time. Still, I emphasise human beings with their own awareness and goal orientation (they are not only "environment" to the social systems).

Finally it proved not possible to use the activity theoretical approach in its full scope. This was partly due to the data that was mostly gathered from individual informants from various different teams and parts of the organization. Had one wanted

to investigate boundary crossings between activity systems the best way to gather data would have been through different kind of data and/or methodology (data from people in just few selected activity systems, data through collective negotiations or developmental work research). A historical analysis of R & D work would also have been required. Despite all this I wanted to keep more dimensions than just one in this study, even though it has caused complications for its ontological “simplicity” and logic. Thus, activity theoretical elements are used to categorize some findings identified in the data.<sup>6</sup>

#### 6.4.2 ANALYSING AND INTERPRETING; DETERMINING TOPICS AND THEMES

The original starting point for this study was the concept of boundary that initially limited the focus of the study. It gave the structure to the conceptual part, where I focused on boundaries, boundary practices, integrating over boundaries (collaboration), job roles, careers and expertise. These areas were taken from research that had focused on boundaries or related phenomena. The research questions were also formulated around these topics (boundaries, job roles, careers and expert work). I specifically wanted to explore the nature and dynamics of boundaries in expert work. The analysis is predominantly based on the data and the findings are empirically grounded. The findings and partly the concepts are induced from the data; *the origin of concepts and problems are in the “local/emergent”*. (see Järvinen, 2004, p. 37, Deetz, 1996) I used

6. Engeström (1987, p. 78) claims that “the [activity system] model suggests the possibility of analyzing a multitude of relations within the triangular structure of activity. However, the essential task is always to grasp the systemic whole, not just separate connections”. Nonetheless, activity theory has already been applied for example in the fields that have traditionally been approached from the positivistic/ systems theoretical perspective: the information systems field (see e.g. Nardi, 1996) and human-computer interaction (Bannon, 1990). Based on Kuutti (1999, pp. 372-373) activity theory may help adequately maintain the relationship between the individual and social levels in the objects to be studied, especially in situations with emergent features of change or transformation. He goes on to claim that activity theory, by its very nature, is multidisciplinary. Kuutti emphasises the fact that the object of the study is a central concept that could draw together various disciplines to discuss in the spirit of common interest: “If we hold to the basic assumption that activities are minimal meaningful objects of study in which human qualities have to be taken into account, we must then admit that activities as wholes cannot be exhaustively studied by any individual discipline. In fact, one arrives at the conclusion that several disciplines should actually have the same context with respect to the research object, namely, the context formed by activity. Although they are focused on different aspects of activity, all other context-forming parts must be also taken into account in order to preserve the validity of research. This common core of the object of study could dramatically enhance the possibilities for different disciplines to discuss with and benefit from each other.” (Kuutti, 1999, pp. 372-373) Thus Kuutti’s proposal is that various disciplines, even from various different paradigmatic backgrounds, could find a common denominator in the context formed by activity. In this study I have adopted the same view as Tuomi (1999): there is a multitude of units of analysis that need to be taken into account when analysing intelligent organisations. The activity theoretical perspective has been taken into account in this study even though no one activity system has been “grasped” as a “systemic whole”. Along with the developments described above in the research field, the requirement to use research results from various disciplines increases, likewise the temptation to use them in an eclectic manner. In the search for a new paradigm, active individuals, communities, societal change and multidisciplinary should be taken into account. It is easy to concur with Kuutti (1999, p. 372) when he asks the following question: “But if several research results from several different disciplines should be used, how can they be fitted together?” From the perspective of this study, the above question is very relevant.

the theoretical frameworks loosely as stepping stones throughout the study. Findings related to links over the borders, integrating over boundaries and job role boundaries are categorized based on some elements and sub-processes in the activity system model.

I describe the case organization and context by using the frameworks of activity theory, dynamic open complex adaptive systems (DOCAS) and social systems. The mappings are rudimentary and describe in more detail some of the organisational entities that will later be used in the analysis. The intention is to depict the context and environment. For this mapping I used partly the interviews, partly the organisational charts and partly my own knowledge. Secondly my aim was to investigate the boundaries related to the structures within the organisation (bounded-unbounded). This proved challenging, since via my data gathering methods I had not actually very well reached the temporary and unbounded structures in the organisation. I attempted to investigate what one case example of a structural coupling, mentioned by a couple of interviewees would show me.

*Organisational change* stuck out from data as a decidedly prevalent feature in the work environment of the interviewees. I have thus described how the organisational changes manifested themselves to the employees and what kind of implications they have for boundaries. My interpretation was that organisational change is a catalyst that reconfigures boundaries. *The work context description from an individual employee's perspective* is based on the interview data; the parameters in people's environment and *the changes* therein. As the analysis progressed, I listed these and ultimately mapped them onto structural and integral factors according to their relation to the what was being designed in the case organization (products).

To begin with I had picked "boundary" in R & D work as one topic around which I gathered any findings in the data. I used mostly Orlikowski (2002) and Ashkenas et al. (1995) as a classification under which I gathered the findings. I refined the classification further (for example, took customer boundary as a separate one). The dynamics of the boundaries are my own interpretation based on the informants' descriptions. The *dynamic links over the borders* emerged from the data. I started gradually to pay attention to the findings related to what the interviewees reported about what *enhances* and *facilitates* their work. In a volatile and a changing environment (my reasoning) there are bound to be some elements that enhance the synchronization, alignment and coherence over boundaries. Originally I just listed the identified elements and called them "boundary glue" which, however, as a term felt too static to describe what I was after. I continued the analysis and noticed that they can be related either to the division of labour or social rules (sub-processes of distribution and exchange) and they have a certain nature.

For *integrating over boundaries* (collaboration) the data would have provided plentiful options to concentrate on. I ended up in describing the collaborative work in general by using data from the interviews as well as the survey. Concepts of social capital, trust and network ties are used to discuss the forms of collaborative work in the

case organisation. Further, in the spirit of boundaries, the following themes emerged from the data: the boundaries around the meetings and knots and the boundary between individual and collaborative work. The findings were categorized under the tools and implicit social rules (production and exchange sub-processes) in the case organisation.

With the *job roles* I concentrated on the findings related to the boundaries around job roles and the overall job role structure in the case company. The data related to the job roles was equally plentiful. The findings were classified under division of labour and tools (distribution and production). With the *careers*, I focused on the career boundary crossings and identified parameters related to them. I also investigated the data in terms of how boundaryless or bounded the careers in the case organisation proved to be. With *expert work and expertise*, I gathered data around the idea of “extending” the boundaries” of one’s expertise that emerged from the data. I also included in the report one *feature related to the expert work*, “*detective work*” which also stuck out from the data very clearly. I finalized the results by listing some features that the interviewees evinced as features enabling them to cope with their work in a volatile environment. From these features I made a list of challenges and important questions for the experts in boundaryless environments (my interpretation).

Some of the findings are thus directly picked from data and some are a result of interpretation. The subject matter being an abstract concept, the role of interpretation was significant. For example, I invoked ideas related to boundary permeability and impermeability on the basis of the interviewees’ stories about how reachable something over a boundary is, what the interviewees’ level of contact with it is and what their attitude is to reaching that something over the boundary. In the interim summary and discussion sections I have summarized the results from each chapter and briefly discussed them by bringing in some of my own knowledge (for example, when discussing the tentative reasons for some boundaries becoming more permeable and some becoming more impermeable, see *Table 9*, p. 207). This was about searching evidence for “why” questions behind relationships. I made some adjustments during the data collection process to the questions I emphasised in the interviews due to the enhanced understanding I had gained (Järvinen, 2004, pp. 73-79). However, I did not specifically ask about boundaries (only in interview set IV).

The dominant mode of analysis with the main data, interviews, was qualitative data analysis. The results of the survey serve as additional data. I have used some quantitative basic figures related mostly to collaborative work and some survey open answer quotes wherever appropriate. The basic starting point for the outcome of this study, however, was the interview data. The open answers in the survey proved in any case to be good additional data and I checked that none of the interview findings contradicted the survey findings. The data analysis started in the data gathering phase (Marshall & Rossman, 1995, p. 112). I started to sketch the initial patterns and themes in the field notes. Reading through the data was an important part of the

analysis process. The analysis and evaluation of the data were done in parallel with reading the research literature and theories, gathering data and writing the research report. The interviews were read through several times, and all along I wrote down possible pervasive themes arising from the data. On my desk there were four thick folders of transcribed interview data and another folder of field notes and open answers to the questionnaire. I read through the material several times and coded in the marginal emerging topics or themes. These themes were written on the interview transcript papers, on yellow stickers and on a flipchart on which the yellow stickers were at the end of the day placed under the right themes. The characteristic patterns were identified and selected interview quotes subjected to hermeneutic interpretations (Polkingthorne, 2000). I intuitively used flipcharts as displays to help in classifying and evaluating the emerging themes, concepts and patterns. Within each flipchart I had one topic and I gathered related findings (concepts, themes, ideas) under each topic on yellow stickers. In order to make sense of the (occasionally chaotic) data I used typical qualitative data analysis methods. I noted patterns, themes and clusters. I noted relations between factors and subsumed particulars into the general (Miles & Huberman, 1985, pp. 215-230). The Word search was used to search for themes, but did not seem to provide any additional help in addition to the findings resulting from reading through the material and manual coding. In the final phases I decided what I wanted to include in the research report bearing the idea of boundaries in mind. When writing the final section that summarizes all the results, I gathered findings under the two research questions mostly from the interim summaries.

Most of the themes to be reported started to emerge as I used the display flipcharts and yellow stickers. I wrote some of the shortest quotes on a yellow sticker and added them to the display under the right theme or finding. I picked the longer quotes from the interviews and copied them on a separate sheet and added them to a plastic folder with the theme name on it. At a certain phase the number of quote extracts related to most findings was quite overwhelming, which was still the case in a certain version of the research report. Reducing the number of quotes was then one step in the writing process, as was the process to find the parameters to describe the *dynamics and nature of each type of boundary related phenomenon* (boundaries, catalysts that reconfigure boundaries, integrating over boundaries, dynamic links over the borders, job roles, careers and expertise). I also drew numerous pictures and made several tables to summarise findings related to a certain theme; some of these have ended up in the final research report. The analysis and interpretation of the data was very similar to the hermeneutic method. In hermeneutic method the interpretation of meaning of a certain text is characterised by a hermeneutic circle. The understanding of a certain text takes place through a cyclical process, where the meaning of the separate parts is determined by the global meaning of the text. The determination of separate parts may change the originally anticipated meaning of the totality, which again influences the meaning of the separate parts. The hermeneutic explication of the text is an infinite

process, which ends, in practice, when one has reached a sensible meaning, free of inner contradictions, for the text. (Järvinen, 2004, pp. 189-191)<sup>7</sup>

Set IV was conducted to check and clarify some themes and to gain some further data, especially the themes of career and boundaries. At a certain point I started to write down the findings and categorizations, and at that point the analysis moved mostly to paper and word processing. The *Set II* interviews served as the main source of data for these themes to arise. Sets I and III were used as support material in theme identification. When the themes had been identified these sets were also taken into account to form the theme contents. It required several reading times, a great deal of time and effort and numerous hermeneutic cycles to identify the themes, topics and concepts to be highlighted in the results. In this phase it was the text that “spoke” to me. I tried to detach myself from the themes defined in the original interview frames and look at the text and see what it revealed about boundaries in the interviewees’ environment. The individual interviewees are not emphasised as such in this study. More generic dynamics and patterns embedded in individual stories were sought.

Rather long quotes (thick description) are used in order to shed light on the work environment and demonstrate how the interviewees talked about their work. The quotes enable independent judgements on the results of the analysis. Getting as close as possible to the human experience is a central goal in qualitative research. I have used quotes to display particular forms of general patterns identified in this study. They illustrate an idea or some parts of it. They represent the thoughts, feelings and moods of the interviewees. Quotes have thus been used to validate the research findings and to vitalize the research report. Due to the large amount of data I have not distinguished the speakers but rather looked for general patterns. The large amount of data has also made possible the strategy of looking for general patterns and not to focus on individual cases throughout the work. This was also an ethical choice. This way the individual voice is visible, but no individual people can be identified from the quotes. With each quote I have added the job role and gender. In order to protect the anonymity of the interviewees, the detailed job titles were removed and replaced by the simplified job role classification that I use in this study. The interviewees are thus classified senior managers, managers, project managers, engineers and specialists (+ an assistant). References to R & D boundary roles are made where relevant. The shortest quotes I have placed in the text without identification marks and the longer ones appear as separate quotes. (see Sandelowski, 1994)

Working with quotes, the selection and editing process was laborious because I wanted to make sure all findings were grounded in the data. (This was especially important due to my role as an employee in the case company; I tried to avoid letting my own pre-conceptions enter the results. Naturally my conceptions had an influ-

7. *The seven canons of meaning interpretation are: back and forth process between parts and the whole, reaching “good gestalt”, i.e. good inner unity of the text, testing the autonomy of the text, gaining knowledge about the theme of the text one is interpreting, explicating the interpreter’s presuppositions and involving innovation and creativity to the interpretation. (Järvinen, 2004, pp. 189-191)*

ence on what I picked out of the data and how I interpret it.) For most points there were numerous quotes that were then reduced in the course of the writing process. For some obvious points there are no quotes. (Again, I made the choice on which quotes to retain and which to omit. For someone else, some of the quotes omitted might not be obvious and the other way around.) I have noted separately if a certain finding is based on only one interviewee mention. With all others at least two or more interviewees mentioned a certain issue. (see Sandelowski, 1994) I translated the selected extracts from the interviews from Finnish to English. Some of the features of the language may have been lost. However, I counted that this is sufficient, given that I know much of the jargon and language used in the case company and also have a linguistic educational background (teacher of English). The report including the quotes underwent a formal language check and some minor corrections, mostly grammatical, were accordingly made to the quotes.

## 7. PRESENTING THE CASE ORGANISATION

The case organisation, Nokia Corporation, is a large global mobile communications and new technology based business company. In 2003 the company employed 51,359 employees. Out of these 22,300 were employed in Finland. The turnover of the company in 2003 was 29,455 MEUR. (At the end of 2005 the company employed almost 60 000 people worldwide. Almost half of the employees were located in Finland.) The average age of the employees was approximately 35 years. The R&D investment of the company has increased from the 3 billion in 2001 to 5.6 billion in 2007. *Nokia Networks* was one single business unit at the time of the data collection. Within Nokia Networks the previously separated units focusing on *radio access systems*, *core networks* and *operator software systems* were gathered under one organisational umbrella in 2002. The business objective of the company is to strengthen its position as a leading communication systems and products provider in the mobile world. The business environment of the company is the global telecommunications industry and in the mobile industry in particular, each of which has exhibited rapid growth, change and convergence in recent years.<sup>1</sup>

The organisation had gone through a long period of organic growth that has been conducive to the development of commonly shared values, stories and ways of working. Increased cost efficiency started to impose more and more requirements on schedules, product cycles and innovativeness. Processes were being developed to be increasingly incremental. Nokia Networks faced financial difficulties in 2001. Nokia had been a “hostage to the unrealistic expectations that operators based on 3G WAP-based (wireless access protocol) data applications, and to the huge commitments made by the European operators to purchase 3G licenses from governments” (see Doz & Kosonen, 2008a, pp. 162, 208-209, Doz & Kosonen, 2008b, pp. 105, 109, 115). Just before the first set of interviews was conducted there had been a hard period of

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1. *At the end of 2001 Nokia had employees in 54 countries the top three being Finland, United States and China. In 2001 employees represented 119 nationalities and spoke 90 different languages.*

downsizing in the business group under study; employees in Finland were under threat of redundancy that left its marks even though the final number of jobs cut was low. The glory of R & D and IT occupations had passed its peak.<sup>2</sup>

The products being developed, especially in the business unit of interest in this study, Nokia Networks, are the kind of customer-intelligent products depicted in Victor & Boynton's (1998) and Engeström's (2004) co-configuration work. In this case the adaptive customer intelligent products are *configurable network infrastructure systems*, the *management systems of network infrastructures* and the *services* concerning the set-up and maintenance of these complex products. The *customers are the operators* providing network infrastructure services to the individual end-users of mobile (and to a lesser extent to fixed) phone users. Thus, the business model is about business-to-business and increasingly service business to service business. There is a continuous relationship of mutual exchange between the customers, producers, and the product/service combinations. The people working in R & D are not all in regular contact with customers (20% of the survey respondents of this study) but the figure is still significant given the number of people working in R & D. Those working in customer account teams close to the customer's main location form a close partnership with customers. Within the company internally there are many channels through which employees, even those without regular contact to customers, can find information about the customers. Strategic information on customer collaboration is shared in strategy sharing events directed to all employees. Many parts of the products are built around the customer processes; for example the network management system as well as customer documentation (created by the technical writing function) are built around the operator processes. The service business on a big scale is a new business model in the case business unit; it was introduced around 2004. The ongoing configuration and customization of the product/service combinations is done over lengthy periods of time and the customer relationships are lengthy. The speciality of software products is that they are developed and produced in parallel and can be distributed electronically to the customers. In the product portfolio of the case business unit there are both purely software products and combined software and hardware products. One historical development of the business model in the 21st century was to go more and more intensively towards *integrated system products* instead of separate but seamlessly working products (network elements). The systems need to be tailored to the various differing technological standards in global use in different geographical areas. Thus, intensive collaboration between various parties in global standardization forums is also needed.

2. *As of the beginning of 2004 the former, Nokia Mobile Phones (NMP), was split up into Mobile Phones, Multimedia and Enterprise Solutions. In addition, two horizontal groups: Customer and Market Operations and Technology Platforms were introduced. After the data of this study was gathered, the business unit focused on in this study, Nokia Networks, was merged with Siemens Networks as of the April 1<sup>st</sup> 2007 to form Nokia Siemens Networks (NSN). NSN is in a holding company relationship to the mother company, Nokia. In 2007 it was announced that the mother company, Nokia, was to be re-organised into a completely new setup consisting of two businesses: Devices and Services & Software.*

One feature of co-configuration work is the intensive collaboration between producers operating in networks within and between organisations. For the case business unit this means seamless collaboration of all parts of the organisation due to the intense interlinkages of the whole integrated system and their configurations. Furthermore, the business model of the “*extended enterprise*” means that the work is done in collaboration with a number of subcontractors, vendors and (strategic) partners which produce parts of the whole system. The challenge for the case company is to *combine agility and the economies of scale* in a volatile and complex global business environment.

The case company is a typical R & D oriented product development company where all activities and human competencies are in place to contribute either directly or indirectly to the efficient development, productisation, marketing, manufacturing and delivery of new products in the selected market segments. The company makes large investments in research and development; in 2002, 38% of the personnel worked in research and development and 10.2% of net sales was invested in research and development. Viable new products and services that meet customer requirements are the core objectives of all the company’s operations; both design and support personnel are geared to developing best possible products, which should be reflected in the profit figures. Most of the research and development projects contribute to a “product program”, which includes cross-functional teamwork, i.e. all organisational functions are an integral part of the product program organisation (see more e.g. Doz & Kosonen, 2008a, pp.104-105).

When this study was conducted the official values of the organisation were *customer satisfaction, respect, achievement and renewal*. The “Nokia Way” and these values are the first element of the so-called “*employee value proposition*” (EVP). The “Nokia Way” is implemented through the values, the employee value proposition, management & leadership philosophy and employee participation. Employees are encouraged to show initiative and to be responsible for their own development. They are encouraged to engage in open discussions and debate. Employee satisfaction (later to be changed to “engagement”) is followed-up with an annually and globally conducted “*Listening to You*” (LtY) employee opinion survey, which is regarded as an efficient way of receiving feedback from the employees.

In the Nokia rewarding and benefits system, *performance* is heavily emphasised. With *performance-based rewarding*, the company’s intention is to provide market competitive rewards. Employees are rewarded for good performance, competence development and for overall company success. Performance-based remuneration is the second element of the employee value proposition.

*The Investing in People process* (IIP) encompasses objective setting, performance based incentives, strategy cascading, performance management and individual personal development discussions. The IIP discussions between line manager and employee are held at least twice a year. The turn of the year round includes target setting for the first half of the coming year, achievement review of the past half year, and the

performance evaluation discussion for the whole year. The summer IIP includes the six-month target setting, achievement review of the past 6 months and the personal development discussion for the whole year. The IIP process is deeply embedded in the way the company works and provides an excellent tool to cascade strategies to the objectives of individual people. Through these discussions employees can discuss with their line managers about what is expected of them and how their individual achievements support the overall company strategy and how they are rewarded. Each employee is encouraged to be active and take ownership of IIP. The objective setting, achievement review, performance evaluation and personal development plans are documented in the web-based IIP tool. It is also possible to conduct a competence evaluation with the same tool.

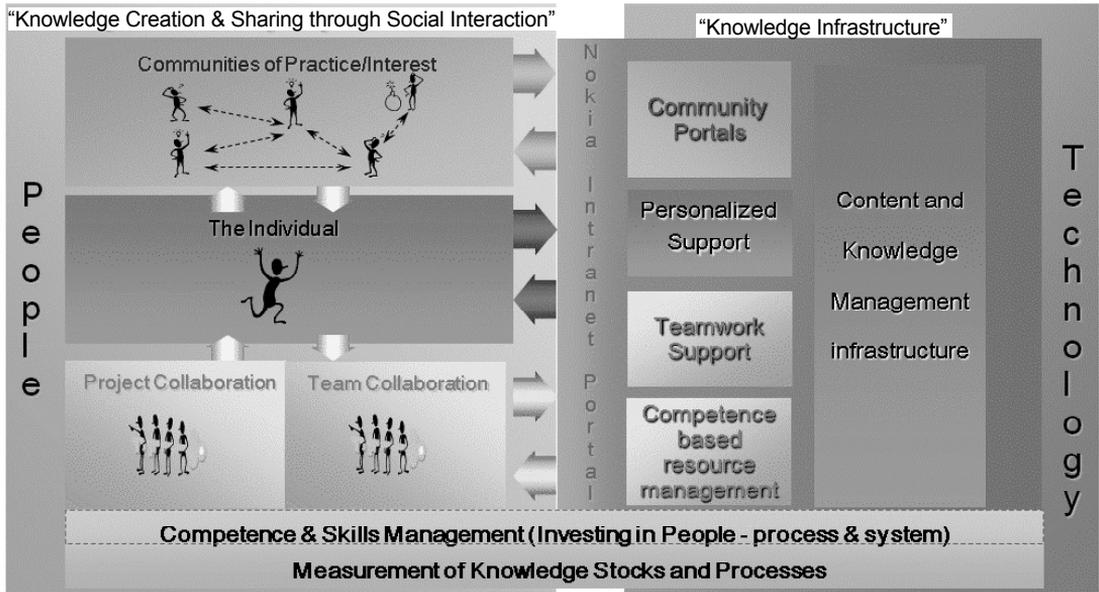
*Benefitting from differences and diversity* is an important aspect for the case organisation's official strategic intent and has been specifically documented as follows:

“Diversity is an important aspect of the business for many reasons, but especially for the following ones: To succeed in a diversified market place, creativity is a key factor for success. Diverse teams are more creative and find better solutions than homogeneous teams. The diversity of the market place must be mirrored in the organisation too, to ensure the understanding of customers needs. Hiring best employees globally includes people of diverse nationalities and cultural backgrounds. Respect for an individual's contributions, as well as a willingness to work together in a constructive, positive way is also at the heart of company's values. (Company intranet, Autumn, 2003)

Teamwork processes and networks are emphasised instead of a layered vertical way of working.

People form the continuous links in the team chain, which makes things happen and integrates all operations in a process-based organization. The main reason why most organizations have moved or are planning to move towards process- and team-based organization is that it facilitates the acceleration of change implementation. Traditional line-organization is slow and expensive, having several management levels involved in decision-making. In process- and team-based organization strictly defined job descriptions and formal criteria for jobs will become less significant and the personal ability to co-operate and work with different teams will become more and more important. (Company intranet, Autumn, 2003)

The Nokia view of knowledge management (KM) at the time the data was gathered was that which encompasses the tool infrastructure, people networks and social interaction (see *Figure 18*).



**Figure 18.** Nokia Knowledge Management (Company intranet, Autumn, 2003)

The official career philosophy in the case company, *career self-reliance* (introduced around 2002-2004), is highly compliant with new career theories; the employees are responsible for their careers and for continuously developing themselves and for being flexible. This philosophy was already part of the Nokia Way even though it was officially written into the policy documents around 2004 (Mäkinen, 2006). The organisation has likewise taken responsibility for providing the learning environment and supporting the employees with career development tools and processes. The *Internal Job Market* (IJM) is an e-tool in the intranet that is constantly available to all employees globally. IJM is the place where all the positions vacant within the company are globally advertised for everyone to apply for.

The formal way to define a person's "job" at a certain point in time is to attach a company wide *job profile* to his/her *position*; the levelling in the job profile also defines how the job is evaluated in the grading system. The job profiles also provide managers with a starting point to outline resourcing and recruitment needs. In addition to company wide job profiles, there are also business group specific job profiles in some areas. The global e-tool built around the global job profiles presents jobs available in fields like R & D, Information Management, Finance & Control or Human Resources.<sup>3</sup> As this is in the format of a compass, it imparts a mental model of non-linear career paths rather than traditional linear careers within one vertical function. The above-

3. The fields with an employee "career path" and job profile list are as follows: R & D, Information Management, Communications, Finance & Control, Human Resources, IPR (Intellectual Property Rights), Legal, Operations & Logistics, Quality & Processes, Sales, Marketing & Business Development, Services, Sourcing and Workplace Resources & Security.

mentioned fields very often form the functional structure in the organisation. On a more personal level, an *individual job description* should be made for each individual position in cooperation with the employee and the line manager. Proliferation of job categories, job profiles and competencies led to a simplification project (2004-2006) where the old categories were removed and a more simplified structure was set up. During the period of growth the options for job advancements and career shifts were extensive. It requires much more conscious effort to keep up with providing career and development options in a company that is maturing from a headcount perspective.<sup>4</sup>

Continuous learning is high on the company agenda. The third element of the employee value proposition is *professional and personal growth*. It is also embedded in the value “renewal”. The company provides its employees with a variety of learning and development solutions. For example, the following tools are available: assessment services, career counselling, career maps & job profiles, competence development and learning solutions and an internal job market. Also, the job opportunities are included in the learning and development options. There are efforts and projects ongoing to create even more web-enabled and mobile human resources development solutions. Job profiles and related competencies provide the employees with a means to reflect on their roles and competencies.

The company philosophy regarding competence development and learning is built around the so-called “70-20-10” model. 70% of the learning happens through the job and working (on-the-job learning), 20% refers to self-awareness of one’s own strengths and development areas. These are to be reflected by means of coaching, peer cooperation, self-reflection and possibly assessments like 360 for managers and mentoring programs. The remaining 10% of learning takes place through formal learning solutions, like classroom training, workshops, e-learning, the virtual classroom Centra and/or blended solutions. The solutions for the 10% is provided through the *Learning Market Place* (LMP) which is an e-tool for all internal learning solutions globally available in the company and to selected external learning solutions providers. The employees can find company wide learning paths and portfolios linked in the Career Map and job profiles in the LMP. The learning paths/portfolios, the Career Map, job profiles and the Internal Job Market (IJM) are interlinked and complement each other. The fourth element of the employee value proposition is the *work-life balance*. This is supported in various ways: for example opportunities for mobile working, flexi-time arrangements, unpaid time off programs and health care services.

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4. In this connection I am referring to the headcount specifically in Finland. In the most recent situation in 2007 with the inception of NSN (Nokia Siemens Networks), there were again negotiations in Finland (and in Germany) between employer and employee representatives on cost savings and possible headcount reductions. On the other hand, new organisational setups always bring new opportunities, too.

## 8. RESULTS

*Chapter 8* will focus on the results of the study. *Section 8.1* is ultimately intended to further elucidate the *context* and *environment* in the case organisation. In *Section 8.2* I will describe the *boundaries* and *dynamic links over the borders* in this context. Results related to *integrating over boundaries* through network ties, collaboration and social capital are focused on in *Section 8.3*. In *Sections 8.4-8.6* the implications for people's *job roles, careers* and *expert work* are considered. The results are summarized in *Section 8.7* and further discussed in *Chapter 10*.

### 8.1 THE CONTEXT AND ENVIRONMENT OF BOUNDARYLESS WORK IN THE CASE ORGANISATION

Opening up the context and environment in the case organisation is done through using the theoretical stepping stones: *activity systems, nested levels of DOCAS* (dynamic, open, complex, adaptive systems) and *social systems*. The work context and boundaries from an *individual employee's perspective* are highlighted in *Section 8.1.4*. *Organisational changes* as a prevalent feature of boundaryless context are discussed in *Section 8.1.5*. *Organisational changes, open state* and *reconfiguring organisational structures* are recurrent phenomena in the case organisation. These phenomena maintain the looseness of organisational boundaries and facilitate learning, change and development in the organisation.

All structures in the organisation presented in *Section 8.1* are either stable or institutionalized. In this study I take the view that all these institutionalized and stable communities exist (and it is important to present them to the reader), but there is also another level of organisation that co-exists with the more institutionalized one, namely the more ad hoc one where the boundaries are constantly and efficiently

crossed. It is more difficult to make this transient environment visible. However, it is possible to evince some features of this kind of environment. This will be done later in the results chapter.

### 8.1.1 ACTIVITY SYSTEMS

It is not a straightforward task to contextualise the activities in the case organisation into the activity theoretical model even if the aim was a description of the context. The obvious starting point could be the products under development. Practically all interviewees were working in one business unit, developing network infrastructures and services. Moreover, the traditional “products” are clearly focused as the expansion of the service business was not topical amongst interviewees in 2003 nor was it in the business unit at large at the time of the interviews. Regarding the products under development, they are highly complex and developed in incremental steps. Previous (and sometimes future) configurations and generations need to be taken into account in the development of the current version. Further, for example network element products need to be built compatible with a network system. The network elements (products) are developed within projects. These projects may consist of several sub-projects concentrating on various sub-systems, e.g. software sub-systems. There are also dedicated sub-projects for related and needed add-ons like customer documentation (technical writing) or PCT (product competence transfer directed to customers and company internal personnel).

In all these cases the object of activity is relatively easy to identify, if one maintains that it is a product-related object of activity.<sup>1</sup> For a sub-project it can be a software sub-system. For a product program it is a product (network element). (Some products may consist of only software like the network management system and some can consist of both software and hardware like the base stations.) For a system product program the object of activity is a system product. A platform project deals with a computing platform as an object of activity. Usually one platform is used by several products. The overall interrelatedness and intertwining within one system and towards other related systems is striking. Within product programs there are several *process phases* (system design, design, implementation, testing, integration & verification) and *domains* like software and hardware. Following the extended enterprise model, some parts of the system are developed within the case company and some parts in the partner companies. In the incremental way of developing, these process phases are accomplished in

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1. *The object of activity in some other organisational units not directly dealing with the customer products might, for example be a process. The product creation process is directly related to developing products. An enabler process would describe how a product development “enabler” project is conducted (e.g. how a new methodology like object oriented SW development methodology is taken into use or how a new learning portal is developed). IT and other tools development have their own activity systems.*

parallel with incremental release cycle. In incremental development changing customer needs are more easily taken into account.

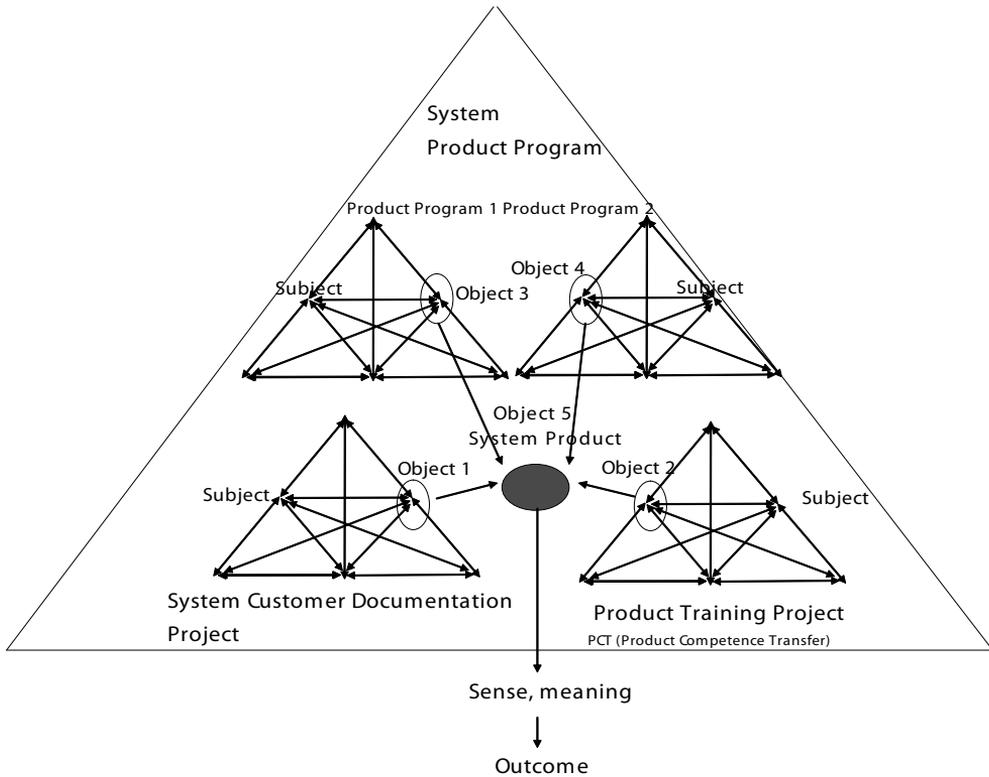
Developing these interrelated platforms, system products and products with their numerous sub-projects requires ongoing sense-making and negotiation among all concerned. People need to orient themselves to new work situations over and over again, they need to have an ability to make mental images of the whole product or process at hand and they need to be able to anticipate the future in relation to the steps they are taking at a certain point in time. (cf. Hinds & Kiesler, 2002, Meil & Heidling, 2003) People encounter boundaries like geography, time zone, technology and culture in their work and they use boundary practices like sharing identity, aligning effort and interacting face-to-face in order to traverse the boundaries (cf. Orlikowski, 2002). Even if an individual is allocated to work within one project developing one product or part of it, his/her work is about continuous traversing of boundaries towards other related projects, products and organisations. He/she may need to deal with other domains, process phases, and possibly with partners and/or customers. The case organisation is a true “multi-organizational terrain occupied by multiple activity systems” (Engeström, 2005b) and a prime example of co-configuration work (Victor & Boynton, 1998) or flexible knotworking (Engeström et al., 1999).

Engeström (2005b) refers to multi-organizational terrains that are occupied by multiple activity systems which “commonly do not collaborate very well although there are pressing societal needs for such collaboration”. In the context of for-profit companies, even if the final outcomes are products, the object of activity needs to be continuously negotiated. Because the individual participants engaging in the knotwork represent different backgrounds, they also envisage the object of the activity in different ways; it is through the negotiation and sense-making processes that the object of the activity also develops further and in concrete terms is made ready to be sold to customers one day (and to be re-worked for the next configuration in parallel and to be gradually abandoned one day after a lengthy period of maintenance when a new generation or technology steps into the picture.)

In terms of the object of activity, the negotiation may take place on any level of an organisation or have any scope; a team might negotiate what the inputs and outputs of the team are or on a larger scale, as when services as a new type of business model/product stepped into the picture. Also, it is debatable whether the ultimate object of activity is to maximize shareholder value or to come up with competitive products.<sup>2</sup> The object of the activity is not a straightforward, clear-cut issue in a complex distributed company dealing with high-technology and complex system products. The object of activity is contested, developing and transforming as also are the activity systems. *Figure 19* presents a simplification of how the activity in the case business could be split up to activity systems if the *products* are taken as a starting point.

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2. *In the mobile device business it is debatable whether the company should be a customer driven, technology driven or market driven and whether it should be a product company or a technology company.*



**Figure 19.** Basic rudimentary mapping of product programs and a system product program to the activity theoretical model in the case organisation

In this simplified example a system product program contains several product programs, a system customer documentation project (technical writing) and a product training project. The system product program coordinates the complex product development work done in product programs that includes all process phases. Those working in system product programs have the system product as their main object of activity (object 5). The product programs within the system program have their own objects of activity that need to be fitted into the system product program's object of activity. Within the product programs there are several sub-projects. Thus, individual employees being responsible for one piece of a much larger product need to have the ability to envisage the bigger picture and the integration of their piece in the total product. Also, anticipation capacity is very much needed as these projects and programs proceed in unlinear pace and often the dynamically living end-result is years ahead (cf. Meil & Heidling, 2003).

A system product program envisaged in *Figure 19* does not even contain all the obvious activity systems that need to be taken into account. Other related activity

systems would be related research projects, technology development or tools projects, process development projects, other system product programs, previous generation and next generation projects and programs, standardization (e.g. 3GPP), handset development, competence development and human resources (especially in terms of R & D incentive/bonus systems). Further, the system program as well as the product programs (and possibly the sub-projects) need to collaborate and align with the (computing) platform activity system that needs to collaborate with other system programs and product programs at the same time. The system product program (for example a radio access system) needs to collaborate and align with other system programs (like a compliant core network system) and possibly with an overall system (for example 3G) program. Moreover there are domains like HW or SW that need to align within their own domain and towards other domains. Partner firms and their representatives are interfaces that bring new activity systems into the picture. Further, there are customers and customer account teams, marketing and product marketing that need to be involved in the program work.

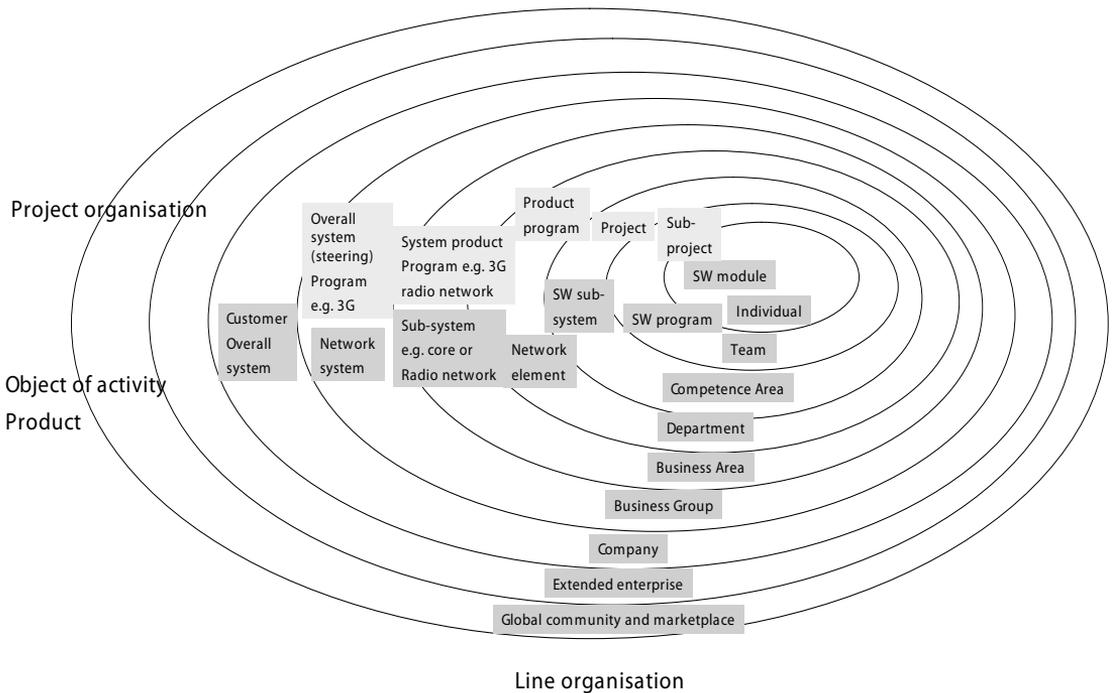
In this multi-terrain of activity systems I have described customer documentation and product training (product competence transfer) as their own activity systems embedded in the system product activity system. This is because I perceive that they clearly have their own objects of activity which is at the same time separate from and included in the common system product object of activity.

One could actually ask what an activity system is in the type of work context that the case organisation exemplifies. What would be a natural or ideal activity system or a group of related activity systems in the multi-terrain of activity systems to be studied? My view is that an activity-theoretical approach complemented with a work developmental and expansive learning approaches are extremely valuable tools (see e.g. Virkkunen et al., 1997). However, in reality it is actually quite difficult to identify activity systems and especially what related activity systems should be brought into the picture to have a close to complete view of the important interfaces of one activity system. In practical terms it is quite easy to create a “natural work unit or team”. However, as stated by Tuomi, activity systems are still institutionalized units of study; in their complete form they already contain a defined (even if it was likely to transform) division of labour (Tuomi, 1999, pp. 271-273).

### 8.1.2 DYNAMIC OPEN COMPLEX ADAPTIVE SYSTEMS

Another view of the organisation is provided by those relying on complexity theories. In dynamic open complex adaptive systems (DOCAS) there are hierarchically nested levels. The systems, networks, or holistic combinations can occur at any level of a hierarchical organisation within an overall nested structure. At any given level of organisation, via the nesting of systems, a DOCAS will be composed of lower-level

micronetworks and will, in turn, be embedded in a higher-level macrostructure. The problem is to relate these multiple nested and interwoven systems so that, via modifications in the lower level micronetworks (the parts), the DOCAS (the whole) evolves to achieve a better fit with the higher-level macrostructure (the surrounding context) – which in turn is composed of other DOCAS-level networks. (Holbrook, 2003, p. 22) *Figure 20* shows rudimentary mapping of various hierarchically nested levels in the case organisation to Holbrook’s (2003, p. 23) description of DOCAS.



**Figure 20.** The case organisation mapped to the hierarchically nested DOCAS levels (cf. Holbrook, 2003, p. 23)<sup>3</sup>

Firstly I have mapped the “line” organisational structures or “hierarchies”; team-competence area-department-business area-business group. Secondly, I have mapped the product (or the system architecture): SW module, SW program, SW sub-system, network element, sub system and network system. Finally, I have mapped the project structure: sub-project-project-product program-system product program- overall system program. Real life is much more complex than this kind of picture can ever show. *In real life, multiple nested and intertwined systems exist, overlap and develop continuously.* Organisational charts would show that there are several business groups within big companies. Within business groups there are several business areas, and within busi-

3. Note that I use here the “bounded” units e.g. individual, team or department (that is an organisational unit). In Tuomi’s (1999, p. 261) terminology the corresponding open units would be human-in-society, community and society.

ness areas there are numerous departments, competence areas and teams. In a matrix organisation there is both line organisational structure as well as the project structure. In a project organisation there is no separate home line base; the project structure combines both current project work and line issues like long-term competence development. Modifications at any level of the DOCAS give impetus for other levels to evolve and develop along the overall system.

### 8.1.3 SOCIAL SYSTEMS

The third perspective presented here is that of social system. The thinking is based on Niklas Luhmann's (1989) idea of social systems that have evolved over time to what they are. In this thinking the social systems can be identified by their own *identity* and *code of communication*. In the case company the starting point for the social systems can be found for example in the way career paths (global job profile structure) are built. The following list of functions can be found in the company but they are differently organised in different parts of the company and at different points in time: *R & D (Research and Development)*, *Business infrastructure/Information management*, *Communications*, *Finance & Control*, *FSP (Financial Services Platform)*, *Human Resources*, *IPR (Intellectual Property Rights)*, *Legal*, *Operations & Logistics*, *Quality & Processes*, *Sales*, *Marketing & Business Development*, *Services*, *Sourcing and Workplace Resources & Security*. Often these fields form separate organisational entities, functions. The way these functions are organised within the overall company evolves dynamically over time.

R & D needs to organise its own activity so that all *domains* related to products (e.g. SW, HW, system architecture) are taken care of and so that all *process phases* within the incremental product development are taken care of. The contacts and the way of working with all other above fields need to be established and continuously updated. Within the R & D career path there are the following "sub-functions": *engineering (engineers and specialists)*, *research and science*, *industrial design*, *project management*, *support (e.g. technical writing and localization)*, *product management and line management*. These functions could be studied as social systems that exist in the case organisation. These social systems are exposed to each other through intensive cooperation within different kinds of projects and programs.

Following Luhmann's (1989) reasoning, social systems differentiate themselves from the surrounding environment through their specific *code of communication* and specific *identity*. Luhmann's social systems are thus rather bounded since over the time they have developed into separate systems that can be differentiated from other systems. Often different social systems can be more prevalent in certain organisational functional departments. Luhmann talks about system internal differentiation. It is about differentiation into similar units (segmentation), the differentiation of centre and periphery, the differentiation of conforming/deviant (official/unofficial, formal/in-

formal), hierarchical differentiation and functional differentiation. This kind of system differentiation necessarily increases the complexity of the overall system. Luhmann points out that a wealth of research questions can be worked out in connection with these dynamics. (Luhmann, 1995, pp. 190-191)

In the context of this study I argue that R & D/engineering is one big social system. It could be interpreted to belong to the *scientific function* system with the *binary code true-false* (Luhmann, 1989, pp. 36-41, 83). In this study, however, I propose R & D/engineering to be one social system with the *binary code related to technical feasibility: technically feasible-technically not feasible*. This is a code that no outsiders can competently share with the insiders. From this perspective R & D could be thought of as a homogenous community. It is the social system that focuses on developing high technology products and all that is authentically needed for the development work, technologies and engineering. Most people in the close environment of this social system have their background in engineering or technology studies and have a corresponding degree from a university of technology or college. (They have their own identity and code of communication.) Within the social system of R & D there are several R & D sub-systems formed by a domain (like SW or HW), process phase (like system, implementation, testing, integration & verification) or technology (like telecom and datacom).

In addition to the R & D social system there are several social systems “on the boundary of R & D”. In this study I describe *technical writing*<sup>4</sup> and *technical competence development* as examples even though they are not the only ones. These social systems are highly interrelated with the R & D social systems, but can still be identified as separate social systems because they have their own identity and code of communication. Another factor in the context of this study is that most people working in these functions have their educational background in a field other than engineering or technology. In Finland those working in technical writing have mostly studied languages (most often English translation or philology) or a language in combination with a/other subject/s. Those working in technical competence development have their backgrounds in various disciplines and often not in a certain professional field (but rather the humanities, natural sciences, psychology and the like).

I claim that in some PCT [product competence transfer] or marketing, people have a different spirit from that in R & D. (Engineer, Female)

There are differences in what they do, for example at F & C [finance & control], people are quite meticulous and so, and so it should naturally be. Well, HR then, I have a picture

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4. *Technical writing or the customer documentation is the field, function, activity system, organisation or people who produce the needed customer documentation or other documentation (descriptions, user manuals etc.) related to technical systems or products. Other names of the function are customer documentation or information design as increasingly the product related information is included in the product SW itself. Another type of field or function on the boundary of R & D is usability. See Gulliksen et al. (2006) for more of usability establishing itself as a “profession in its own right”.*

that they are overloaded, that they are always very busy, kind of difficult to reach a contact person. Yes, there are differences but it is difficult to say, you know, in a detailed manner what it is but is a kind of a different spirit... well, in our CA [competence area], there are a kind of real diligent, outgoing and open people when again on some R & D side there are quite introvert and quiet people. This kind of difference there is. There have been great deals of changes, for example in HR, the pack has been really shuffled and on F & C [finance & control] side I heard that the number of controllers has diminished and so has in partnering... But the HR bunch has always kind of been their own bunch, style “in HR” you know. Well, not in a negative sense, but they are a bunch of their own... well, maybe it is that they know much more than others, they have accesses more widely, I don't know how to explain. Maybe so that they have contacts much more widely and they are involved in so many things, that is why they are much more knowledgeable of this company's things on every level. (Assistant, Female, in Program/project management competence area)

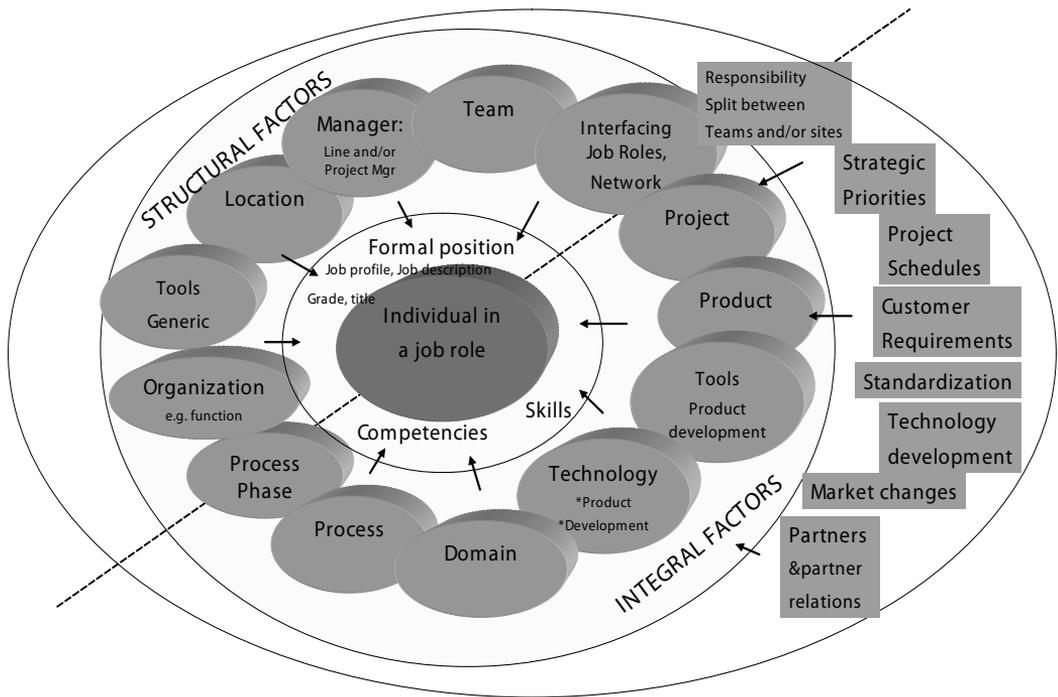
In real life where there is often a matrix organisation, the line entity can be regarded as a homogenous social system and the project as an arena for different kinds of social systems to meet. In cases where there is no separate line organisation, the social system goes on living in another format but does not lose its identity or code of communication. Structural coupling and perturbations between social systems are inevitable and recurrent. My proposal is that R & D/technical & engineering is the *major social system*, or the overall social system, in this context and functions or social systems on the boundary of R & D like technical writing or technical competence development are *minor social systems*. Within the major social system the sub-systems like domain, process phase or technology still share a major overall identity and code of communication even though they also go through the processes of structural coupling, perturbation and adaptation while developing further.<sup>5</sup>

#### 8.1.4 WORK CONTEXT FROM AN INDIVIDUAL EMPLOYEE'S PERSPECTIVE

What does life on the boundaries look like from an individual employee's perspective? Based on the interviews I have gathered in *Figure 21* factors or parameters that can change and in some way or other affect what one individual is doing and how. This picture also aptly describes the boundaries that individual people have in their job roles. At least some of these parameters are on the move at a certain point in time.

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5. See McIsaac & Morey (1998) for the “culture of engineering” that motivates R&D workers.



**Figure 21.** Factors that can change and cause changes in people's work

Figure 21 also shows the parameters that people used when describing their work and job role. This is by no means meant to be an exhaustive list and not every interviewee used all these parameters. It also needs to be borne in mind that this picture has been drawn from individuals' perspectives. If it was drawn from the perspective of the organisation, project or a product, the picture would be different. Figure 21 shows *what can change in individual people's environment*. It actually also shows the interfaces<sup>6</sup> or boundaries that people have around them and that they need to cross when needed. Within all boxes, especially in the inner circle, there are people who are involved and with whom the individuals need to collaborate. In addition to these, one needs to cross political, geographical, time zone, cultural, social and political boundaries. Examples of changes that the interviewees described were related e.g. to technology and product generations (from 2G to 3G), to processes (from the waterfall development process to the agile/incremental process) and to the generic tools (the introduction and implementation of the new virtual meeting system).

The job role contains what a person is actually doing at a certain point in time. He/she needs certain competencies and skills to do the work. There are many param-

6. *Complex SW and/or HW products have their own architecture; architectural interfaces and the regularities within the architecture is a completely different thing.*

eters in people's work that can change and cause changes to one's job role. Most R & D people's work can be described by attaching certain labels to it: *product*, *process phase* (e.g. system design, implementation, testing or integration and verification), *domain* (e.g. SW, HW) or *function* (e.g. marketing, customer documentation). The organisation is also usually built around these parameters. Whether there is a matrix organisation with separate line and/or project organisations varies over time and in different parts of the whole organisation. Some people work more "globally" concentrating, for example, on global business development. Some work more "locally" belonging for example to a team developing one SW sub-system for a certain product. *Figure 21* does not intend to separate matrix and project organisations; structural factors are in place in both. In a networked type of environment the number of managers "giving guidance" may be high in all kinds of organisational setups. "So about this matrix organisation, so many people have several bosses, it must be close to ten, if we start to count all those giving guidance, which is already perhaps too many."

The *structural factors* are more often related to how things are organised, many of these being related to organisational structures. The *integral factors* are more related to what is being done, i.e. products and what needs to be done inside the product. Ways of organising like process phases or projects are in between the structural and integral sides. In the following extract a participant in the Council describes how the Tampere Networks Council is not tied to a certain organisational structure. It is tied to the location but the participant selection is actually based on the products, i.e. the integral side (e.g. radio access).

The council actually isn't tied to the organisation. It is only a bunch of people that have been gathered from different areas, you know, gathered from different areas to tell about things from the employee point of view. What I am after here is that does it really matter which organisation there is behind? It should actually be so that the organisation does not matter. For example, here and now, when our X group dissolves, so the radio access side, so it is still there, they wouldn't disappear anywhere from the booth next door. (Engineer, Female)

In my opinion the [organisational changes] are not so essential. So that it doesn't affect your project if your boss changes, so that you just go on doing the same work. I don't know, you have kind of grown numb with them, so that you don't take them like that any more, whereas the first organisational change was just shattering. But it doesn't, you know, feel anything. They don't touch you... It's just a kind of external, external from work, so that it doesn't affect your work... So now we are in the X business area... So, the business area setup has also changed many times; it used to be the business area Y and it was driven down and then we ended up in Z, from site A the people were sacked, and our Product Manager left from there, and there has been quite a lot of people changes, so that definitely affects...

Yes, in a way, the line organisational changes don't affect at any level, but this kind a thing yes, business area related changes do affect. (Engineer, Female)

It doesn't matter so much at the end of the day, anyway this is, when I myself think kind of project centrally, so that these line issues are quite secondary, at the end of the day. (Project Manager, Male)

So, it is this line bunch and then there is this one's own responsibility area... I don't know what it would be all about if you were in a project and people would change in a couple of months and then you would be in another project and people would again change in a couple of months. It is good that you have your own core group, those certain people. (Engineer, Male)

Work is mostly organised around *projects* so that the follow-up of their progress and budget is easier. Both product development and improvement efforts (for example process improvement projects or other internal improvement projects) are organised in the form of projects. People can be part of one project or several projects. The *skills* needed in a job role also vary according to the tools and methods that constantly develop and change.<sup>7</sup> Learning new tool specific skills is increasingly regarded as a business-as-usual matter in technology intensive R & D work and “no one makes a fuss over having to need to learn new tools.” Tool development and incremental processes have further enhanced the erosion of work strictly split by process phase; design, development and testing are done more and more in parallel. Certain process phases include in-between type of tasks, for example unit/module testing has traditionally been on the boundary of design and testing/integration process phases. There were clearly *people who identified themselves to the project organisation and those who identified themselves with the line organisation*.

#### 8.1.5 ORGANISATIONAL CHANGE AS A PREVALENT FEATURE OF BOUNDARYLESS WORK CONTEXT

Some kind of organisational structures and reporting lines (organisational architecture and design) are always needed no matter how complex and intertwined products the organisation is developing and no matter how turbulent the business environment is. The “rule” that the more volatile the business environment is, the more volatile the organisation also needs to be internally (see e.g. Starbuck, 1989) seems to be reality

7. *Many of the skills are related to everyday tools in use. In SW design the skills might be e.g. the SW languages (C++, Java etc.). In testing it might be the various SW testing and debugging tools and in technical writing it might be various text editors, e.g. SGLM or XLM editor. In addition to the process phase, function or competence area specific tools, there are also general tools that everybody needs to know how to use. (e.g. general document databases, project management tools, conference meeting systems etc.)*

for the case organisation. Indeed, according to the interviewee descriptions, the frequency of changes in the organisational architecture is high. This pace also determines the speed with which the teams and the boundaries are reconfigured. Organisational architecture is one of the tools to enhance the levers of network tie creation (cf. Gratton, 2005). Even if there were many changing parameters in people's work, indeed it was often the *organisational changes* that were regarded as the impetus for changing processes, people, interfaces, networks, modus operandi etc. "There are organisational changes at least once a year, often twice a year, at Christmas and in the summer."<sup>8</sup> Nokia's top management has obviously been successfully implementing changes in the strategic directions of the company based on the market situation. Even the highest level changes in direction can cause changes along the line in the organisation, not to mention changes implemented on lower levels.<sup>9</sup>

In this section I will focus first on the organisational change as a prevalent feature in the case organisation.<sup>10</sup> I will explain what I mean by *open state* and describe the open state by listing certain *features* related to it. I will also list some *positive, negative and improvement items* identified in the interview data. Secondly, I will approach the organisational changes from the perspective of *structural couplings*. I will present some *examples* of organisational changes that change the way certain organisational entities are structurally coupled. Organisational changes are needed first and foremost in order to make the organisation respond better to strategic and/or operative requirements of the current moment and future. *My purpose is to describe how individual people perceive changes and the implications at the grassroots for their work and boundaries at the workplace.*

## Open State

First I attempt to define what I mean by open state. The recurrent organisational changes regularly bring to the surface a kind of *open state* in the organisation. By *open state* I refer to *a state where a certain change is announced and only partial information*

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8. Outside the data corpus of this study, one manager even counted the time to retirement in terms of how many organisational changes he still needs to go through.
  9. This is the point where my understanding and ontology differ from that proposed by the biological explanation of *autopoiesis*. In my view, strategic leaders constantly make decisions on the direction of the overall company. In the same way, managers at every level constantly scan their own areas and initiate changes on the need basis. Every single employee can give input to planning, even participate in the decision-making or at least take things forward in a self-organising manner. Thus, active and intelligent decisions and showing direction as well as intelligent self-organising are needed. Passive adaptation to the surrounding environment is not enough.
  10. From the management's perspective the key elements of the organisational architecture or design are: strategy, vision, business model, organisational design/structure, processes, capabilities and culture (see e.g. Watkins, 2003). There are many classifications and typologies of change. Within the scope of this study these are not thoroughly presented. The size or radicality is probably the most common categorisation of change (Hilden, 2004, p. 67). Dunphy & Stace (1988), for example, discuss the incremental or evolutionary change and transformative or revolutionary change and the means to achieve these. Their view is that these approaches are complementary and they apply at different stages in the organisational life cycle. Ackerman Anderson & Anderson (2001) differentiate between developmental, transitional and transformational changes. Different types of changes touch upon the organisational structures to a differing extent. In this study, the interviewees found the level of organisational structural changes very high.

of the implementation is known. The rest, i.e. what it means in practice, is worked out in the organisation in dynamic and emergent processes. Participants are involved in the planning to varying extents and at varying phases. During the open state the organisational boundaries are questioned and possibly re-configured. "I bet that [this organisation's way of working differs from that of some other organisations] like day and night. I bet that it differs like night from day. It differs through flexibility, agility..."

The rhythm is so hectic, the network is so extensive and in here the machinery works, at the end of the day, really well, even though this feels real chaotic... We have really professional people here and they are real fast learners and in adapting to different things. They don't necessarily see it themselves when they are all the time in the midst of this all. (Manager, Female)

Secondly, I will present some features of open state. It seemed that the structural part (how the organisation is built up) and the integral part (what is being done and how) do not evolve hand in hand. Changes in the integral part naturally cause changes in the structural part. However, according to the interviews, it seemed that the organisational changes related to the structural side (changes in organisational structures and reporting lines) took place very frequently. Thus, *the organisational structures change more often than what is being done and how (products and processes)*.

People indeed seemed to be very much used to organisational changes, desensitized, even to the level of becoming "numb about them".<sup>11</sup> Thus, people seem to be coping well with the changes and do not become too stressed by them. (However, if changes are introduced too often, do people have the energy to proactively contribute to their planning and implementation?) The interviewees considered flexibility and change as the only possible state of being for keeping the enterprise viable. "In this company there is this exploding adjustment to change." The boundaryless work demands a value base that supports networking, knowledge sharing and collaborative learning. One of the company's official values "renewal" (at the time of the interviews) also implies continuous change. "Change is in the DNA of each and every employee of this company" is a commonplace remark from top management. "You are so immune to any announced change that you just think that ok, this kind of thing this time. You can expect any kind of news any day, really." "You even have to change office buildings and rooms so often that you almost have your removal boxes physically and mentally packed all the time."

You wouldn't be working in this organisation unless you enjoyed constant changes and questioning the status quo... But yes, hm, it definitely is very hectic and chaotic; everything

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11. In Hilden's (2004, p. 159) data (277 survey respondents in 2002 in Nokia Networks Professional services (PS)) 38% felt they had become more tolerant for change because of the organisation's frequent changes. Only 1% claimed to have become personally less tolerant for change and 24% felt no difference in their personal change tolerance.

keeps changing: organisations, projects, people and so on, but then again, most of the time the products at least remain the same... Well, of course sometimes even the product programs are killed and dropped from the portfolio. (Project Manager, Male)

Of course the organisational changes are made for the sake of productivity and efficiency, but I haven't always so carefully thought about it because one, in a way, becomes numb about them, when you know that they come, come and go. They just come and go. As long as you just know where your own box is. (Engineer, Male)

*Constant changes in themselves make people immune to further changes because they actually live and breathe changes all the time.* The opinion of the interviewees was that the pace of change was constantly being accelerating from what it had been in the past. *Desensitization to changes* is a consequence of organisational changes, product, process and technology related changes but also of physical moving around. Some said that they had been in the same office room for ages, but they were a minority. Most people often had had to pack up and move to a different location in the office buildings and spaces. *Renewal, continuous reflection on the status quo and floating on the change* would describe well the mental state of the interviewees.

*Creative self-organising needs to take place in the organisation during the open state.* Curiously enough, many descriptions of the organisational changes can be traced back to the expressions describing nature and living organisms, not to systems engineering language. In the forthcoming quotes people do not describe straightforward or systematic changes but rather fuzzy and experimental types of changes. There is “*competition between the teams*” and the existing structures keep “*living*”, “*developing*”, “*adapting*”, “*renewing*”, “*dissolving*”, sometimes “*dying*” and new structures keep “*emerging*”. Moreover, it is possible that two teams have ended up doing “*overlapping work*” and decisions need to be made on teams' scopes and tasks. *Organisation is described with expressions like “messy”, “wild”, “chaotic”, “dynamic”, “tangled”, “amoeba”, “wave motion”, “big stream” and “big seething mass”*. People overall were of the opinion that the organisation changed into a new setup surprisingly quickly. There were also many features of the “*crisis*” mode of working as well as *ad hoc* or *reactive* way of working. Several interviewees expressed willingness to take things forward to the end no matter how messy the environment was or how desperate the situation looked at the start. In short, *organisation is messy and dynamically changing; people are proactively willing to take things forward even in messy and crisis situations and stretch if needed (creative self-organising)*.

I felt that it was about a wild situation when everybody was looking for their own position... In organisation X, so there, you know, they kind of were adapting always based on the situation. Especially in the beginning when we had the SW team, so it was regarded as much better than the other teams, and there was this kind of competition between teams

that was sticking out very strongly. Then there were coordinator teams and always very competent project manager teams and then it fell apart and then at the end of the day, those teams based on a certain area dissolved, and then the coordinators were in only one team when we transferred to company Y. Coordinators were in one, and then it [organization] always adapted. (Specialist Female)

So even though this is a kind of big seething mass, so there is still the kind of order and pieces that work smoothly together, at least in principle... The organisational changes are a bit like a necessary evil, one knows that they come in any case, a little bit like that okay this organisation lives and is constantly on the move and is a bit like an amoeba, so it is kind of, like one always anticipates that it is coming again, so I don't regard it as so bad... In a way it is quite clear that we do not get into a rut that we have had this team here for ten years so it cannot naturally be that way because everything changes, all systems change so much that surely the organisation also needs to live. So I don't consider it so bad. But of course when they come thick and fast, so it is not always necessarily so nice that always you are that "hello!, who is now the new contact person on this issue?, and where did the other one transfer?"... The pack just gets so much reshuffled that one always really needs bothering to chase up that certain person from a certain bunch of people... You don't necessarily get the message, it might not reach you, so you just have to pick it up from somewhere, follow very carefully that state between organisational change... Like now this situation when this new organisation is effective as of July 1<sup>st</sup>, so kind of, like in the beginning of the holiday season so now things have changed and now you have to orient to: "hey, what is this organisation all about now?!" So it is a bit that "oh no, it's changing again, it's a mess again!" Then there is the moving of offices and everybody is once again sitting wherever... So often, when things start rolling, there is the kind of chain of events and the organisation is in the new format very swiftly. That is actually sort of curious that such a big organisation, so even this big an organisation can change just like this [the interviewee snaps her fingers], let's move! and there they are, people are in their new teams! (Program Assistant, Female)

And well, we floundered through that one release and then quite soon after that there was a project decision that we have done parallel work with [location Z] and so our team was run down. (Engineer, Female)

Even today, so I just have a kind of a small crisis ongoing, so with different bunches of people I just ponder what we should do next. All kinds of crisis meetings... Well, I have to say that there is anyway you know, such a thing, there is that certain kind of attraction. Just the thing that it feels that we have such a good bunch of people here that whatever is the trouble, so we will anyway solve it at the end of the day. A couple of weeks ago we had a gigantic performance problem and we were just almost crying in tears in the office that "how are we now going to handle this"? "what can we do"? But now after two weeks, when

we are here, we worked a bit during the weekend in between and now it looks very good again, so that we will anyway get through it. (Project Manager, Male)

Work in general was described as continuous “*interface work*” where individual people, projects, products and organisations in collaboration define, build up, maintain and improve their interfaces. Several interviewees stated that the organisational changes disturb collaboration on a certain boundary if and when the contact persons change. Thus, interface work is constant *but it is done on an intensified level closer and over an organisational change*. “*Interface work*” is actually about negotiating the way of working and mode of operating over a certain boundary of boundaries between individuals, teams and organisations.<sup>12</sup>

Continuous organisational changes are related to the constant job role changes. They bring about the “*musical chairs*” game especially for the individual movers. People move into the new organisational setup either within the *modular teams* or as *individual movers*. Individual movers are often those in managerial positions or those in support functions. New organisational configuration needs a new setup of managers and support functions to work for them. *Those transferring as individual movers are more often exposed to job role transitions and a selection process than those more often transferring within the modular teams*. In many cases the development teams (often consisting of designers/engineers), that is the lowest structural denominator, sometimes the project structures, also do not experience dramatic changes. Sometimes they might be split up but often they float over to the new organisational setup as fixed teams (cf. Gratton’s (2005) modular teams). Their existence stabilizes the volatile system since they make the organisational reconfiguration easier and more flexible. It seems that managers, people in support functions, and possibly specialists, are more often *transferred as individuals* to new setups and more often implementation people like designers and engineers are *transferred within modular teams*.

Usually when there are these organisational changes, um, and there have definitely been quite many even during the time I have been here, so that there haven’t been many months before a new change has come. This big boss has changed, in other words this department head and this kind of thing, but otherwise this bunch of ours has remained. There have been some smaller changes, so a couple of new guys have arrived and a couple have left but this core bunch has remained, hm, quite stable and well-knit, but of course things keep changing over the years. (Engineer, Male)

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12. In Hilden’s (2004, pp. 161-166) data (277 respondents in 2002 in Nokia Networks Professional Services (PS)) 34% reported that it takes less than one month to clarify how a team should work together with other teams, 32% reported it takes 1-2 months, 12% reported it takes 2-3 months and 21% reported it takes more than 4 months. 37% reported that it takes less than one month to rebuild networks after a change, 35% reported it takes 1-2 months to rebuild the networks, 12% reported it takes 2-3 months and 15% reported it takes more than 3 months. It might also be so that the borderline between change related interface work and normal network building and interface work are blurred.

The renewal, so if the organisational changes are justified by the fact that we need to renew. In my opinion there always needs to be a reason, because it is, you know, expensive stuff. There is another thing perhaps here, like one cannot really in my opinion stay in one place, well maybe at the very top and in the kind of implementation level work, one can stay on a certain level, but like in the managerial career path, so very quickly one rotates either up or down, so that not very long does one stay in one place and on the same level. Even though I haven't changed jobs in three and a half years and there have been like seven organisational changes in some way or other. So very quickly it happens that your activities and the activities of your colleague are combined. Two options: you start to lead that activity in a different way and the responsibilities grow or then you start reporting to your colleague. But in a way you cannot keep on one certain level. So if someone wanted to stay on a certain level, it is not possible, but all the time you go up or down. In my view, this is kind of, in a way conscious, we don't so much talk about it... but it is like one way that you can gracefully transfer, when the organisation is changing every half a year or so, so very gracefully people can be transferred to jobs where there is more or less responsibility. In a way you make it rotate. So that is like one thing that if you haven't performed so then you go to a job with less responsibilities, so this definitely rotates very quickly. (Senior Manager, Female)

*The change related workload and pressure is not distributed evenly or hits people differently in different phases.* One feature of open state is indeed that there are *many who need to be involved in the current assignments (e.g. project work) and at the same time prepare for the future in the form of planning the new organisational setup and mode of operation.* This is especially the case with those who succeed in getting a new position or role early in the selection process taking place during the open state. Organisational change situations are thus a sort of *double change state*, at least for some; managers especially are subject to both being an object of the change on the one hand and leading the change of their teams on the other hand. It is especially the managers who are involved in planning the change and the number of those participating in planning grows over time. The change itself induces a great deal of work. This work is often related to considering the basis for being organised the way it currently is. The overall feeling is that *one often needs to start all over again, "from scratch"*. People reported that *it is continuously underlined that the ongoing project work, especially concerning product development (the integral part) should remain untouched as much as possible, even through the organisational changes.* Many were so used to the changes and inured to them that they somehow even yearned for regular changes and open state. It was as if people were working in crisis mode building up a new setup which at some point turned to waiting for another "crash", a change, to come. For some the open state features the "down time" type of state, at least in some phase. Some interviewees indeed felt that there is a kind of a break when waiting for the organisational change to be announced, while waiting for it to "crash" or after the announcement while waiting for

the change to cascade to one's own team. This kind of “*break*” or “*down time*” could also be considered a cooling off period or even time for learning. For many there is no “normal” stable state; the work varies between the hectic chaos mode and the kind of down time waiting for the next change, the lull before the storm.

*Organisational change has different implications for different people. Some live constant open state almost all of the time, even double change state. For some there is alternation between hectic open state phases and down time. For some others organisational changes, at least not all of them, do not have major implications.* My interpretation is that those who are more involved in organisational planning (like managers), constantly float in a busy open state (one follows another). Those who are not so deeply involved in organisational planning can float in the variation between chaos phases and down time (for example people who have internal customers like competence development people or people developing internal processes and tools). There were also some, especially in modular teams, who did not describe such a big impact of organisational changes on their work. *How much a certain change affects an individual person or a modular team varies and depends on the situation.* It is indeed hard to say whether the open state actually is more of a normal state compared to a stabilized state after a change. From a wider perspective it probably is the case that the open state never stabilizes before a new change is initiated and another open state begins. Open state actually seems to be a feature of boundaryless organisations where the change is continuous and the boundaries are continuously contested and negotiated.

- [Team] stability excellent; members selected by professional know-how. (Extract from the survey responses)

- Stability; what's that?? Most of the time teams are in flux and member selection seems to be a rather chaotic process. (Extract from the survey responses)

Somebody proposed that we should have a work number where we would record work done for the organisational change. Then we would see like, you know, cumulatively how much a certain change costs, just like time usage wise. I must have used something like a couple of months out of this year for change, which as such doesn't produce anything. (Senior Manager, Female)

But I can say that a kind of an announcement that an organisational change is coming, so up to the point when it works again, so it is a surprisingly long time and it is a kind of down time. Nowadays, due to this, it is emphasised, now you notice that the further you go with these, the more it is emphasised that current work, current work needs to be finished up decently and there should be no changes in that [current project work]. (Project Manager, Male)

That is kind of a downside of Nokia nowadays that when the organisational changes come so fast, so there is so much of that down time and just when you get everything working, so there you go and let's start all over again! You don't, you don't ever get forward. So that twenty, thirty per cent of your working year goes into twiddling your thumbs and thinking when it's going to crash and if it's going to crash. Ok, it crashed, so let's wait for a couple of weeks and let's see what, who my customers this time would then be. (Specialist, Female)

Third, I will list *positive implications* identified of open state. Organisational change is a powerful catalyst to reconfigure boundaries. The positive implications from the organisation's perspective are related to the strategies, and as listed by the interviewees, to "*rationalization*", "*productivity*" and "*efficiency*". There is an opportunity to re-consider some taken-for-granted activities and ways of working and perhaps leave them behind. During the open state all *previous ways of working, practices, processes, methods of interaction and organisational structures are questioned and again, re-created in a negotiation process*. The recurrent open state situations *allow leaving aside practices, processes, projects and job roles that do not bring added value or those that have grown too heavy*. The most feasible ones, at best, are adopted from the previous organisations brought together in a new setup. In organisations developing highly complex technology based products, the various parts of organisation are closely interlinked and intertwined through the products being developed (which could be interpreted as being the object of activity). When developing a new setup, a heavy negotiation around the object of activity is needed. In the new setup people can *see the object of activity from a new perspective*. There may be people from different organisations who now find themselves in a new organisational setup where they suddenly have a common object of activity, no longer an interlinked activity.<sup>13</sup> Along with organisational changes the organisational entities, "*silos*", can be touched upon before they get too impermeable. Organisational changes may cause changes in operative mode or processes, too. New kinds of structural couplings and perturbations are created in the organisation. When organisation is shaped into new forms and new forms of structural couplings are also introduced, it brings new space and *opportunities for the network ties and serendipity and innovation at its best to occur*. With the organisational changes *new adaptive fields* are created (cf. Gratton, 2005).

From the individual perspective the positive implications are related to "*change*" and "*variation*". Organisational changes provide opportunities to change one's job and enhance one's learning and development. From an organisational perspective it might be an advantage to have a chance to renew managers and employees in the organisation if needed. During the open state some people obviously feel, in spite of possible stress due to the anticipation of the change and its implications, some sort of

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13. *Bigger organisational design changes always need to be based on the strategic choices, selected business model and competitive environment e.g. bringing service business into Nokia Networks and the convergence of Networks and Siemens.*

*optimism. The optimism is related to the possibility that within the new setup some of the drawbacks in the existing system will be removed.*<sup>14</sup>

There is no one black-and-white view on this, so when I was in the product line, the processes were different. In here X [organisation] it is completely different. And usually the most efficient one is picked. Let's say so that not too much should be tied to any process. There is no need to make tools just for the sake of it either. There needs to be some brains in there. A system induced from needs and a process induced from needs. And as simple as possible. (Project Manager, Male)

It is good that there is stability but change is also, now and then, quite good. The good I know about change, is variation, because the changes are not always only for good... Of course the organisational changes are made for the sake of productivity and efficiency. (Engineer, Male)

When the change is announced, you see, somehow one tends not to think about the problems, or hm challenges [laughter] so much and you kind of think that “never mind!, they will be fixed in the new setup”, or somehow [they] will be rubbed out, even though that won't probably happen, or at least, the challenges will be different. (Senior Manager, Female)

One advantage of organisational changes is the number of *job opportunities* they create. The “musical chairs” game was considered to make *people continuously “do their very best”*, to perform at the edge of the ultimate best. There was evidence that people acknowledged the fact that recurrent changes made them give their best performance as their continuation was measured in the next organisational change in terms of being invited or selected for some relevant jobs. Thus, the recurrent organisational changes and consequent open states were, on the one hand, regarded as a *personal driver*. *The constant changes also provide an opportunity for the constant selection to the job roles based on self-organising, related to who is allowed to do what, e.g. who can be in a managerial position. Organisational changes enable agile flux of people based on their performance. Organisational changes and open state are thus related to people's performance and how the career boundary crossings and job role transitions take place.* On the other hand it raised the question: “Isn't anything enough?” The drive to push one's own boundaries further and further apart was seen to be ambiguous. There is a downside to changes, opportunities and drive; organisational changes can be very stressful if they occur too often. The danger is that people get tired and become apathetic regarding work. The open state is simultaneously a sustainability factor and an intensity factor. It gives energy

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14. *Even though I am not referring to the change process or change curve here I acknowledge that uninformed optimism is one step in Conner's (1992) classical change curve model.*

and drive but if the balance switches to the intensity side, changes and extending one's boundaries become a burden. In the following quotes there are elements of both.<sup>15</sup>

And in general if someone is looking for trouble, so you aim at getting rid of them. We used to have here as a manager a kind of a person who really came to replace our own manager and no one really got along with him. He didn't really even care about what we were doing, then at one point he was pushed out and our previous manager returned. (Engineer, Male)

I kind of notice that I get drive when I notice that I really need to put my best foot forward. I feel good about doing my best and, you know, when they explicitly wish to take me along to the new organisation. (Assistant, Female)

But yes, one definitely needs to be flexible here, so that there aren't other choices, if you weren't flexible I don't know what would happen, if you didn't comply with the tasks you are given, well I can't imagine such a situation so... well as for myself I always get enthusiastic about it, so it isn't then I guess, it is only work, so you have to take such a view of it, not so passionately, that even though I did my work dutifully and at full speed, so it is still only work... Yes it is a bit like that, like that you get a bit sceptical with those management decisions, that there are great visions and clear needs at a certain point of time but then, in a year's time those needs are something completely different, so it is a curious thing. (Engineer, Female)

If we think of the *individual people* and not the organisational entities, social systems or activity systems, the *changing setups and configurations make it possible to learn from each other more efficiently than in more stable setups.* The various differing and changing setups of people allow much better hands-on learning than only collaborating in fixed and stable setups. At least *people learn new ways of working and operating and behaving from new people, who often change around them, including the colleagues and the line manager.* This is also an advantage in building up the network ties and the adaptive field. One does not only learn content (what) but also ways of working, operating and practices (how). "All these changes have been so enriching on the other hand, so that you have gotten to build networks through different tasks to different kinds of people." It is probably easier to "put the Nokia hat on" and consider things from several viewpoints, not only from one's own "silo", if one has personal experience of various different perspectives. By this I mean that it is probably *easier to adopt wider viewpoints and detach oneself from a single-minded viewpoint if one has experience of several organisational setups, several viewpoints.*

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15. In Hilden's (2004) data (277 respondents in 2002 in Nokia Networks Professional Services (PS)) 21% reported they had gained drive and energy as a consequence of a change. 21% on the other hand disagreed, i.e. had not gained drive and energy from change. 42% were neutral, 12% disagreed strongly and 4% agreed strongly.

The changes start to go through pretty painlessly here, so here the organisational changes don't shake and bother people so much, they are just like that "all right, to what organisation do I belong to this time?, when it changes, who is my next manager?, ok." Of course it slows down the pace. Whenever they change, especially if the change is big, so your whole network changes, which is almost your most important capital, and then you start to build it up again. So it does slow it down, that's pretty clear. But on the other hand, it enhances the renewal when you are always dealing with different kinds of people and you always get into different kinds of situations. So there are always two sides to the coin. (Manager, Female)

I have now my tenth manager during my Nokia years, and from all of them I have anyway really learnt a lot, what it is all about to be a manager and about the ways of working and ways of operating. So I think that this is actually a pretty good way to learn and of course from your closest colleagues, when they also change. Change does bring pretty good chances to learn, you know. (Project Manager, Female)

Fourth I will consider the *negative implications* identified of open state. When asked what *most impedes collaboration*, the interviewees' answers were usually related to the constant organisational changes. Organisational changes were also reported to cause *unclarity in roles and responsibilities*. However, even though organisational changes bring about unclarity and fuzziness of boundaries, roles and interfaces, it makes people question the "status quo". The unclarity in roles and responsibilities possibly enhances the constant clarification of roles and responsibilities in a fuzzy environment that never ultimately stabilizes but dynamically changes all the time. With a downside there can also be a reward side.

This operational development organisation, so from our perspective there have definitely been too many, whenever the organisation changes, we lose our interfaces with whom we function and projects that have been agreed upon. A great deal is agreed anyway between people and the projects do work because there is really someone who needs the result, gives guidance and makes use of it, and if these change, we need to start the projects anew, redirect them or stop them. So when it comes to the operational development, my own people estimate that dozens of per cents of this year's work has been done in vain. Depends a little whom you ask, some give very high figures and some a little lower. (Senior Manager, Female)

People reported that when an organisational change is announced many *projects related to developing the structural side of the organisation are dropped*. Such *development projects* were, for example, intranet improvement projects, competence development projects and some tool and process development projects. It is no use proceeding with development projects that are related to a certain organisational setup when that setup

is being reconfigured. Similarly some generic process and tool development projects might have to wait until the organisation stabilizes and issues like internal cost allocation structures stabilize. Recurrent organisational changes and open state might *delay some development efforts and cause down time to people working on such projects*. After an organisational change the basics of the new structural setup like intranets and HR systems are built up very quickly, at an “exploding pace”. The concern is more on *keeping the long term development projects viable over the organisational changes*. (Of course organisational change situations, on the other hand, allow the very need for any development effort to be reconsidered.)

Fifth and last, I will highlight some possible questions or improvement items in the case organisation related to open state. Some interviewees mentioned that the *justification and the reasoning behind the organisational changes could have been clearer to them and they wondered if there was a need to introduce organisational changes so often*. This finding was aligned with Hilden’s (2004) findings from the same case organisation.<sup>16</sup> Mostly the reasons behind the organisational changes were understood by my interviewees. *What they seemed to miss was the retroactive reflection and facts on the organisational changes and whether they had served the purpose*. For many the organisational changes manifest as “announcements” of people changing positions, “coming” and “going”.

It would be very interesting once to see a study stating the aims of these organisational changes and whether they were achieved. But never have I seen such a thing during these seven and a half years. We have made a lot of mistakes; we have seen that we are going in the wrong direction. Then we have taken these corrective actions. (Senior Manager, Female)

I feel that at one point there was terrible lot of rotation and all the time there were just announcements that this one is going here and that one is going there, and that cannot be good for the work when there are too many changes. So that must be the positive side there that people stay. (Engineer, Female)

They are coming, those changes, thick and fast, so it is quite something if once a year, once a half a year the organisation is changed, so it definitely requires quite like an exploding adaptation to receiving the change. So that you have just gotten into the change, the previous one, that is then put into a new format... I have studied some financial management and business strategies, so it is quite easy to see the kind of solutions that now you draw the organisation like this and it is quite clearly visible what the reasoning perhaps is behind it. But then if you have concentrated on that [SW] coding, so the message probably isn’t quite the same. So you quite often notice that one cannot put it into, how would you call

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16. Hilden’s (2004, p. 131-132, 142-143) survey data (277 respondents in 2002 in Nokia Networks Professional Services (PS)) show that 35% of the respondents experience 1-2 changes yearly, 23% experience 2-3 changes yearly, 22% 3-4 changes yearly and 16% more than 4 changes yearly (3% experience fewer than 1 change yearly).

it, into average engineer format, so that one would be able to say what one wants... It would be difficult for me to understand that the functioning of the organisation would not be assessed, but if they tell about it, is another thing.

Engineer, Female

The interviewees would mostly concur with the “boundaryless” type of definitions of organisation where chaos is one element. Mostly they understood the organisation as an emerging system and emphasised autonomy, independence and self-organising. However, there were also references to the “clarity” of the old, more rigid system. People were negotiating what an organisation and job roles mean in their environment and what they have traditionally meant. The curiously mixed and intertwined views show that there is still a lot of *ambivalence in how people perceive their changed environment*. There were a few of interviewees who missed the clarity of traditional hierarchical organisation. Perhaps the improvement item would be to further *clarify to people how the contemporary organisations with blurry and changing boundaries are, so that they could better understand their environment and contribute to their work and possibly to the organisational development*. Missing retroactive reflection on the change success is related to this. Would it even be feasible to explain to people that management is experimenting with organisational structures to find best fit with the selected strategy?

If you compare this to the old organisational models where there is a certain pyramid and it is quite clear in the sense that it is known who does and what and who decides on what. Now we have a kind of a juggling system where, if one decides something so another one abrogates that decision of yours or when a decision is made, so someone can state that this does not concern us. There should be the kind of clear hierarchy... In 98 and before that, we had X [organisation] that was quite clearly this kind of hierarchical organisation... I would take as a starting point the thing that you kind of set the responsibilities in place and possibly make the organisation such, you know, into a form that you can directly see what the responsibility model is. (Specialist, Male)

My understanding is that it is led directly from the top. In my opinion they come in Nokia all the way from top management, so that we see that the target state organisation is not defined to the most detailed level, so that everybody would have detailed job descriptions and responsibilities and interfaces agreed. It is kind of a slow organisation to change, when we see that the world changes. In other words, this is, sort of, this is on purpose, so that the responsibilities and roles are a bit vague so that people need to understand what it is all about and people then define and agree interfaces between themselves. Not so that it is given from above. The other thing is that higher up in the organisation, you don't have the time and you don't understand enough, so people themselves understand better how to agree an interface between people and that way we get people's expertise into the action.

So I think that this is quite a conscious, a very conscious solution, how these organisational changes are done. (Senior Manager, Female)

### **Reconfiguring Organisational Structures and Structural Couplings**

The consequence of recurrent organisational changes is that the teams and the individuals are recurrently configured into new kinds of setups where the relations between the organisational entities, various functions, teams and people are different. These perspectives (teams and individuals) at various points of time engage in negotiations and boundary work in differing setups and configurations. From the organisational perspective the mingling of perspectives and diversity at its best is bound give space for new kinds of ideas and innovations. The new setups, where space for new interactions is set, can be looked upon from the structural coupling perspective. In organisational change situations, it is planned how the various parties will be structurally coupled in the new setup. In this section I will describe just a few *examples of organisational configurations before and after and organisational change*. I also attempt to tentatively describe what kind of *implications a perturbation between social systems can cause*. Another view is the perspective of activity systems.

Basically, the relations have changed, so that when I started, there was no X forum and in a way we are more and more dealing with Y and Z. It has kind of changed, when I started, so organisation X was more important and now its significance has diminished. So, well this is, in principle, these players have been here for a quite long but it just changes the way the relation is. (Manager, Female)

Maybe with this centralizing we aim at, now when we have such different cultures, we talk about different corporate cultures between our product lines, there is a big diversity. Now when we are centralizing, we are actually looking for the common sounding board from all these product lines. (Manager, Female)

And then really these changes, so I would say that they help, they force you to learn something new and then perhaps maybe shake up those basic modes of operating anyway, also in a good way, so that “we have always done it like this”, meaning two years, then you realize that in fact maybe it was not the best way to operate after all, even though you possibly stick to it for a while, so anyway you learn that some other [mode] might be more sensible. (Project Manager, Female)

In this quote one interviewee describes how the boundary role function, customer documentation, was at one point of time a function of its own in the organisation and at another point the customer documentation people were split up to the software teams. Those in customer documentation social system did not lose their own identity even in “diaspora”. Even if the “diaspora” time was harsh, the individuals, and probably

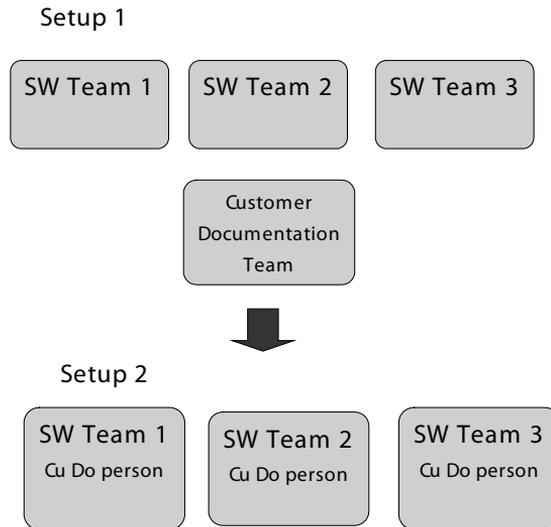
the whole function, learnt a great deal, not least about self-initiative. I will use this storyline as an example of change in a structural coupling between social systems.

Well, one thing was these organisational changes that hit quite quickly. We had, like time to exist as a group, was it half a year or seven months after I came [to the team]. We had this kind of, we had two documentation groups in X [organisation], which consisted of documentation people and they were led by documentation people. Then we were merged with the software teams and then we spent the coming one and a half years in this diaspora so that we had our bosses who didn't know anything about what we were doing and they could have cared less. Then we were just working with the software teams like lone strange creatures. In a way, it was a fun period. There was plenty of work and you felt like doing something significant and achieving something when one was doing the project work. The documents had deadlines and "my god!" if they were not ready on time! But on the other hand, it was grim but fortunately there were colleagues on whom you could rely, and with whom you could vent your depression, aggression and frustration. So the bosses didn't really understand what we were doing, so the sort of work guidance, there was almost none of that. It was just that "handle your stuff, you know better". Then they came and said that "ah, this is the way it goes!?" So, no one came to shout after you. That is at least one thing that has always been more of a rule than an exception in this house. (Manager, Female)

The "structural coupling" between customer documentation and software development (R & D/engineering) and possible consequent changes is here approached from both the social systems perspective and the activity systems perspective.<sup>17</sup> *Figure 22* in its simplicity shows how the customer documentation was first structurally coupled with software development and how along the organisational change the structural coupling changed into a new kind of setup. In the second setup the two are more intimately configured together.

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17. *The most obvious shortcoming in Luhmann's system theory is linked to the fact that it does not tell much about the relationships between the different sub-systems. In this respect it needs to be complemented with theories that place more stress on such ties. (Sevänen, 2001) The structural couplings depend upon language as the linking device, but there is no "supersystem" organising this coupling. This is the only direct coupling that connects the societal system with its outside. (Luhmann, 1997)*



**Figure 22.** Change in the structural coupling between SW development (R & D/engineering) and customer documentation (R & D boundary role) social systems

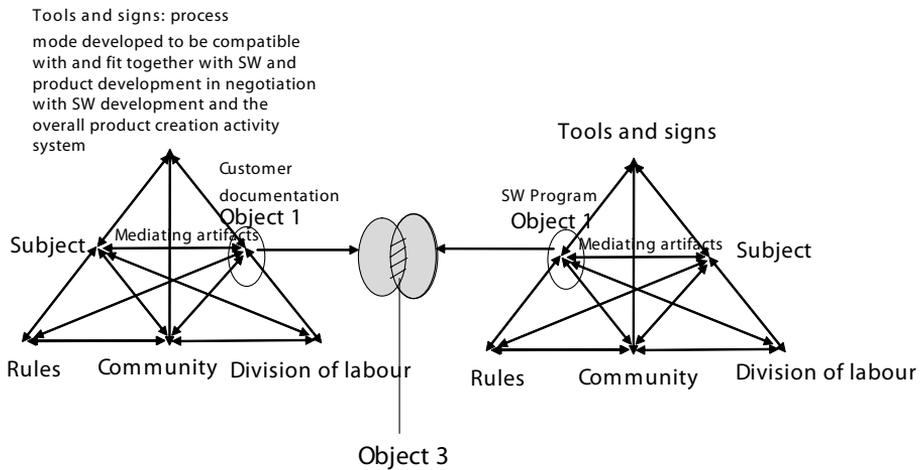
In the Luhmannian sense, both the R & D technical/engineering, in this case SW development and customer documentation are their own social systems because they have their own identity and code of communication (meaning processing system). In this study I have labelled R & D technical/engineering as a major social system and on the boundary of R & D like customer documentation as one minor social system. In the Luhmannian sense perturbations occurring in structural coupling situations can initiate changes (adaptation) in the corresponding social systems. One thing that has happened in this specific structural coupling situation over the years is that customer documentation has adapted to the mode of working of the major social system and developed, for example, a *process mode* for its own function that goes hand in hand with the software and product development. “The Nokia way of working has transferred quite well to X [customer documentation partner company].”

We have just this documentation process... and always the newest version of the process is followed up... Program or X [person] dictates the dates to us when the library needs to be ready. In that way it depends on the milestones of the product, even though we don't really use them, but phases in the process are at least the “information design”, and then “writing” and the “publishing”, there they are in general outline, I guess. In that writing process, there are in fact all phases like gathering information, reviews and all that stuff. (Project Manager, Male (R & D boundary role, customer documentation))

Process thinking, vocabulary and concepts have entered the R & D boundary social system's, namely customer documentation's, meaning processing system. In this case it is natural that it has been the major social system that has caused a change in the minor social system. In Finland customer documentation people have mostly studied foreign languages and due to their educational background they are not used to the linear, process type of thinking to the extent engineering people are. Customer documentation having developed their process mode and the fact that it has taken related vocabulary into its meaning processing system has released tensions between the two social systems (cf. Luhmann, 1989), and made the collaboration smoother and more efficient.

From the activity theoretical perspective the form of man's activity develops historically as cultural development. The members of a community continuously negotiate their rules, division of labour, tools and signs. These develop, change and possibly transform in the historical development through the mediated artefacts. In *Figure 23* the structural coupling type of situation takes place between customer documentation activity system and SW development activity system. In order to produce object 1 (customer documentation) efficiently, the activity system has needed to negotiate and develop its tools and signs that are used as mediating artefacts to cohere and fit with the tools and signs used by other related activity systems (in this case SW development). As a consequence, they have created a process mode for their activity system that is linked to the product creation process. Even though the customer documentation activity system may not originally have had such a linear process thinking and way of working, it has been compelled in the course of historical and cultural development, to negotiate and change in this direction. In this case the two activity systems are in the same way "structurally coupled", engaged in collaborative negotiation as in the previous example social systems were. The developments explained here have thus taken place over time, including various organisational setups of the customer documentation function (including the two setups in *Figure 23*.)

Customer Documentation Activity system    SW Development activity system



**Figure 23.** Customer documentation and SW development activity systems jointly negotiating the tools and signs, mediating artefacts to be used in common synchronised activity

There were many other examples of different setups of various functions, process phases and roles within the company. The following quote shows how the project managers and quality managers were gathered into the same group having previously been distributed to the various product lines and businesses.

Then after two or three years there was an organisational change where all the main project managers and quality managers from X [product line] or current Y in Tampere were gathered together and at that point I started to lead that group so I was a solid line manager to project managers and quality managers. (Manager, Male)

Another case example of a new kind of structural coupling situation was the new “Information Design” organisation where the previously distinct activities (customer documentation/technical writing, internal information design and product competence transfer) were combined into one organisational unit. In organisational discourse “finding synergies” is often used as a justification for combining certain activities and functions.

The changing organisational setups and structural couplings can be considered as one catalyst component of intelligent self-organising in an organisation. It can be also thought to be one factor that makes the underlying infrastructures and boundaries more visible and thus amenable to negotiations and development. Organisational changes, open state, reconfiguring organisational structures and changing structural couplings are

an essential part of boundaryless organisations. These phenomena keep the boundaries loose and accelerate learning, change and development in the organisation.

#### 8.1.6 SUMMARY AND INTERIM DISCUSSION

In *Section 8.1* I attempted to describe the context and environment in the case organisation to enable a better understanding of what the environment looks like in the case company. First I described what it looks like from a *systemic perspective* (using frameworks of activity theoretical model, DOCAS (dynamic, open, complex, adaptive systems) and social systems). Second, I depicted the environment from the *individuals' perspective* (boundaries that individual people may encounter in their work.) *Organisational change was mentioned as a prominent feature in the case organisation* (and possibly in boundaryless organisations in general). I approached organisational change from the perspective of individual employees and how they described the implications and features of organisational changes in their work or environment.

Organisational change led me to a conceptualization called *open state*. By open state I refer to a *state where a certain change* having implications on the organisational structures (based on the change in strategy or business environment or a need to rationalise) *is announced*. In the beginning of the open state *only partial information on the implementation is known*. *The implementation is worked out in dynamic and emergent processes involving participants in the planning to varying extents and in varying phases*. *During an open state the organisational boundaries are questioned and possibly re-configured*. From the interviews I gathered a list of *features* describing the nature of organisational changes and open state, some *assets* of the organisational changes, some *downsides* and finally some *questions* which may also be *improvement items*. Open state as such is a state where features of self-organising are bound to surface more easily than in a more stable state. One could also ask whether the open state is actually a “normal” state in organisations like the case company. However, one feature related to the open state described in this study is the announced organisational change. The open state starts at that point and continues up to the point when the change is “implemented” (which is not possible in the full meaning of the word due to continuous development). Also, some managers may already be evaluating the current setup and possibly planning a new one, when at the grassroots level the previous change is still being implemented.

Some of the *features* of organisational changes and open state are summarised here. *Organisational structures seem to change more often than what is being done and how* (integral side of the organisation: products and processes). *People are inured to the changes* due to their frequent occurrence. *Changes and continuous reflection on the status quo is a natural part of their work*. The downside is the threat that they may become inured to changes and can no longer contribute proactively if the number of changes

is excessive. The organisation was described as being *messy, chaotic* and dynamically changing. *People are proactively willing (and expected) to take things forward even in messy and crisis situations and stretch if needed* (creative self-organising). *Continuous interface work* is needed to define, build up, maintain and improve interfaces between individuals, teams and organisations. Interface work is about negotiating the way of working on the boundaries and beyond them. With the organisational changes some people move to the new organisational setup as *individual movers* and some within *modular teams*. Organisational changes often mean *new job opportunities*. Individual movers are more often exposed to job role transitions and selection process, the “musical chairs” game. Managers, people in support functions and possibly specialists move more often as individual movers and implementation people like designers and engineers move more often within modular teams. Organisational changes enable *agile flux of job transitions based on people’s performance*. There is also a possibility to change some people in certain job roles, if deemed relevant. How various teams or individuals are affected depends on the nature of the change and the situation. *Workload related to the change is likewise not evenly distributed and affects people differently and/or in different phases*. Some, like managers, may constantly float in an open state situation. For some, like those with internal customers, open state may include a *down time* where there is more waiting than normally. The down time or idle time is related to waiting for the internal structures (internal customer set-up) to get clarified. For some a certain change may have no major implications, for example for those transferring within a modular team.

Some *positive sides* due to organisational changes and open state are also sustainability factors for the whole organisation. *Previous practices, processes and structures are questioned and possibly recreated*. Change allows “*rationalization*” and *improvements in “productivity” and “efficiency”* as listed by the interviewees. Changes can bring people *variation, learning and development*. They may also bring *new job opportunities*. In some cases a change to come also created *optimism* because “something is being done” about the drawbacks in the existing setup and there is hope that in the new setup they will be fixed. (Optimism is also one part of the change curve thinking.) Organisational changes are also a *personal driver* causing people to make an effort. It seemed almost as if organisational changes were one means to ensure continuous stretch performance. From an organisational perspective, changes provide a *possibility for agile flux of people* according to *their performance*. The performance was measured in the next organisational change in terms of being selected for some relevant jobs. Considering the other side of the coin, one can ask how long one individual can endure yearly organisational changes, including the continuous appraisal of one’s value. *Learning from various setups, perspectives and changing colleagues and managers* is also an advantage of changes. It is possibly easier to adopt wider viewpoints and break free from single-minded viewpoints when given a wider spectrum of viewpoints (“putting the Nokia hat on”).

*Negative sides* included the fact that organisational changes seemed to *impede collaboration* and cause *unclarity in roles and responsibilities*. In addition, *long-term development projects may be dropped or delayed* due to organisational changes.

The *questions or concerns* that interviewees mostly raised were related to *wondering if so many organisational changes were really needed*. The other thing people contemplated was their feeling of *needing more justification and reasoning as to why certain organisational changes were conducted*. Thus there is possibly a need to explain more to people what modern organisations are like and why the boundaries sometimes seem fuzzy.

The organisational changes were experienced as a factor that is very much present in the informants' everyday life at the work place. I agree with Tuomi in considering the formation and changes of bounded social units a mechanism for intentional manipulation of the activity structure (cf. Tuomi, 1999, p. 262). The changes seem to be a way to keep the boundaries loose and preventing the organisational ways of working becoming too institutionalized. Organisational change could also be considered as management's tool to make sure that "sharing identity" does not become "organisational groupthink" which is an inhibitor of boundary work (cf. Orlikowski, 2002). Most people understood the reasoning behind the organisational changes. (Few but not many, missed the old times of "clear hierarchies".) Also, most people seemed to understand the competitive realities (part of contextual clarity (cf. Ericksen & Dyer, 2005)) and the possible related need for organisational changes. However, many would have liked to go back to the organisational change and the justifications afterwards to see whether the change had served the purpose. There seems to be room for improvement in explaining the justification related to the changes and explaining what kind of features are an innate part of boundaryless organisations, like a certain level of fuzziness. This is probably not a true discrepancy in the system, but it is anyway an issue to which more attention could be paid. This is part of the contextual clarity of which Ericksen & Dyer (2005) urged every employee in a firm to have an understanding. One is the perspective of boundaries: organisational changes touch upon the boundaries and it would be important also to make the employees aware of and knowledgeable about the importance of boundaries not being too long-lived and stabilized. For example, it is not by default a bad thing that the "understanding of the other team's role is blurred". It forces the parties to define and re-define the purpose of the team again, to define, re-define and improve the interfaces and the mode of collaboration between the teams. It can also force participants to pay attention to hidden infrastructures and boundaries. Also, in some cases it provides an opportunity to re-consider some taken-for-granted activities and ways of working and perhaps relinquish them.

Hilden (2004), who studied the same organisation, claims that her study suggests that hierarchical changes might hinder the cornerstones of networked organisation. There were indications that change seems to hit hardest at the understanding of the other team's role in the big picture. She concluded that *a networked organisation might*

*not fit together with structural changes in hierarchy.* My view is that both organisational “formal” structures as well as the informal networked structures need renewing from time to time. My view differs from Hilden’s in the sense that I see structural (what Hilden calls hierarchical) and integral as well as formal and informal structures in organisations as intertwined structures. However, Hilden’s point and her question are still very relevant:

To conclude, I would like to investigate the possibilities of making the needed change in operations by changing the network rather than the hierarchical organisation. If we let go of frequent change, do we actually create the foundations for flexibility and renewal? (Hilden, 2004, p. 199)

One might also wonder whether changing the “hierarchies” and the structural side of the organisation, the very focus and interest is indeed on the hierarchies and structures that these vertical (and why not also horizontal) new boundaries are fortified at the same time as they are focused on. For people a change may manifest as “announcements” of people moving positions and nominations of individual movers (starting from manager nominations).

The most significant boundary dynamics identified in *Section 8.1* were related to the way boundaries are reconfigured. In the case company organisational change was perceived by the interviewees as the catalyst that reconfigures boundaries. It causes renewal not only in organisational structural boundaries but also in job role boundaries (and consequently careers). Next I will move to investigate boundaries and links over the borders that enhance the synchronization of the whole system.

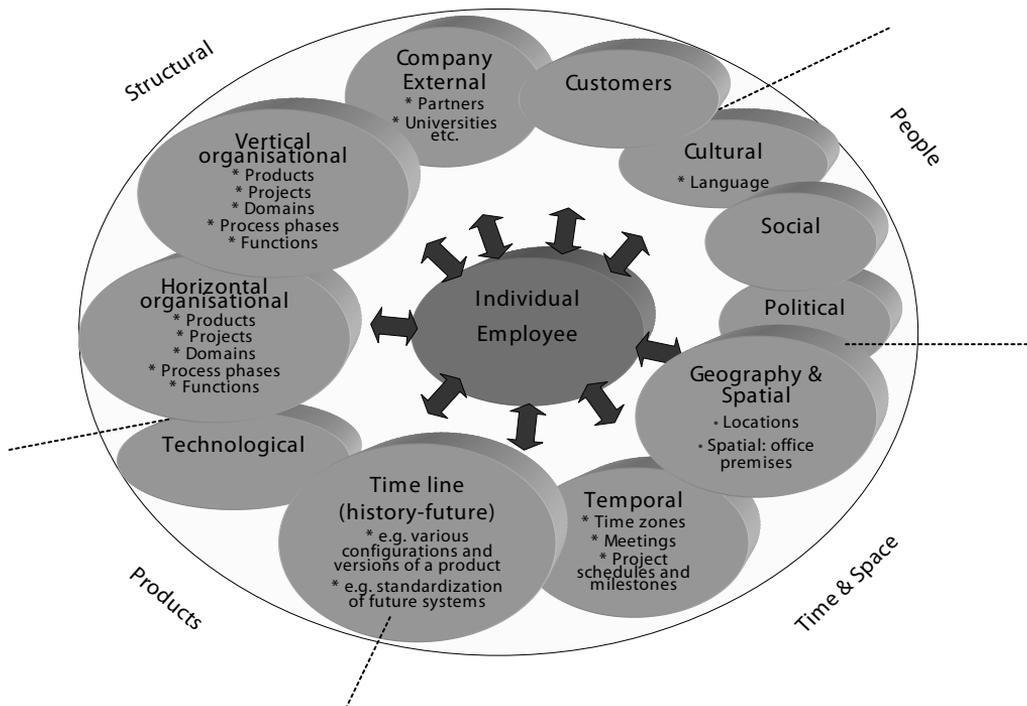
## 8.2 BOUNDARIES AND DYNAMIC LINKS OVER THE BORDERS

In this section I will first describe what how the *boundaries* looked like in the case company. The boundaries discussed are: geographical, temporal, timeline (history-future), social, cultural political, technological vertical and horizontal organisational boundaries, external boundaries and specifically the customer interface. Secondly, my idea is to approach the boundaries from the perspective of what dynamically holds the constantly moving parts together in an organisation. In an environment where the boundaries are multiple and where the changes and moving parts are reality, it is important to find what factors act as *links over the borders adding up to the synchronization, coherence and integration of the whole system*. The *links over the borders* identified were categorized as *extensively used links over the borders* (R & D incentive/bonus system and strategy cascading via the objective setting system), *systematic links over the borders* to be used on the need basis (competence transfer, induction, product competence transfer practice

and handover practice), *integral links over the borders* (products, projects, milestones & schedules, processes, related common language and strong shared identity) and *ad hoc links over the borders* (duo working, looking at an issue from the company overall perspective and familiarizing oneself with the process phases horizontally).

### 8.2.1 BOUNDARIES

I took Orlikowski's (2002) idea of boundaries and boundary practices as a starting point in the theoretical *Sections 3.1* and *3.2*. As stated by Orlikowski (2002), the salience and the multiplicity of boundaries is indeed clear in R & D work. Orlikowski's list contained temporal, geographic, social, cultural, historical, technical and political boundaries. Company internal vertical and horizontal boundaries are dealt with as well; they are based on Ashkenas et al. (1995). I have taken Orlikowski's and Ashkenas et al.'s (1995) boundaries as the starting point in this section. *Figure 24* depicts all these boundaries that people encounter in their everyday work. These are related to and resemble the factors that can change in individual people's environment shown in *Figure 21*.



**Figure 24.** Boundaries in people's work

### Geographical Boundaries

While there are people who feel that they are mostly anchored to a location and to a team there is an increasing number of those for whom the boundary of time and space has become less clear-cut. People described their roles as either more “local” or “global”. According to the survey results people have regular cooperation on average with *four* other geographical locations apart from their own. The number of locations ranged from one/own location to 25 locations (four people reported having collaboration with all countries). In addition to European sites the interviewees had regular cooperation with India and U.S. *Table 5* shows the number of sites/locations with which people have regular cooperation.

Regular cooperation	N	%
Only with people from my own site	12	1%
1-5 other sites	747	78%
6-10 other sites	167	18%
11-15 other sites	18	2%
16 – all other sites	10	1%

**Table 5.** Number of other sites/locations with which people report regular cooperation

For some the work can still be done mostly locally (local roles) but for many the work is increasingly done in virtual mode (global roles). A considerable amount of time is spent in virtual collaborative situations via technology based tool systems. *26% spend almost the whole cooperation time in virtual mode*, 30% use 40-60% of their time in virtual mode of cooperation and 44% use only 0-30% in virtual mode of cooperation. (These figures might partially be related to some travel restrictions prior to the time of the data gathering.)

There were interviewees who reported that they cooperate regularly with one person or with several people at other geographical locations that they have never met. There were stories about how one imagined the appearance of their virtual colleagues based on how they talked in virtual meetings and how, if and when they ultimately succeeded in meeting these colleagues, the reality had stunned them.

More face-to-face meetings were desired both in the interviews and in the survey answers because at the time of the interviews the control for travel approvals was stricter than normal due to the financial situation. Earlier, before the time of virtual meeting tools, there had obviously been a need to travel more and also to organise projects more according to sites so as to reduce travel. According to Gratton (2005, p. 154) and *Figure 6* (p. 56) in this study, the levers of proximity, time, motivation and culture need to be place in order to enhance efficient network ties. The concern about lack of face-to-face meetings is very much related to the lever of proximity.

Some were of the opinion that the projects may be too geographically scattered. At least it becomes a problem if there is not a critical mass of people on a certain site; *“lone riders” at remote sites feel isolated*. “Small sites, too small sites are a problem. If activity is clearly global, then things have been organised to support the global mode.” People reported that even every site in Finland (three big sites in this Business Unit) have their “own soul”, partly based on the products being developed on that site. There were also some mentions of the “competition between sites”. “But then for example internally, when we are at three sites, so everybody notices that information flows very badly and all sites safeguard their own interest. It has been a kind of pure horror.”

Still people felt that “common values, way of thinking and way of working are exceptionally alike around the globe.” The concept of distance has changed dramatically. “The distance between the next floor and the U.S. west coast has strangely approached each other.” Even if their world has grown smaller, people need to stretch the boundary between work and free time if they happen to be in a project transcending time zone boundaries.

So with us this international thing has become stronger and stronger, which is actually a good thing. The bad thing about it is that because of the time zones, it messes up our working times and working days to whatever. We try now to struggle through these tough things and think then how to organise it in the future... Currently I am actively in contact with U.S., in there mostly Seattle, L.A., and Dallas and then another daily contact point is currently Hong Kong. Then one contact, almost a daily contact that has now been a bit quieter though is Camberley; there we have our own people and we don't have customer activity there. Then within Finland, the cooperation is focused on Oulu, Tampere and Helsinki sites. There you already got the most important ones. (Project Manager, Male)

People reported that they increasingly used the option for virtual meetings and also increasingly or regularly working from the home office every now and then because “it is all the same anyway from where I attend all those scattered [virtual] meetings I have during a day”. Another reason for home-office days was to have something done because “at the office during office hours there is not a second of time to concentrate. So if I want to have something done, you know, somehow the peace needs to be guaranteed.” In addition to geography, some issues related to spatial considerations were mentioned. *Open space offices* were mentioned many times in the survey. They are supposed to increase cooperation but often actually seem to hinder it; people do not dare to talk to others because they fear disturbing those concentrating on their individual work in the open space. The engineers and designers especially found it disturbing. “Don't they see that in design work you just need to have time to concentrate on your own stuff, without being interrupted all the time?”

## Temporal Boundary

The work is organised around projects that are scheduled and continuously synchronized around the changes in schedules. Without scheduling and constant synchronizing it would not be possible to produce complex system products. The *project and process milestones* were things that everybody was aware of and they were considered important landmarks in a landscape where boundaries have become blurry. The *milestones* are also, as will be explained in *Section 8.2.2*, dynamic links over the borders adding up to the synchronization of the system. Such links over the borders ensure that various parts of the organization are moving in the same direction, more or less in the same rhythm, in a fuzzy environment. The achievement of some important milestone was celebrated by having parties. These landmarks, however, seemed volatile and people found it difficult to get to know about changed milestones. The thinking is very linear in project and process mode. The “on the boundary of R & D” functions (or social systems) like customer documentation had also adapted the same kind of project and process mode to adapt to their environment.

I need information about schedules because they keep on changing often. And then about the content of the project, in other words about the features that are grounded around. Those two are the most important. Schedules and content. Well, what else, well, the responsibilities change to some extent. That goes quite naturally, doesn't cause any big problems. (Project Manager, Female)

Crossing the time zone and geographical boundaries via virtual meetings and other tools (like email and video conference) has made distributed projects easier and also reduced unnecessary travel.<sup>18</sup> Increased virtual working mode has decreased the space for free discussions with colleagues and getting to know them intimately. Crossing the time zone and geographical boundaries seemed to be more like business as usual, “this is the way it is” type of thinking. This result is aligned with Hirschhorn & Gilmore's (1992) thinking when they claim that the new boundaries in “boundaryless” companies are different from the traditional “hard-wired boundaries” like geography. The interviewees reported that when the new virtual meeting tool had been introduced there had been normal resistance to change regarding a new tool but when it was just imposed no one had a say and people very quickly adopted the tool. Managers also immediately started using the tool and showed a good example.<sup>19</sup>

The virtual mobile work (cf. Vartiainen, 2007) has definitely increased and the “follow up of the working time has decreased” as stated by one interviewee in 2006. In general people have *more freedom from time and place*. This has increased initiative and self-management because “only your performance and achievements are actually

18. Note that those people in marketing jobs need to travel more even in the era of virtual tools so that they can actually meet the customers face-to-face. Internal R & D people can meet more often via virtual meeting systems.

19. Since 2003, the virtual meeting system used in the case company has been changed to another system.

followed-up”. “I can work from home and I can have short confs with people on the need basis and don’t need to spend long days in meetings.” For those in highly collaborative mode it may be that the speech contact with other people has decreased and efficiency improved when it is not always necessary to travel. On the other hand, the borderline between work and free time has faded, which is a clear intensity factor. “It is not a joke that you need to be continuously connected and available.”

Virtual collaborative working mode seemed the way of organising work especially for many managers, those in global positions and for those working in distributed projects. Some thought that virtual mode has at times been taken too far and become too pervasive. There were comments like “we are in those virtual meetings and everybody is just doing their own stuff with their laptops and nobody is listening to what the person talking is saying, it’s kind of like half-presence.” There may be very few or no face-to-face meetings or informal interaction and people may have never met their colleagues. On the other hand, less time used for travel had increased time spent at home or hobbies. The virtual mode is so pervasive that it affects even the way people physically close to each other work and meet.

We often have the virtual meetings and people from all over attend, and my colleague from next door also attends, but we have both become so lazy that we can’t even make it all the way next door (laughter) , and there we both sit in the same meetings but never actually see each other. (Manager, Female)

For many it is a real challenge to find time and space for uninterrupted individual work. People have adopted different kinds of strategies like working from home, using the evenings or even reserving the meeting room, going to the “telephone box”<sup>20</sup> or even to the self-study room. Vartiainen et al. have made the same conclusion: “ the work of a knowledge worker is characterised by a continuous double-binded search for places to concentrate and to share and socialise” (2007, p. 10). Especially managers, but also people in some other roles, depicted *work days that were highly fragmented*. Within a day the tasks were also fragmented and partly parallel. The data revealed a culture where people occupy themselves with parallel tasks. *Multitasking and task switching* might take place e.g. during a meeting where people listen to what is being said with one ear and use their laptop for emails, approvals, preparing presentations etc. The mobile phone is used also to send urgent SMS-messages to people not present. Accomplishing multiple parallel tasks and communicating with various parallel tools may also take place during meetings. This is related to the “half-presence” mentioned earlier. One interviewee contemplated the fact that space for informal time together had diminished. The meeting practices and overload of emails also came in for criticism.

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20. *A telephone box is a space reserved for individual phone calls and phone conferences in an open space office.*

There are not so often these informal situations any more where we spend time together, because it, however, does create the kind of feeling of bonding with others, so that we could do something else together and not always work... so that there wouldn't always be so much hurry that one doesn't even have time to sit at the coffee table. (Engineer, Female)

Somehow there is this kind of email culture that someone starts a string of emails and people answer on-line with one-liners and the string grows to be a monster and at the end of the day nobody remembers where it all started from. And what do you do yourself: add up to the hassle and feeling of urgency by keeping up with answering [laughter]... And when attending a meeting, what you usually do, is listen with one ear and listen up if you hear something that is interesting, you know, relates somehow to what you are doing, well, and you listen and then all the time you read your mails and answer them and you might handle some tasks like approving some invoices or other kinds of requests, and then there can be text messages coming and you tend to answer those too, and you get this feeling of being efficient but of course it is somehow deceptive because you are not really concentrating on anything properly, you see. (Manager, Male)

The perception of flexibility (employee or organisation) was very different for different people. Some obviously enjoyed the freedom and flexibility of work and some were of the opinion that only the employees are supposed to flex. "I am ready to flex when, in its turn, the organisation is flexing, too. If I work overtime in a busy period, then when it's more peaceful I can take a day off or leave a bit earlier for the weekend."

### **Time line Boundary (History – Future)**

Dealing with the previous versions or configurations of products, i.e. the history versions is one part of the everyday work in R & D. The re-use of earlier software or specification documents is aspired to, if possible, because it reduces the time used for newer versions. Often this is not possible because the documents are not up-to-date or the colleagues who have been involved are no longer available for consultation. The risk of re-inventing the wheel is high. Somehow the view of the past seemed very short. People found such situations difficult, when no one with tacit knowledge of past solutions was available due to recurring job role changes. The document alone seemed insufficient and people were wondering if they could trust the documents.

I don't have the history background to this specs that I am working on, so that is visible to an extent, so that I don't know what had happened in previous releases that how... not everything is written down in the previous versions of documents so that they only come via my predecessor, that knowledge, so that is one thing, but this is quite normal so this has nothing to do specifically with my case. (Engineer, Female)

It inevitably means that when you have been involved, then all that back-end, in a way the competence transfer to all the trainers and on the other hand to the documentation people, and also to the designers, now you realise that time utilisation wise there are challenges in having so many projects running in parallel. And anyway you don't get rid of the old ones. It doesn't go so that when you have done the re spec, you could leave the stuff but it really takes a long time when the product goes to the customer and long after that, very easily you are the person people ask even though the boss would of course like that you need to be much stricter and kind of tell people that "this has been transferred there" and "ask there!", but very easily you are involved in it for a very long time. (Senior Engineer, Female)

Compared to Orlikowski (2002) I would like to deal with the *historical boundary* more like a *time-line boundary*. There is a need to continuously cross the boundary both to the history/past but also to what is discernible in the future. When developing systems here and now, one need to take account of the previous generation systems as well as what standardization says about the future. A couple of informants were worried about the long-term projects not getting enough focus and resources at the expense of short term projects. Also, the boundary around what will be included in a certain product release was blurry and the "content" kept changing as mentioned by one interviewee. If a feature is not included in the version under work, it might be considered for a future version. The boundary between various projects within people's job roles is blurry. There may be several projects running in parallel. One might need to support those working on the same area within the next process phases long after moving on to the next project/s. Thus, whatever one has learned sticks to that person for a long time after he/she might already have left that area behind as one's main, formal responsibility area. For this reason an agile organisation cannot move people directly and abruptly to new responsibility areas; there is always a certain stickiness in people transfers due to the knowledge and expertise that has attached to those people who have created or implemented some parts of the system.

### **Social Boundary**

Knowledge workers in R & D usually have a high-level background education likewise the research participants in this study.<sup>21</sup> There is no distinction between white and blue collar workers in the traditional "factory" sense. All in all most research participants claimed that the cooperation between people is very professional and that there have been no major cliques in their environment currently or in the past. "The organisation changes so often anyway that the "cliques" dissolve soon if there are any signs of, you know, skis going criss-cross with some one." One person conjectured about the relation between the informal way of working and flat organisation and Finnish culture. The boundary between introverts and extroverts was mentioned and could be considered a kind of social boundary (or a diversity feature). Even in this extract the project manager

21. *Moreover, very often collaboration skills are on the selection criteria list in the entry tests.*

ends up thinking how he could himself better deal with diverse people, thus taking an attitude to *proactively cross the boundary towards another person*.

Those who are such introverts, so they must have had some kind of a reason for having been hired, so that they are then very professional. All these introvert guys, so they are just damned geniuses. When you just learn how to deal with them, when you let them be like they are, you know, so you just have to. It might feel... I have felt stupid when dealing with some of these guys, but then afterwards you might kind of hear that you have even got something, like even good feedback that they have then given. So that even if you yourself felt that for yourself it might perhaps be a bit kind of awkward to act at times with someone when you don't know what he/she is thinking. But then you just kind of need to take that person as he/she is. So maybe you should then just think of it like the other way around; that the problem is me, so you just should be able to deal with all kinds of people. (Project Manager, Male)

The women interviewed working in R & D core job roles had not felt singled out for their *gender* even though they were slightly prepared for it. "There are a lot of acquaintances and friends around so I don't see any barriers. Even though I am the only woman, and this way, and that is not a problem to me, and probably not to others either, so long have we been working together." Thus, *it seems that there is no gender boundary within R & D*, at least not a notable one. It was rather so that the interviewees described some job roles or functions as gendered. Assistant or secretarial work was clearly described as women's work. There were no specific mentions of any *age* boundaries in the interview data.

Then again if you think how these coders come and talk with the secretary, so definitely there is a gap. So that it is a remote kind of service lady behind the counter and you approach then differently. And in a way you are not in a female, female role work, when you're in this [SW] group. You had a clear female role, when you were secretary, now not any more... Now it is an egalitarian situation on the other hand. So that is quite ok. (Engineer, Female)

In an organisation where IT tools supporting work have been elaborated far, the "man-machine", the tool/technology – social/human interface clearly is one boundary. People were in many cases eager to have a proper *requirements management tool* that can handle the whole requirements management process.<sup>22</sup> The expectation is to delegate much more to the IT tools when it is obvious, however, that no tool can alone handle any complex process or issue.

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22. "Requirement" refers here to any requirement related to products or systems mostly coming from customers.

## Cultural Boundary

Most research participants were working regularly with people of different ethnic or national background from their own. *Most of them were also fairly knowledgeable about the existence of cultural differences* (at least based on what they told) and of the fact that intercultural communication is something that people need to learn more about all the time. Some had attended specific organised training, e.g. how to work with India. Again the *attitudes encourage the proactive crossing of boundaries wherever possible*.

Culture is such a thing that we have kind of learnt to take into account more. Training Finns and training Chinese, so that is about two completely different things. So that kind of thing we have learnt, you know, and then there are all kinds of cultural training, how do you get along with Indians and the Indians go to the courses where they tell how to get along with Finns. So they are really great and they are needed because we have different cultures and we are different people like by backgrounds. So just the fact that we have different habits and if we don't know and identify them so then that causes conflicts. (Senior Manager, Male)

Then there is one Indian, when you go to his room, so he stands up and offers a chair and it kind of differs from this, it just is his culture, so that when a project manager enters, so you stand up and offer a chair. Somehow, you just can't make that manner disappear, even though otherwise we are you know like buddies, it just kind of wouldn't go away, you can't get rid of that cultural thing. But I don't get bothered; it suits me, so that I have learnt a great deal about these cultures, when they are so different. So you can anyway say about all individuals that they are all anyways different. And maybe, if I say just one more thing, so a year ago when I was in the adaptation projects, there we had those Indians, it was just different with them because they are so overly nice. This is quite a known fact, and always we have talked about it, but just the thing when you experienced it for yourself. So maybe those problems if look at this picture, so maybe those people from X [company] here are too nice, so that they would tell us that we cannot do this, but they kind of rather say nothing, this kind of cultural differences there are. (Project Manager, Male)

Diverse ethnic or national backgrounds as such were mostly thought to be a positive thing. There were varying comments about the *language* to be used in oral communication; some mentioned that they try to get non-Finns always to the team and meetings in order to stick to English to learn more and "since minutes and everything else is in English". One person mentioned that it is easier to be in a Finnish-speaking meeting "because I can express myself much more widely in my mother tongue".

So, little by little the cooperation expanded with them [Indians]. Of course the language is an issue, when they speak English with their own accent, but we surely manage with that. You get used to that. (Manager, Male)

Then I am a lot in contact for example in the OSS direction, with OSS, there seem to be a bit different cultures in different sub-areas. We have a certain kind of culture, OSS has got their own, ex-MSK, the core [network] side, has a certain kind of culture. And also the management cultures seem to be a bit different. Platform [organisation] has a completely different kind of culture in Helsinki. (Project Manager, Male)

The interviewees also mentioned that the cultures in different organisational entities or functions can be somewhat different. (The social and cultural may thus be intertwined.) In R & D the engineering culture is pervasive and was something that those not having an engineering background or education were very knowledgeable about. Still, collaboration between various organisational functions is recurrent and role switching in collaborative situations is possible. The culture in different product lines also seemed to be different.

### **Political Boundary**

As for the political boundaries, the first comments hinted in the direction that political games or “knifing in the back” were not really apparent in the immediate environment of the research participants. Many wondered that maybe higher up in the “hierarchy” there might be more politics or at least lobbying ongoing than in their own environment. Nonetheless there were some indicators of political boundaries as well.

At the end of the day people play very much with open cards here. Things that are related to your own work or your being in this company, so they are told and discussed very well, so there is no kind of moping about, not much. At least this department is clean as far as that is concerned. Everybody tells what is bothering and things are talked out. In my previous life, the support from my manager was not exactly in place, that was a bit weaker, so a bit more responsibility was gained and no criticism was received, you know, it was kind of conservative management thinking. Here it is quite open and equal, so there is no, you don't need to do or fill in any requests in any way, so this is quite buddy-buddy if you can say so. A very intimate way of working, you know honest, upstanding, quite upright, upright way of acting. So that things are done right and that is enough for everybody. So no kind of making decisions based on the face factor. (Engineer, Female)

This is so much based on knowing people and in the parenthesis the old boy networks needs to be quite, at least the higher up you go, so it is more about playing with relationships, so that you can get certain decisions, when you can beforehand go them through with certain key people and in a way they agree to listen to you because you know them. So just this, that you know the right people, so you get your matters forward. (Senior Manager, Male)

The interviewees assumed that the organisational changes might cause more “political” friction between people, especially managers, and even organisational units or

locations. More competition appeared in these situations as “normally the competition is more covert”. (In this study I have referred to “open state” as the state between two organisational configurations.) The recent threat of redundancies and personnel cuts at the time the interviews were conducted especially had made people to stick to what they know as it might be beneficial for them at some point when people were reallocated to new jobs. All in all there was a feeling that the organisation was shifting towards a more hierarchical way of working as a consequence of the announced reductions and that this eroded the overall trust. There were also some comments that “after the layoffs everything returned to normal surprisingly soon.”

### **Technological Boundary**

Crossing the technological boundary is in the core of many R & D people’s job in the case company. Learning new product technologies or development technologies and all their implications for the system is also a big learning boundary for people to cross. “The continuous challenge itself that comes through the work, in other words there are new technologies coming that we use in our work, so that creates the pressure to learn to do those new things.” Crossing the technological boundary towards new technologies (future) entails to leaving a more mature system behind and stepping towards the insecurity and immaturity of the new system.

Just this, that continuously new technologies are introduced, like now this changing of our system, and you always feel that we try to be one step ahead and anyway we are not on such a maturation level that the system would function even now. So somehow it feels that the old system, like the Unix side and C++ coding side was much more stable. So maybe that brings the kind of insecurity that “oh no! how long is it going to take when it functions again properly?” (Engineer, Female)

It probably was the doing of the first req spec [requirement specification] for X [a system product], so that perhaps was the kind of boundary mark in a sense that I was there for the first time with requirements and this still of course learning, you know, what is a good requirement and how it should be formulated and split up and that was all in all an interesting thing how you needed to cross it and step into a new area so that up to that point even if you have studied something, but it has been different, so that was definitely one. (Engineer, Female)

When developing large systems with several generations a great deal of coordination and synchronization work is needed between the various components constituting the complex system. The informants often mentioned the need for “synchronization” and “getting up-to-date” with the progress of other components of the system, e.g. network elements. This synchronization takes place in formal “info sharing” or “status” meetings where “one might sit (especially managers) half a day without hearing anything new”

but on the other hand one might “suddenly hear about some change” in another part of the system that “turns my plans completely upside down”.

Various information storing systems were also mentioned. Even if a lot of effort is put into integrating different systems and to making them function seamlessly, there are always breaks in the information flow taking place in the tools. Most often, however, people stated that the problem was that the data or information in tools is not up to date. Many commented that IT systems are probably in a better shape than in many other organisations. The ongoing wish list included further development of knowledge management tools in the direction where information is in a form that can be “easily picked over and digested.” However, mostly people complained that the intranet is a “bottomless swamp” and the written “documents are always a step behind” or “outdated”. In this point the results are aligned with Döös et al. (2005).

### **Vertical Organisational Boundaries**

The manager employee hierarchical asymmetrical relation was characterized by the fact that the *manager seemed to change relatively often*. Most interviewees counted that their *manager had on average changed once in a year*. As previously mentioned, the overall feeling was that the *organisation was relatively flat* and that the vertical boundary was not too impermeable in terms of hierarchies that people would need to respect.

The management style is so terribly flat and the way of working in this organisation, so there is no bowing down in any direction, what I saw in, anyway, in the summer job that was an old traditional company, where there were a lot of old-timers working who were used to kowtowing. So there was none of that here, and nor can one see that today either... Cooperation between people is continuously one of our strongest sides. No one needs to think what you can ask and from whom, and in my opinion it works real fine. (Project Manager, Male)

Then maybe this kind of getting the attention of senior or top management, gaining support for your own undertakings, so maybe I am not that good at that, but in a way one should know how to use it, and I have used to some extent, but anyway kind of bringing up those issues and making proposals, sort of breaking through into it. So it is not necessarily like, you know, it doesn't always go so that the most important things get picked, but the most important thing is that you really take that issue forward and believe in it yourself, then you maybe also get the support of top management. (Senior Manager, Female)

In this kind of agile corporate culture, how democracy works, so what has been somehow reduced, and this is a bad thing, so the respect for the kind of substance knowledge has reduced. I suppose I believed in that, like earlier even the high management could talk with the experts... There was more about, in a meeting there could be something like four

layers of the organisation to discuss some matter. This organisation has gone in a more hierarchical direction. It probably hasn't been the objective, but there has been so much of reshuffling of the organisation in recent years, and we should do so much of everything, it is like difficult to pick what is important. Today individuals need to quite a lot ask that who has ordered this and who has given the order to do this. To some extent we went in the wrong direction in my opinion in the X [organisation], because quite a lot was justified by saying that the head of the division has decided so, or the management team of the division has decided so, kind of they didn't say why something is done, you know the substance, but like who has decided. (Senior Manager, Female)

*Lobbying upwards vertically* was something that managers obviously needed to engage in to get attention for their area or projects. One senior manager commented that the vertical boundary has grown more impermeable in the sense that *management does not involve experts in decision-making as much as earlier*. The overall feeling was that the organisation is flat and the structures (hierarchies) do not impede collaboration. However, there were several interviewees who were of the opinion that the organisation "is going in a more hierarchical direction". One interpretation is that the organisational changes have actually strengthened the hierarchies. The very fact that organisational changes have been about changing the structures and hierarchies may have drawn more attention to these. For employees organisational changes can appear as announcements of people nominated to new positions in the new organisational setup. The other interpretation is that with the maturation of the organisation (even the downsizings), the natural options for job advancement have diminished and people would stick to their positions more than earlier.

### **Horizontal Organisational Boundaries**

When developing highly interrelated systems, seamless collaboration over organisational structural boundaries horizontally is crucial. Ashkenas et al. (1995) called the boundaries between the organisational entities and functions, *horizontal boundaries*. In a "boundaryless" organisation the knowledge flow, contacts and learning also take place horizontally across the organisational structures. In Nokia the organisational structures were broken down time after time along with organisational changes. One manager interviewed pointed out that "organisational boundaries are *never* unchangeable". People used words like "silo" and "silo effect" to describe what happens if an organisation is left untouched for a long time or if its mode of operation is rather navel-gazing than outward reaching. "People don't talk enough over the organisational boundaries. It is funny how the organisational boundaries, they affect so powerfully all we do. That sure is surprising."

There were also other kinds of "silos" or boundaries that people felt are sometimes hard to cross, i.e. it is not always organisational structures. Such "silos" that are hard

to get past may be a boundary between platform development and product development<sup>23</sup> or domains like hardware-software. The boundary between various product lines (system program trying to reconcile), process phases (nowadays done more incrementally), interfaces like SW design-SW testing interface, the borderline between functions like customer marketing/customer business team and product line and line versus project organisation were also mentioned. On the other hand, the organisation is built up around these parameters and set up in different configurations in organisational changes. *Synchronizing and cross-checking over the horizontal boundaries* was often apparent in the interviewees' accounts. The concept of "interface" (again not the technical or systems architectural interface) emerged repeatedly. Interface is the touching point on a boundary between two entities. An *interface* may either work well (knowledge and information flow) or an interface may work badly (knowledge and information do not flow well enough). An interface needs to be built and maintained. A working interface includes a person or persons who actively work on the interface so that information and knowledge is interpreted and negotiated on the boundary in several needed directions/perspectives. The following extracts highlight this part of people's work.

In my opinion, the cooperation between the testing phase and software design has improved a lot and it is due to the fact that the competencies improve and the people's understanding of the big picture starts to improve and that is good. What is quite challenging, always has been a problem, is the technical cooperation between the platform and the application level, but it can now be kept in shape, when we look after things carefully and phone after people and at least we have gotten support from the platform. Their interests are anyhow a bit different from ours when they do their own software. (Project Manager, Male)

Now we are in X business area, how the info flows from there is quite weak. I don't know how much our project manager communicates to that direction, so that is in total black-out that there is hm, there we have a restraint on. That is quite weak. I don't know for example of our market situation, I don't know at all, and nobody in our group knows. How many of our products are on the markets and in use, how actively are they used, and what features they would wish to have, and this kind of things do not trickle down to us. (Engineer, Female)

There you should look at how we really could get the collaboration setup with marketing in shape, or that they would, you know, really understand that there is a chance for an interface and not only that stuff moves back and forth here. (Specialist, Male)

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23. *The reason may not be only the organisational boundary and ways of working "that have developed in differing directions" but also the fact that platform development cycle is longer than product development cycle and the fact that one platform is used in several products causing pressure on system planning and synchronization. Thus, the "organisational ages" are different. Also, product programs might be closer to the end-customer than the platform organisation.*

I immediately get to think of, so this interface just doesn't work, this communication with network elements and so we don't get the knowledge... so anyway we need to improve this collaboration with the network elements. This system level X feature that we will then show here in a graphical manner, covering the whole network in one place, so it requires that all these network elements implement that feature in itself and we need to be later more there to investigate that they really do it on the specification side and testing side so that they get to check all the things there. (Project Manager, Male)

I do have myself the SW experience so I cannot jump necessarily to the hardware side but somehow I feel always that it needs to be taken into account. But always when you invite a hardware buddy, so it is that just in a minute: "How is this now related to this? What is this all about?" (Specialist, Male)

The survey results show (see *Tables 6 and 7*) that 82% of people need to collaborate horizontally with 1-6 other professional or process phase groups in addition to their own. 54% of people spend 20-50% of their collaborative time with other professional/process phase groups than their own. 27% spend 60-100% with other professional/process phase groups.

<b>No of other professional groups/process phases one regularly collaborates with</b>	<b>% of respondents</b>
Only with my professional group/process phase	9%
With my own professional group/process phase + 1-3 others	52%
With my own professional group/process phase + 4-6 others	30%
With my own professional group/process phase + 7-11 others	8%

**Table 6.** Number of other professional groups/process phases that people regularly collaborate with

<b>% of time spent with other professional/process phase groups</b>	<b>% of respondents</b>
0-10%	19%
20-30%	32%
40-50%	22%
60-70%	16%
80-100%	11%

**Table 7.** Amount of informants' collaborative time spent with other professional groups

The overall feeling of the interviewees was that the collaboration over horizontal boundaries had increased and the "messages zigzag" in the organisation more than earlier.

Well, nowadays when this organisation is hm, so messages zigzag... I tend to believe that direct communication between peers, between people on about the same level, that has definitely increased, but the one who would then make decisions related to them, that decision-maker is missing. (Project Manager, Male)

*Getting feedback* is an important part of developing one's expertise and learning at work. For example, Järvinen's & Poikela's (2001) model of workplace learning processes shows well what an integral part of a well functioning workplace processes feedback is. There were cases where interviewees reported that they had had good feedback, for example from some specification they had written and others had subsequently used it as a basis for their work. However, many interviewees stated that "one never gets too much feedback" and they also wondered if it was "a Finnish cultural trait not to give feedback too easily." In modern co-configuration types of organisations the perspective from whom people should get feedback and to whom feedback should be given has changed. In cases where the manager is not really knowledgeable about what his/her people are actually doing, the feedback can only be superficial. The significance of the *horizontal feedback channel* has increased. Traditionally it has been managers who give feedback (vertical feedback channel) but in a networked way of working it comes or at least should come more and more often from one's colleagues. Feedback especially from peers and colleagues horizontally was desired. Several managers reported that they gather feedback from other people for the achievement review and development discussions of their subordinates. One interviewee stated that "possible negative feedback concerning a colleague is most easily directed if it goes via the manager." Self-management skills become increasingly important in this kind of environment where the work guidance and feedback do not come solely through the vertical channel. This is also related to the authority boundary brought forward by Hirschhorn & Gilmore (1992).

I have been for many years in a group where the solid line manager has nothing to do with my work, and so I haven't really gotten next to any feedback from my solid line manager. But then I have all the time kind of had a project manager who can basically see the performance. And sometimes you get feedback from the project manager, but in my opinion there is no such official channel, so that there would be a kind of regular event, when you would get feedback. From colleagues you get some feedback. Well, I don't give myself that much of feedback to anyone. Very little do I get feedback on how my team works... I don't know if the managers get it. I have at some point been a solid line manager here myself and I would think that even when I was a solid line manager, even then I didn't get any feedback on how the group works, so this, I would think, this kind of aspect is, sort of, completely missing. It doesn't exist and anyway we do quite a lot of teamwork and teamwork is valued. (Project Manager, Female)

At least when every half a year we go through, when we go through their objectives, they give feedback to me and I give feedback to them. Then just in passing also...In the half yearly reviews we go through real careful how it has gone and once a year we do this kind of performance evaluation, i.e. we give this kind of statement. Then once a month we go through the objectives and I can see how they are progressing and how a certain thing has gone in my opinion. And then continually, if I hear feedback from somewhere I also like to give it. Of course it is difficult for me to give, of course I can encourage and praise and when we reach some deadlines and they have reached one, but really I don't see them in their own work, so that I can basically give the feedback that I hear from somewhere else. Because rarely you give that face-to-face and rarely someone from some other organisation goes and tells someone else that you handled this real well, but they might mention that to me, so I pass it on. (Manager, Female)

### External Boundary

To Orlikowski's boundary list I have added the boundary between two different organisations, i.e. the *external boundary*. *Customer interface* can be regarded as one special external interface and it is dealt with separately. When asked about the type of *organisation's external networks* people have, the average number people pointed out in the survey was two types of external parties (see *Table 8*). The external parties that people mentioned in the interviews were predominantly R & D collaborators and suppliers, but also the academia and training institutions as well as customers. In the survey 55% reported cooperating with *R & D partners or subcontractors*, 28% with *other partners/subcontractors and vendors*, 20% with customers, 14% with *university or research centres or equivalent* and 7% with other *external special interest networks* e.g. discussion forums.<sup>24</sup> With the university or research institutes there might be common projects or people might attend conferences or the like for learning purposes. All these external networks can be considered to be people's background networks that bring useful knowledge to their work.

External contact	N	%
Customers	189	20%
R & D partners or subcontractors	527	55%
Other partners/subcontractors and vendors	266	28%
Special interest networks e.g. discussion forums	65	7%
University or research centre or equivalent	136	14%

**Table 8.** The extensiveness of survey respondents' external networks

24. In addition to the given options in the survey, people had added the following external interfaces they have cooperation with: standardization forums, environmental test laboratories, competitors, conferences, exhibitions, special interest experts, friends working in similar areas, regulatory agencies and patent agencies.

The cooperation across the boundaries between different companies was generally perceived to work out reasonably well. There is a significant difference between the various types of external interfaces regarding the type of cooperation people are involved in. Usually with the external R & D partners or subcontractors there is a common goal depending on the business mode. The most common way to organise the work in the case organisation was for the R & D collaborators to implement some modules of a product, e.g. software, according to specifications made in Nokia. There were situations where external parties were only supervised in terms of the ordered outcome. There were also descriptions of people working with externals in exactly the same manner as with their colleagues in the same company, “the only difference being that they cannot participate in the team building and parties and such.”<sup>25</sup> It seems that in partnering interface there are many different kinds of situations and levels of collaboration. Some few people commented that there is “no real knowledge boundary between the companies” and that the geographical boundary with the other side of the globe with one’s own company may be more complicated than with a partnering company in the same location. In other words, the geographical distance may be a bigger boundary than a company borderline.

The target state in organising the way of working seemed to be setting *as few as possible contact points in the partner interface so that everybody knows who the contact point is*. There were also comments related to the need for having more “informal links” with the partners. In these cases project managers or collaboration managers in the partner interface can act as a real bottleneck if people cannot be directly in contact with each other between companies.

Later on we would probably need to be directly in contact with X [company], so [now] this kind of indirect link doesn’t really work. They anyway handle their stuff damned well but in the future we should then improve the link towards them... The problem is that we don’t know whom we should contact. There are so many guys with the same name.  
(Project Manager, Male)

As for the boundaries between partners and subcontractors in product creation there seemed to be difficulties in *getting feedback* on problems arising during the collaboration projects. (One might ask if this reduces knowledge sharing across the boundary between design and implementation, and in the long run, innovativeness with the products.) General feedback over the external boundary horizontally was also desired. In addition, the *technological boundary* between firms, e.g. document sharing systems, virtual meeting systems, intranet access and such, had caused problems, but these were rapidly being remedied. The following interviewee focuses on the *IT tools*, how to draw up *contracts*, how to make *reports* as well as refraining from *communicating*

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25. In the black box business mode the outcome based on a contract is ordered from the partner company. Another mode is to use external temporary labour for peak period work.

*company business specific information* to the partnering company representatives. The research participants also described cases where too much *involvement in running in (induction) and training partners' employees* was needed or, in fewer cases though, time used in *getting to know the partner's processes* was needed.

I usually don't get any feedback. There is too little feedback... I don't so much need feedback but it would be nice to know that they think of all issues, and how I have done as a project manager. Everybody wants feedback, some kind of feedback on their work. (Project Manager, Female, Boundary role in a partner company)

Yes, it [this product] is over 75% done in a subcontracting mode. Yes, we act a little differently. There are some just tool restrictions, so those you need to bear in mind when you work with them, so that they cannot do everything. Just as one example, they cannot participate in a net meeting and we need to use completely different tools. One needs to think a little what one can talk about with them. You can't necessarily go and mention all the firm's business issues in the meetings, but we have quite generally taken that kind of thinking that we deal with them as if they were own people. You don't tell your own people all business issues either. As far as I understand our partnering, collaboration has developed further. There is still a lot to do but it has already developed, but then there is quite a lot about contract technical [issues] and reporting technical [issues]. But that I have to say that we went into the partnering some time in 2000 and now in 2003 we still have several tools and many things still completely on a shaky basis with respect to this partnering. We went there very strongly without any tools. There we started to build a house with our bare hands, so that we didn't even have a saw. That was quite a bold stroke and we are now paying that debt daily. (Project Manager, Male)

### **Customer Interface**

Finally there seemed to be a dual approach to the "customer interface" as people liked to call it. On the one hand, the attitude was that "not just anybody can be at the customer interface" and that *one really needs to be a knowledgeable person if put at the customer interface*. On the other hand, the attitude was that being at the customer interface, even from time to time, is basically *one of the best ways to learn*. 20% of the survey respondents reported regular collaboration with the customers. With the interviewees the figure was a little higher, especially taking into account also those who had been in customer interface at some point of their careers and could tell about it. Customer interface was considered to be a *factor causing stress and strain* to R & D because then one could really see the pressure from schedules and requirements. Those who were supposed to be concentrating on implementation work were "protected" from the customer pressure.

Very traditional is this communication between marketing and release planning towards customers versus their comms towards the product line about what is possible. That must probably be the oldest in the universe. The communication between CBTs (customer business teams) and products line. It seems to be currently quite difficult and we try to strengthen that currently. It is also a fact that every CBT is their own thing... and with some, life is easy and with some others it is more challenging and some can handle those questions almost completely there, and keep customers happy. Then again some forward those questions directly to the product line, so that they can even go to the customer's side, so that "we do not quite believe that product line is 100% here" or something as crazy as that... It depends on the CBT competence, people, the culture in the country; it is such a many-sided palette that is going round and round. (Project Manager, Male)

Customer business teams seemed to act as a *boundary buffer* between the operator customers and the R & D product lines. In the first of the above two quotes, an interviewee from R & D suspects that someone in a CBT has not been loyal to the product line but has rather taken the side of a customer. He also emphasised how different all CBTs (customer business teams) are. Several interviewees mentioned that *customers are becoming more and more remote than before*. This may be due to the systems becoming increasingly complex, which calls for more people working around them, and not everybody can be at the customer interface. "Maybe earlier there was more contact to some customers, so that people saw that there is the item that I have done, so that kind of touch is, kind of, missing."

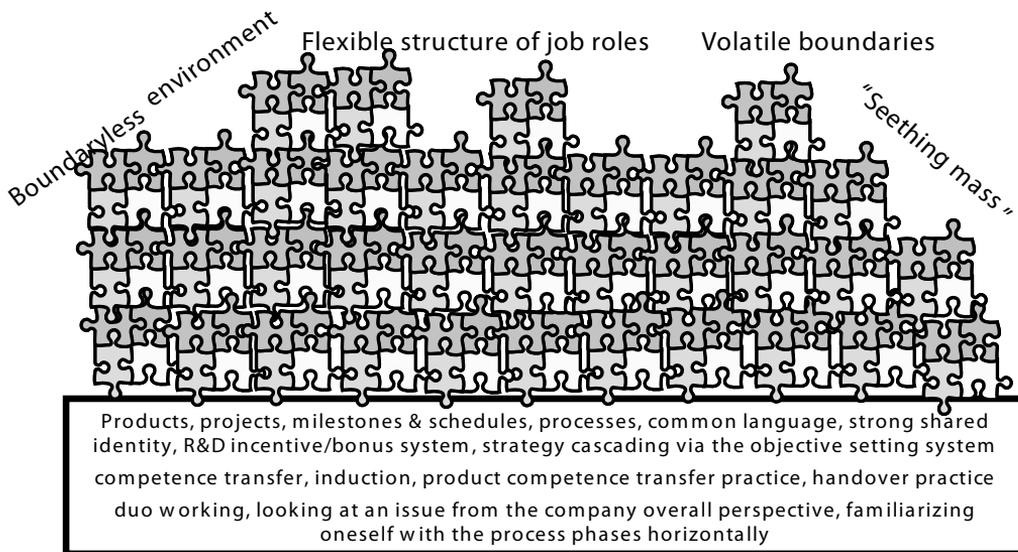
## 8.2.2 DYNAMIC LINKS OVER THE BORDERS

After having investigated the work context in the case company and discovering the multitude of boundaries as well as the velocity with which the organisation was being reconfigured, I started to wonder how it is possible that agile companies keep being productive in the first place. I concluded that there was bound to be some kind of dynamic pervasive elements to keep the system viable and heading to the same direction. I set to work on what the interviewees had said about issues and factors that *enhance their daily tasks and collaboration with other people*. I started the analysis by listing the elements picked from the interview data that enhance the work and collaboration and contain some kind of boundary crossing element. Then I checked whether these really are the kind of elements that enhance the synchronization and integration of the whole system. My term for this phenomenon is *dynamic link over the border*: it is something that *increases the alignment of the parts of a system over boundaries*. A link over the border is an *element that enhances the synchronization, coherence and integration of the whole system*. *Certain elements to link over the borders are needed in an environment where the boundaries are multiple and where the parts of the system are in constant move*

(for example recurrent organisational changes and job role changes). In addition to those identified in this study, there are probably many more. The below extract describes well why links over the borders are absolutely needed in the contexts like the case company to keep it viable.

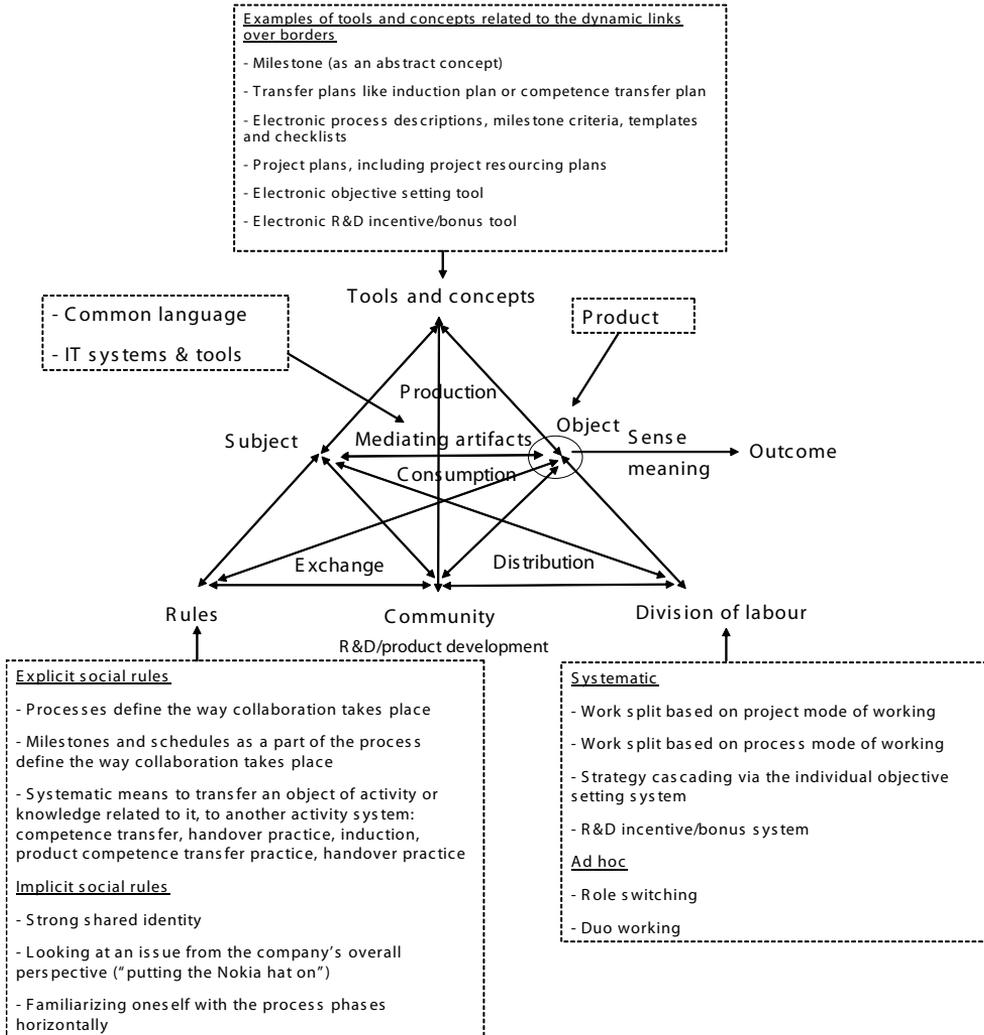
In a firm that grows or changes intensely, there are always reorganisations and growth, so the greatest challenge is that nothing stays still. In organisations, the units change, people change, here and elsewhere, continuous shifting and changing. (Senior Manager, Male)

Figure 25 gathers all the links over the borders identified from the data. The upper part of the picture, the puzzle, is characterized by reconfigurable structure of job roles and changing boundaries; it is the “seething mass” as described by one employee. It is the environment conceptualised as “boundaryless” environment in this study. Underneath, within the platform that supports the chaotic seething mass, I have listed the links over the borders that keep the above structures synchronized.



**Figure 25.** Dynamic links over the borders identified in the data

The next phase in the analysis was to investigate how it is that these elements dynamically attach and link the boundaries together and increase the integration of the whole system. For this purpose I used the activity theoretical framework and *classified these elements based on which dynamics in the activity system these elements have an effect*. Figure 26 shows where in the activity systems model the identified links over the borders have an effect.



**Figure 26.** Links over the borders and which dynamics in the activity theoretical model they have affected

### Common Object of Activity and Mediating Artefacts

In this study I have adopted a view that the *products* can be interpreted to be *objects of activity*. At its best, the constantly negotiated objective of activity can drive people in the same direction and compel them to work for a common interest. Products also proved to be the integral links over the borders within the R & D/product development. People went to various situations of knot-work as representatives of a product and it is the products that create space for negotiations on how the various parts of the product might and should be interrelated. The products are natural objects of activity in a business company aiming to create products.

So quite quickly the kind of commitment to the product so that the work becomes a little like something else than only work. So that you then want to make the product as good as possible and then take joy over that product when you possibly get good feedback over it and then you react to the bad feedback. This kind of a bit bigger kind of work, at least that is the way I have felt it myself. (Project Manager, Male)

All this time I have worked with the same product, almost 100%, excluding some offshoots that came during the group manager's job, because people were dealing with many products in my group, otherwise with my own product. (Project Manager, Male)

I picked an R&D position; I have always wanted to be close to the product. (Specialist, Female)

The whole system in the case organization is built around products, whether physical objects containing SW and HW, SW products downloadable from the internet or delivered on a CD (or whether they are services that are increasingly being developed in the case company). Also, Döös et al. (2005, p. 484) mentioned that "people networks were a major source of knowledge, and it was global, timeless and partly non-situated, however, connected through the products and problems that were to be solved".

Negotiation, development and producing an object of activity are only possible by means of *mediating artefacts* that may be both material tools and signs. In the activity theoretical view, language is a mediating artefact in the activity systems and between them. In this connection a *common language, vocabulary* and *acronyms* that people often used can also be listed as a link over the borders due to the synchronization and integration they bring to the system as a whole. The common language refers to the jargon related to the products, technologies and the organisation. Mostly the concepts are in English and they are used either in English or adapted into the phonetic form of the speakers' original languages, e.g. Finnish.<sup>26</sup> A common language guarantees

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26. *In much written material, especially internal material, there have been references to the mixture of English and Finnish, "Finglish" used in the case organisation. Also the language used by the engineers in the company has been referred to as "Nokia English".*

that no parts of the organisation start drifting in a completely separate direction. It holds the various parts of the organisation together by providing a point of contact for people collaborating over the boundaries. A common language can be seen as a tool that helps negotiating the common object of activity between all the parties involved. It also helps sharing identity, interacting, aligning effort and developing capabilities together and involving participants in project decisions (cf. Orlikowski, 2002). The *concepts, words and terms are derived from the products, projects, technology, processes and organisation* and they are obviously under constant change and negotiation. Over time many things related to the process are internalized with people in such a way that they actually become *concepts*. For example, a certain milestone is not just a letter and number (E3 or E4); they are much more. A certain milestone may for an R & D employee, for example, evoke the level of software maturity at the milestone. (From the social systems' perspective language may serve as the point of contact between the different social systems. Different social systems have their meaning processing systems which may, however, change as a consequence of structural couplings and related perturbations.)

We have a common language here, clearly yes. First when you arrive and start, you don't understand a thing about what people are talking about. There are so many words and concepts popping up in people's speech, and they are mostly related to products and to organisations, and you know, what not, common processes and technologies. And it's mostly abbreviations and there are hundreds of them. At some point, I remember, there was even a Dictionary of Abbreviations. Soon, of course, you learn and when someone new comes, you cannot understand [laughter] why he/she can't master all those self-evident acronyms! (Project Manager, Male)

IT systems and tools can also be classified as mediating artefacts. Both synchronous and asynchronous tools are available and being developed to mediate the activity and negotiation around the object of activity. For example the large scale introduction of an electronically mediated meeting system combined with a conference phone had changed the way people work; for many this change had, for example, reduced the need to travel. Some other concrete examples of mediating tools are related to the rules and the division of labour: induction (running-in) plans, competence transfer plans, electronic process descriptions (including templates and checklists), an electronic individual objective setting tool and an electronic R & D incentive tool.

### **Division of Labour and Distribution**

The factors related to the division of labour and the distribution sub-system were partly *systematically used* and partly they were rather *ad hoc practices* that could be used on a need basis to hold the boundaries together. Division of work is often done based on *projects*. In this study projects as the way of working is the first important systemati-

cally used division of labour related link over the borders. (Projects as such can also be classified in the production sub-process.) Projects are set up to arrive at a certain end result and people are allocated to work on projects. Even though in many cases the products are abstract SW systems, the projects creating those products are given names, numerical codes and even nicknames. (The same goes for the products).

People mostly gathered that the *R & D incentive/bonus system* also focuses on rewarding the common integrated effort. Thus, the incentive system is the second systematically used link over the borders related to the division of labour. It enhances integration over boundaries and adds up to the discipline and order and the common sense of purpose in the organisation (cf. Dyer & Ericksen, 2005). R & D incentive system puts projects/programs, products and their contents, schedules and quality in a central role. Incentivizing joint effort to achieve the planned results is a strong guiding factor. The interrelated parts of the system can be prioritized and dynamically linked together via the incentive system. The R & D incentive/bonus system is targeted specifically at those contributing R & D projects/programs.<sup>27</sup> In the context of activity theory it would be easy to say that the R & D incentive system that sets certain parameters for the object of activity (e.g. a product program milestone date) provides a powerful tool to direct the efforts in the same direction. The R & D incentive system also provides a tool to negotiate and reconstruct the object of activity in terms of the focus at various points in time: whether to focus on the schedule, quality (e.g. number of errors in software) or content (e.g. number of features included in a release). “Everybody is working in their own position, you know, but the incentives give direction or the target setting there, hm, it is guaranteed that everybody concentrates on the essential.”<sup>28</sup>

Bonuses and such things do have an effect... Usually when you set some deadlines, when we support projects and we have our responsibility areas, and when the project goes well and according to the schedules... Of course the bonus system is a pretty good motivator; people are then well motivated to work for it. (Engineer, Male)

The [incentive] system itself has been built so that this kind of cross-functional support has been a very integral part of that system... And I know it because I have been involved in planning the system as of 1998. It is the fundamental guiding principle there. (Project Manager, Male)

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27. *Those in R & D roles have their individual targets defined in the individual objective setting tool and how they are achieved is reviewed in the half-yearly IIP discussions. The performance management system is partly tied to the achievement of these individual objectives. The bonuses of R & D people, however, are linked to the common incentive targets defined in the R & D incentive plan. For people in other functions the incentives are tied to their individual objectives.*

28. *The R & D incentive system came up in relation with the interview questions: What is rewarded? What issues does rewarding support in this company?*

The third systematic element in the division of labour is the *cascading of strategies to the organisation via the personal objective setting system*. The IIP (Investing in People) process cascades the strategic objectives of the company all the way to every employee's individual short-term objective setting. It allows vertical and horizontal alignment of the targets over the boundaries. In practice it happens in such a way that top management sets certain business objectives for each half year for the whole company. The top management splits those targets into tangible objectives for the next level which then splits them again for the next level all the way through the organisation. The action plans of each organisational entity are also cascaded from the firm overall strategy. The challenge is obviously to choose the right objectives and set the right, sufficiently challenging, level for the targets in a volatile environment. The advantage is to be able to clearly prioritize the main focus areas that everybody should put their best effort into. A related factor is the *strong value-based emphasis on results, achievement and performance*. This kind of mindset causes the cascaded objectives to be realised in practice. The performance (the what and how part) of each individual related to the main objectives is followed up in the achievement review discussions and in the individual performance evaluation system. "Of course it is important that one is competent and skilful and so on, sure, but I think that here we tend to emphasise quite a lot what you achieve and what your end results are, you know." There was also one mention of a six-month cycle for individual objective setting being too long. This concern was related to the pace of change. "It's a must to learn new things because no old rule is valid in six months' time and no skills acquired are sufficient in six months' time."

The first of the identified ad hoc link over the borders related to the division of labour is *role switching*. These ad-hoc links over borders could also be interpreted to belong to the exchange sub-process. Constant *cross-functional teamwork* (heterogeneous team) in a boundaryless environment enables *role switching*. In such a situation someone assumes a role that is not formally in his/her job's scope (e.g. in the first of the extracts below a technical writer describes about situations where she had assumed the technical expert's role in collaborative situations). The data clearly shows that the background history of the people present in various collaborative situations does not emerge. It is the competence and/or knowledge of the person that counts, not the educational background, organisational position or function (social system) as such. Boundaries between various competence areas and educational backgrounds seem to dissolve with strong socialization in the organisation (e.g. strong basic training, "you can ask anybody" mentality and common language and concepts). This kind of environment allows role switching in collaborative situations.

When I think back to the time when I was still a [technical] writer, and in a project meeting I would correct let's say some technical issues, that "no, no, it's not going like that, but like this", it was not belittled or anything, or considered to be in someone else's role.  
(Engineer, Female)

Maybe I have thought more about the assistant background. But if you know your stuff people don't think about it. Of course you don't know everything, nobody knows. (Specialist, Female (has crossed the boundary from assistant to an R & D role))

Basically yes [we understand each other]. There isn't anything special there [in cooperation between professional groups]. I think that if there are any communication problems, they tend to boil down to personal communication... I would say that the corporate culture brings us to the same formula. (Project Manager, Male)

The second one is *duo working* (two people working closely together across boundaries) that was also brought up by a couple of interviewees spontaneously. Duo working pairs were not systematically planned. Duo couplings happen and dissolve spontaneously. These ad hoc links over the borders related to the division of labour can be used on a need basis in collaborative situations.

For human resources people it is easy to develop line management and leadership skills because it is about their own area but when it comes to technical issues, well, and then working in a duo with a colleague from the technical side becomes a strength. (Senior Manager, Female)

We just noticed that we formed an excellent pairing and somehow complemented one another, and you see, because we were dealing with the same issue. And it just clicked into place and felt a natural way of working but then I don't remember, somehow then at some point we drifted apart to some different tasks and areas. (Senior Manager, Female)

### **Explicit and Implicit Rules and Exchange**

There were both *explicit* and *implicit social rules* that act as links over the borders in the data. These are related to the exchange sub-process in activity theoretical framework. Processes and process related activities (product development processes) were salient and considered of utmost importance by majority of the interviewees. *Processes* as the first explicit rule, an underlying stabilizing factor of the whole complex product development that guides the way people collaborate. Processes give guidance to work and act as a basis for the linkages between various process phases. People felt that when starting a new job in a new context it was of utmost importance to get to know the relevant process. Processes also make transfers between various process phases and even products smoother. Processes, however, seemed not to be fixed likely to stiffen the system. They seemed to be flexibly developing all the time and allowing differences between programs and products. Process related activities could also be interpreted as being the trading zones where "diverse groups can interact across boundaries by agreeing on general procedures of exchange even while they may have local interpretations of

the objects being changed and even disagree on the intent and of the exchange itself” (cf. Kellog et al., 2006, p. 39).

The bigger framework I am involved in is engineering, but it also means here the processes of the product development, methods and tools. So this is kind of background work for the business areas. This is about creating new things and piecing things together. You know, people change so we need to be able to always handle things somehow. (Senior Manager, Male)

Of course the processes start to be quite well in my grip, they have been quite stable, there might have been some minor nuances, how [product Z] is, umh, done, so that has been quite clear so it has been like that, and the tools can change and they then just change but that is only fine-tuning which is not essential... Now we are changing the process model too, and making it more uniform, so that like in the matrix, all process phases would be more involved in planning and we would more likely listen to the testing and coding people for example already in the planning phase, and that way [we] would get synergy from there too, for creating the product. (Engineer, Female)

We have actually developed from the Nokia level process, developed a NET level process, product creation process, that has then again been tailored to all programs or to product families, partly, probably even every program has got it a bit different... And the partners use the same process. (Manager, Male)

Process descriptions provide a view of past and future process phases, process phase inputs and outputs and also the overview of the whole collaborative process flow. One can browse web based process descriptions deeper down from the overview level down to the level of templates and checklists (examples of tools and instruments created for and within the process of production (Engeström, 1987, p. 81). Processes like this could even be interpreted as being examples of constellation type infrastructures described by Engeström (2005a, pp. 12-14). Processes are naturally under constant development and especially if people were dealing with a completely new product or other issue, the fact that both process and knowledge of the product were immature caused extra strain in the form of novelty to people. However, the many basic issues within the product creation process have remained much more stable over the years compared to the organisational structures. In some cases it was mentioned that a process also contains good information on responsibilities, “who does what”, and can thus give guidance to job role division. In other words, the process combines “how to do” and “who does”. The challenge is to go to the incremental processes or agile processes and to keep the processes light enough and continuously develop them. Incremental processes have brought along the simultaneousness of the former more clearly separated process phases and strengthened the interdependence between

process phases and interdependence between people even further. Or conversely, in a complex world, concurrent engineering and agile, incremental processes are the only way to make things happen.

Processes clearly act as a link over the borders in product development. The processes contain a great deal of knowledge and the people using them act in a more nimble way they otherwise would. Indeed *project management practices combined with processes* can be considered as a powerful link over the borders in volatile environments. “Usually it is the milestone everybody targets”. Project management practices and processes are used both to share identity and to align effort. (For Orlikowski (2002), activities comprising the practice of “aligning effort” consisted of common models, methods and metrics.) Imposing project mode on practically everything was also criticised by one interviewee. “Can’t we really do anything at all without making it a project?”

Secondly, in the context of project work, the *milestones*, and *milestone schedules* proved to be a strong link over the borders within the explicit rules category. As part of the processes they were the landmarks that everybody aspired to stick to and to work for. The negotiations concerning the interrelated parts of a system were also often built around milestones and milestone schedules. Most people counted on the project managers being knowledgeable about the latest status of the milestone schedules, which also kept changing. Communication about the changes in milestone schedules was commented as being very challenging.<sup>29</sup> For most people work is built around products, projects and the respective milestones. This type of link over the border sets the basic denominators for people’s activity.<sup>30</sup>

Thirdly, there were several links over the borders related to *transferring a certain object of activity or knowledge related to it over to another activity system*. These rules are related to *transfers between certain activity systems*. Their significance is very high in volatile environments where the rules and practices need to support handing over or transferring knowledge, projects or products over boundaries. These links over the borders provide a systematic means to transfer or hand over a certain object of activity or knowledge related to it over a boundary to a new or extended “ownership”. In change situations these links over the borders can be used on a need basis. *Competence transfer, induction process, product competence transfer practice and handover practice* belong to this category.

Job role changes are frequent and thus individual *competence transfer* (or *handover*) from the previous job-role holder to the next one is essential as the newcomer most often jumps onto a moving train. The same goes for any bigger changes e.g. in cases where the location of a project changes. In these cases there is a need for a larger scale competence transfer plan (handover plan). Competence transfer or handover would

29. *Yakura in her study (2002) dealt with timelines as temporal boundary objects.*

30. *It is easy to see how the sub-processes of production, distribution and exchange are interlinked. “There is no activity without the component of production” (Engeström, 1987, p. 80). The shortcoming of this study is to use the activity theoretical framework to shed light on elements identified in the data and to describe the context. The activity theorists emphasise that “the essential task is always to grasp the systemic whole, not just separate connections” (ibid, p. 78).*

be needed, for example, when a certain product was handed over for further development to another site, to a different team or when a project was transferred to another process phase, e.g. to the maintenance phase.

The whole *induction process* (running-in) could be counted as one link over the border. A newcomer is accompanied deeper and deeper, over a boundary to a certain job role, a new technology or the like with the induction process that contains both formal and informal encounters with people, formal trainings and hands-on project work. In Gratton's (2005) data, the induction process was one of the strengths in network tie creation in Nokia there were, however, also indicators in the data of this study that if an induction plan is made for all entering the company, it was not done for all those changing job roles internally. (On the other hand, regular development discussions between a manager and an employee, when well conducted, provide a space for discussing the development and possibly even induction needs.)

*Product competence transfer (PCT) practice* could be listed as one element linking over the borders. There is a separate organisational function for preparing the training materials and training both for internal people and customers. PCT is related for the products being developed in the case company. Internal people and customers need to be trained to the newly developed products and how they function. The development of the training and materials takes place in parallel with the development of the products so that the training can start at the point the product or its increment is ready. PCT gathers knowledge related to a recently developed product, disseminates it rapidly and thus links people and related parts of the organisation together.

Now I am transferring to China, so now I have none [projects] left. I just [recently] had a handover session, where I transferred the last tasks to my successors. (Project Manager, Male)

I say that the kind systematic competence transfer definitely makes one's life easier. Once again, we did a proper plan how, whom, with whom, who is responsible, who trains, what courses, what gaps, and so we were really thinking of those and listing them. In a way, I have had many tutors here, and it has made it much easier, that I have had such a protective army around me, so that their time is properly reserved to teach me and it has been such a great thing and I can really appreciate it, it has very much facilitated my induction. (Engineer, Female)

*Implicit social rules* are often related to the *collaborative situations*. These are the type of practices that help people to rise above the boundaries of their immediate environment and to *take wider perspectives into account in their own work*. *This is bound to improve the outcomes of individual actions and decisions and ultimately the whole system*. Previously mentioned role switching and duo working could also be listed to the group of implicit social rules in the exchange sub-process. *Strong shared identity* is

the first of these implicit social rules. The interviewees praised the spirit and culture in the company. The identity is definitely related to what the whole company is all about, the values and products being developed. Identity is related to the common sense of purpose in the organisation, understanding the competitive realities (Dyer & Ericksen, 2005) and acting upon them, and not forcibly based on a certain bounded entity's interests. "Sharing identity", having a common identity, was one practice in Orlikowski's (2002) repertoire of practices too. In the interviews there were even traces of *elite identities* described by Alvesson & Robertson (2006). The first extract is from an interviewee still working in the company and the second from a person who recently worked in the case company.

I feel that my identity is a good deal related to the role of human resources developer, to my own reference group. And then it is related to the company. One part of my professional identity, sort of, I feel that I am just working for Nokia. (Senior Manager, Female)

I have been thinking that and I have come to a conclusion that it must be those HR tests that we have clever bunch of people working here, so that there is no need to, and hopefully not either to me, to explain everything so terribly thoroughly. Somehow we have the kind of smart and clever people working here. At least you feel when you walk there outside the company that you meet all kinds of people whereas within the firm so everybody is in a certain way, you know, oriented in the right way to this stuff. (Project Manager, Male)

I think about it now a little bit like when you have transferred to a different kind of organisation, you know, where there is nothing ready, so I kind of miss so much the kind of team spirit and I have quite clearly come to see that when you are here, there is something clannish here, that's what it is here, but on the other hand when you just learn this language you are one member here... So it is amazing the way people approach you, I can't explain it, but then I belong to something, I am classified as something and they start to talk to me in a certain language. (Specialist, Female)

The second implicit social rule linking over the borders is the conscious detachment from the current position and *looking at a certain issue from the overall company perspective*, "putting the Nokia hat on one's head". This kind of thinking allows a person to rise above the boundaries of the current job role or organisational entity. (It is noteworthy, though, that these comments mostly came from senior managers.) Again "putting the Nokia hat on", looking at an issue from the company's overall perspective is about conscious striving towards the contextual clarity and understanding the competitive realities (cf. Dyer & Ericksen, 2005) and acting for the common good. "They kind of take responsibility for the whole, and ponder what the big picture is and act the way one has to in order to achieve the common targets."

There have definitely been situations when I would have liked to keep someone, a key person in my team, but in those cases you must put the Nokia hat on and really think where each and every person can best contribute, looking at it from the whole system's perspective. (Senior Manager, Male)

*Familiarising oneself with other process phases horizontally*, knowing “what people in the neighbouring box” are doing, was the third implicit social rule counted as a link over the borders. There was an interest in knowing more about what happens to one's object of activity over the horizontal boundaries. This included either working on another process phase or consciously familiarizing oneself with the work of those in the interfacing process phase or organisation. Familiarizing with other process phases horizontally over boundaries seemed to be happening both in an organised way and in an improvised way.

We have attempted to follow up the knowledge transfer so that others would see, even if you didn't do it yourself, but you would see at least one, what this other guy is doing in our stuff... In the summer our manager organised a thing that we were looking at what the others are doing. So that we would know what the others are doing, so if it has got even a little of an interface with one's own stuff and know why this other box is here, when you're working yourself next to it. And really it depends on one's own activeness, so that if you want to know how a certain appliance works and what the other one is doing so ask the guy's help to do it, so it is not a problem at all. You can agree about it. (Engineer, Male)

Recurrent job role changes could also be listed as this type of link over the borders, since they enhance the expansion of people's perspectives, which is useful in collaborative situations. It is an implicit rule in the case company that changing jobs enhances learning and development.

### 8.2.3 SUMMARY AND INTERIM DISCUSSION

In *Section 8.2* I first dealt with *boundaries* that people encounter in their work. (The list of boundaries was mainly based on Orlikowski (2002) and Ashkenas et al. (1995).) Thus, I investigated the nature of *geographical, temporal, time line* (history-future), *social, cultural, technological, political, vertical organisational, horizontal organisational, external* and *customer* boundaries. Secondly I explored what elements of *dynamic links over boundaries* are to be found in the volatile environment of the case company. My conception was that within a highly volatile environment there need to be some *underlying elements that dynamically hold the parts of the whole together and add up to the synchronization, coherence and integration of the whole system*. *Figure 27* summarizes the findings related to the above listed boundaries. The boundaries are classified under

technological, structural (internal organisational and external), people (boundaries related to the way people work with others) and time and space (the way work is organised across time, geographies and space).

<p><b>Technological</b></p> <p><u>BOUNDARIES</u>. 1. Products, 2 Development tools, 3. IT systems</p> <ul style="list-style-type: none"> <li>- A new technology is a learning boundary</li> <li>- Crossing the technological boundary towards the new technologies equals leaving a more mature system behind and stepping towards insecurity and immaturity.</li> <li>- Ongoing synchronization work between the various parties involved in building up complex systems</li> </ul> <p><u>CHALLENGES/ISSUES</u></p> <ul style="list-style-type: none"> <li>- The increasing complexity of systems</li> <li>- Outdated data in the storing systems (document storing, intranet, etc.)</li> <li>- Seamless collaboration of systems covering human interaction and technological tools (e.g. requirements management)</li> </ul>	<p><b>People – boundaries related to the way people work with others</b></p> <p><u>BOUNDARIES</u>. 1. Cultural 2. Social 3. Political boundaries</p> <ul style="list-style-type: none"> <li>- Professional attitude on how to deal with and benefit from diversity</li> <li>- No long term cliques as organisation changes often</li> <li>- Attitude to proactively cross cultural and social boundaries.</li> <li>- Different nationalities and languages</li> <li>- Different organisational functions</li> <li>- Flat organisational hierarchies, easy-going culture</li> </ul> <p><u>CHALLENGES/ISSUES</u></p> <ul style="list-style-type: none"> <li>- Organisational changes (and especially threat of reductions) can cause politics</li> </ul>
<p><b>Structural</b></p> <p><u>BOUNDARIES</u>. 1. Internal structural (vertical, horizontal, projects, domains, process phases, functions) 2. External (partners, subcontractors, customers, universities)</p> <ul style="list-style-type: none"> <li>- Lobbying “upwards” needed to get things rolling</li> <li>- Flat organisation</li> <li>- Organisational change important in shuffling the “silos”</li> <li>- Horizontal collaboration increasing. 82% collaborate horizontally with 1-6 other professional groups/process phases</li> <li>- Ongoing horizontal synchronization and alignment work between the interrelated parties: platform, product, domain, system process phases, functions, line-project organisation)</li> <li>- People have collaboration with an average of two types of external parties</li> <li>- 20% of people have a direct interface to the customer. (Customer business teams as boundary buffer)</li> </ul> <p><u>CHALLENGES/ISSUES</u></p> <ul style="list-style-type: none"> <li>- Are experts involved in the decision making as much as earlier?</li> <li>- Have the organisation changes fortified the hierarchies?</li> <li>- Are customers becoming more remote to average employees?</li> <li>- Boundary towards R&amp;D partners: feedback loop and the seamless tool infrastructure over the boundary</li> </ul>	<p><b>Time &amp; Space – the way work is organized</b></p> <p><u>BOUNDARIES</u>. 1. Geographical 2. Spatial 3. Temporal 4. Time line (history – future)</p> <ul style="list-style-type: none"> <li>- Cooperation on average with 4 other locations</li> <li>- Freedom from time and space: increasingly virtual and mobile virtual working mode via technology aided tools</li> <li>- Flexibility in both directions: individual-organisation -&gt; increasing need to create boundary around work and working days</li> <li>- Past and future configurations, versions and releases of products or parts of it</li> <li>- Standardization of future products</li> </ul> <p><u>CHALLENGES/ISSUES</u></p> <ul style="list-style-type: none"> <li>- Isolation of smaller sites if there is not a big enough critical mass of people</li> <li>- Too few face-to-face situations and informal situations</li> <li>- Challenges to fit individual work and collaborative work in open space</li> <li>- Fragmented work days, multitasking, task switching, half-presence in meetings</li> <li>- How to gain knowledge to earlier versions of a product or a part of it, when the job role holders change often</li> </ul>

**Figure 27.** Summary of findings and challenges related to the boundaries

For agile and dynamic organisations it is important to have efficient *boundary crossing capabilities* throughout the company. The *boundary crossing capabilities enable efficient collaboration in distributed environment where a large number of people in various geographical locations develop together complex technological systems*. From the *vertical structural perspective* it is important that knowledge flows seamlessly between the implementation and management layers. Intelligent management decisions and direction showing capability keep the business viable in volatile environments. It is important that management involves those possessing the knowledge, specialists and implementation people, in decision making so that relevant, up-to-date and detailed enough information is available. In addition to this *upward boundary crossing flow*,

it is equally important that knowledge flows *vertically downwards* so as to enable intelligent self-organising and decision making at the relevant levels. In addition to the vertical boundary crossing capability, there needs to be a *horizontal boundary crossing capability*. In distributed development people on all levels need to constantly collaborate with various other parts of the same organisation. The complexity and interrelatedness of the systems being developed have driven participants into a state of *heavy interdependence*.

In an extended company model, the number and significance of *external partners* is high. From the *external boundary perspective*, it would be important to have a seamless information flow over the external boundary both with the *customers* and *R & D partners*. It would be important to have a continuous feedback loop established especially with R & D development partners in order to make changes and learn on-line.

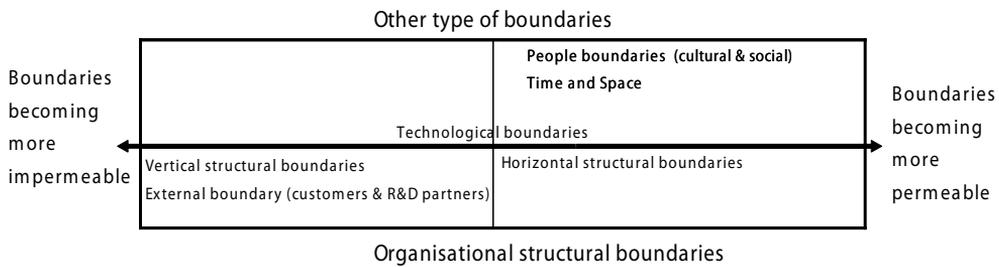
From the *time and space perspective* it is of great concern to be able to collaborate efficiently with various geographical areas and time zones. In dynamic distributed development there is a need to communicate about and respond in an agile way to changing circumstances and situations.

From *technological perspective* it is crucial to be able to cross boundaries towards the number of interfaces developing the same system at a certain point of time, but also towards the past (previous history versions) and towards the future (next generations and new standards). Transparency over boundaries is important due to technologies having become more complex and interrelated. Also, the pace of change in technologies is fast and in some cases the technologies are becoming more and more complex.

From the *people boundaries perspective*, boundary crossing capability is increasingly important due to exactly the same issues; due to the complexity and interrelatedness of the systems people are heavily interdependent on each other and on the collaborative skills of each and every participant of the system. In many cases there is also a need to collaborate with various geographical areas, languages and cultures.

Above I listed some reasons why boundary crossing capabilities are important in agile organisations. Next, I will summarize from *Section 8.2.1* which boundaries seem to have become more *permeable* and which possibly more *impermeable* in the case organisation. It seemed that the *people boundaries, time & space boundaries and horizontal structural boundaries had become more permeable*. Conversely, it seemed that *vertical structural boundaries as well as external boundaries had become more impermeable*. In the case of the vertical boundaries, the organisational culture had traditionally emphasised flat hierarchies, empowerment and openness. At the time of the interviews several interviewees felt that the organisation had become more hierarchical. In the case of *technological boundaries, conflicting drivers* in boundary development dynamics were identified. On the one hand, the boundaries had become more permeable when at the same time the complexity of some technologies drove the boundaries in a more impermeable direction. (Most probably the same kind of contradictory forces continuously influence all other boundary types, too.) From R & D employees' perspective

it thus seemed that people, time & space and horizontal boundaries had turned more permeable whereas vertical and external boundaries had turned more impermeable. *Figure 28* shows which boundaries have become more permeable and which more impermeable. *Table 9* lists tentative reasons for these *boundary development dynamics*.



**Figure 28.** Boundaries having become more permeable and more impermeable in the case organisation

Horizontal boundaries becoming more impermeable is possibly related to the increased need to collaborate with others developing the same complex systems, to recurrent job role changes and organisational changes that put people into different setups and possibly enhance their capability to collaborate over horizontal boundaries. Another factor is the IT tools that enable efficient collaboration over horizontal boundaries. The fact that horizontal boundaries have become more permeable has affected the working of feedback loops. Earlier, when the vertical feedback channel could be predominantly used (manager-employee channel), it was simpler than in boundaryless environments, where there is a need also to have feedback channels in place horizontally and even across the boundaries of the company. Horizontal feedback giving seemed to take place to a certain extent naturally, in a self-organising manner, but there were no institutionalized channels or ways to give feedback horizontally or diagonally. Thus, there might be a need to revisit feedback giving practices and possibly institutionalize horizontal and diagonal feedback channels (possibly also over external boundaries) in addition to the vertical ones. One reason for vertical boundaries turning more impermeable could be the organisational changes themselves; in organisational change situations the very focus is on creating the “hierarchies” anew, opening up the positions for individual movers, these often being managerial positions and selections to them (cf. the change may be manifested to people as a large number of appointments and related announcements).

From the interviewees’ perspective the external boundary (both customers and R & D partners) had grown more impermeable. Due to the complexity of systems being developed, there has been a desire to search for clarification and simplification of boundaries and crossing points at the external boundary. Certain dedicated interfacing

gatekeeper job roles have been set on the external interface. Towards the R & D partners the dedicated interface can, for example, be a Partnering Manager and towards the customers it can, for example, be a CBT (a customer business team). There were indeed still direct contacts with the external parties but many interviewees mentioned either a personal experience or a feeling that the direct contacts especially with the customers had diminished from earlier times. With R & D partners the direct contacts had not diminished as much as with the customers. However, there was a feeling that due to the formalization of the relations the ongoing feedback loop and related learning from each other had become more rigid and happened to a lesser extent.<sup>31</sup>

Boundary type	Dynamics of boundary development	Tentative reasons for the boundary development dynamics
People boundaries (cultural & social)	Becoming more permeable	<ul style="list-style-type: none"> <li>- Attitude and culture to proactively cross the cultural and social boundaries</li> <li>- Selection criteria and testing at the phase of entering the company</li> <li>- Organisational changes put people continuously to new configurations. Consequent adaptation to different people and dissolving of possible cliques</li> <li>- Available related competence development solutions</li> </ul>
Time and Space	Becoming more permeable	<ul style="list-style-type: none"> <li>- Tools that enable virtual and virtual mobile work</li> <li>- Individuals willing and allowed to flex with their working times and places</li> <li>- Individuals flex with their "task concentration": fragmented work days, multitasking, task switching, half-presence</li> </ul>
Technological boundaries	Becoming more permeable and at the same time more impermeable	<ul style="list-style-type: none"> <li>- Technology is at the heart of the company's activity, which causes natural interest in technologies in general</li> <li>- Learning attitude and culture</li> <li>- Attitude and culture to proactively communicate with others working on the same technological system</li> <li>- Efficient boundary glue elements e.g. processes, competence transfer practices and R&amp;D incentive system</li> <li>- At the same time some technologies and how they are interrelated are becoming more and more complex</li> </ul>
Horizontal structural boundaries in the organisation	Becoming more permeable	<ul style="list-style-type: none"> <li>- Attitude and culture to proactively communicate over boundaries horizontally</li> <li>- Organisational changes put people into new kinds of changing setups that enhance their understanding of other perspectives</li> <li>- IT tools enable efficient asynchronous and synchronous collaboration</li> </ul>
Vertical structural boundaries in the organisation	Becoming more impermeable	<ul style="list-style-type: none"> <li>- The organisational culture has traditionally emphasized flat hierarchies, empowerment and openness.</li> <li>- Have organisational changes fortified hierarchies, when the very focus is on building up the structural organisation and reporting lines anew (hierarchies)?</li> <li>- Has the toughening business situation, maturation of the organisation and steadying of the organic headcount growth (even downsizing) caused more competition related to managerial positions which might cause fortifying of vertical boundaries?</li> </ul>
External boundary (customers & R&D partners) of the organisation	Becoming more impermeable	<ul style="list-style-type: none"> <li>- The complexity and the size of the system has pushed to a mode of operating where there are dedicated customer or partner interfaces who deal with the customers and R&amp;D partners (e.g. Partnering Managers or CBTs (customer business teams))</li> </ul>

**Table 9.** Boundaries having become more permeable and more impermeable and tentative reasons

31. Note that there were no specific indications whether the relations with universities, research centres and other external parties in the educational, training or research field had increased or decreased. Nor were there any indications on the boundary development dynamics with these interfaces.

The second focus of interest in *Section 8.2* was the *dynamic links over boundaries*. My reasoning was that in such a volatile environment there need to be some elements that keep the system viable and heading in the same direction. I gathered such links over the borders from the interviewee data based on what the interviewees considered to be factors enhancing the performance of their daily tasks and collaborating with others. A link over the borders, as conceptualized in this study, is an *element that increases the alignment of the parts of the system over boundaries*. These elements *enhance the synchronization, coherence and integration of the whole system*. Links over the borders are needed in an environment where the boundaries are multiple and where the parts of the system are in constant flux. The dynamic links over the borders identified in this study were mapped on the elements in the activity theoretical approach. *Products as common objects of activity* were identified as important links over boundaries. *A common language* within the R & D and *enabling IT systems and tools* were *mediating artefacts* enabling the negotiation and product creation over boundaries. An example of a *concept* related to the links over the borders was, for example, *milestones* as abstract concepts that evoke in the minds of R & D employees a picture of the readiness of the system, product or a part of it. Examples of other more *concrete tools and instruments* related to the links over the borders are: *transfer plans like induction plans or competence transfer plans, process descriptions, templates and checklists, individual objective setting tool and R & D incentive tool*.

Links over the borders related to the *division of labour and distribution* were classified into *systematic* and *ad hoc*. Systematic links over the borders related to the division of labour were: *worksplitted by projects, worksplitted by processes, strategy cascading via the individual objective setting and R & D incentive system*. Ad hoc links over the borders related to the division of labour can be used on a need basis in collaborative situations. Examples of such links over the borders are *role switching* and *duo working*. These could also be interpreted as belonging to the exchange sub-process. Links related to the *social rules* and exchange were classified into *explicit* and *implicit*. Explicit links over the borders related to rules identified were: *processes and related milestones* as well as *systematic means to transfer an object of activity or knowledge related to it to another activity system*. These systematic means, as described by the interviewees, were *competence transfer practice, handover practice, induction practice and product competence transfer practice*. The implicit social rules were: *strong shared identity, looking at an issue from the company overall perspective* (“putting the Nokia hat on”) and *familiarizing oneself with the process phases horizontally*.

*Table 10* presents all links over the borders identified. These are the elements that dynamically hold boundaries together in a highly volatile environment. I have split the elements into the systematic/explicit class and ad hoc and implicit class.

Dynamic links over the borders in the R&D/product development community's collaborative activity	
Systematic/ explicit	Projects, processes, milestones, strategy cascading via the individual objective setting system, R&D incentive system, systematic means to transfer an object of activity or related knowledge to another activity system: competence transfer, handover, induction, product competence transfer
Ad hoc or implicit	Role switching, duo working, looking at an issue from the company overall perspective ("putting the Nokia hat on"), familiarizing oneself with the process phases horizontally, strong shared identity

**Table 10.** Dynamic links over the borders in the R & D/product development

The systematic and explicit elements are possibly easier to manage and impose on the organisation if needed. From the perspective of this study the ad hoc or implicit links over the borders are more interesting. The nature of the ad hoc and implicit elements is very different. Role switching or duo working are practices that can take place ad hoc on a need basis in collaborative situations. Looking at an issue from the company overall perspective ("putting the Nokia hat on") allows a person to rise above the boundaries of one's own current job role or organisational entity and take wider views into account in decision making. This can happen in collaborative situations or within a person's individual thinking. Familiarizing oneself with the process phases horizontally shows willingness to know more and learn over the boundaries of one's own area. This can take place both in an organised way or in an improvised way. The strong shared identity is related to the spirit, values, culture and products (common objects of activity). Further, it is related to the common sense of purpose in an organisation (cf. Dyer & Ericksen, 2005) and at its best, it can enhance acting upon competitive realities beyond the boundaries of one's own position and location in the organisation. *All these ad hoc or implicit links over the borders are the type of elements that are either about self-organising practices or they enhance self-organising in an organisation.* Some factors that enhance this type of elements to surge have already been mentioned. The values, attitudes and culture support such behaviour. The entrance selection criteria (to most job roles) and available training and competence development options have an influence over the emergence of self-organising practices. Recurrent organisational changes and job role changes put people into new changing setups, which possibly enhance their understanding of other perspectives.

The most significant boundary dynamics identified in this *Section 8.2* were related to boundaries and to the dynamic links over the borders. The boundary development dynamics are related to the permeability or impermeability of boundaries. Dynamic links over the borders are elements that attach various parts of the organisation dynamically together over boundaries in order to ensure the synchronization of the whole system.

### 8.3 INTEGRATING OVER BOUNDARIES THROUGH COLLABORATION AND NETWORK TIES

In the previous section dealing with dynamic links over the borders, several elements related to the collaboration and social rules (and the exchange sub-process in the activity theoretical model) already emerged. In this section I will look at the boundaries from the collaboration, network tie and social capital perspectives. *Network ties* and *social capital* are important means to succeed in boundary work. Social capital and network ties form the “glue” that enables efficient operations in an organisation. Through social capital lenses organisations are seen as complex networks of acquaintances (bridging ties) and friendships (bonding ties). The interest lies in the type, extent and capability of these cooperative relationships (cf. Gratton, 2005) that can enable boundary crossings. Engeström (2005a, p. 1) defines social capital as the “glue that makes communities more than a sum total of their individual members”. He emphasises that social capital should be studied as a *dynamic cyclic process* (motivation – formation – routinisation - maintenance) also taking the underlying *materialistic infrastructures* into account. It should not be studied as a structural static property. In contemporary organisations *trust in network ties* should be considered to be *project like* and *constantly changing*. It emerges when people share a *motive* and an *object of activity* and use their *complementary knowledge* in order to achieve an aim. It is very different from the trust based strong community ties of pre-capitalist times (cf. Miettinen, 2005).

In this section I will pay attention firstly to the *context and environment of collaborative work in the case organisation*. I will present further data on how people *form* and *maintain* bridging and bonding network ties and how the adaptive field keeps building up. I will also discuss how in this specific case organisation the contemporary object based trust manifests itself through *product and project based trust* enhanced by *strong shared identity*. They create the starting point, the *motivation* to collaborate. Then I will present *four specific features of collaborative work in the case organisation*. These features could also be interpreted as *implicit social rules in the R & D/product development activity system*. This is about how people *form*, and especially *routinize* and *maintain* their network ties and social capital. The first one of these implicit social rules is the *varying set of meetings and knots with different purposes*. The second is the *optimal representation in meetings and knots*. The third one is *cascading information and knowledge created in meetings and knots over the boundaries*. The fourth one is *blurry boundary between individual and collaborative work*.

### 8.3.1 FORMS OF COLLABORATIVE WORK IN THE CASE ORGANISATION

R & D work, when developing complex, interrelated systems is indeed very much about collaboration or “social integration”<sup>32</sup> between people. The *time people use in collaboration with other people* varies a lot. According to the results of the survey 42% use 50-100% of their working hours in collaboration with others. 58% use 0-40% of the working hours in collaboration with others.<sup>33</sup> My results are close to Vartiainen et al.’s (2007) findings; they claim that around 40% of total working time of knowledge workers is *solo work* and involves tasks requiring concentration (p. 9). The survey data also showed that those in *line management, business management, project and program management* work more in cooperation with other people than *specialists* and people in *support functions*. The survey respondents regularly worked with four other process phase groups and functional groups, in addition to their own.<sup>34</sup> In the open-ended responses there were also an extensive number of other organisational units and functions with whom people collaborate.<sup>35</sup> Half of the respondents use 40% or more of their collaborative time with other process phase or functional groups than their own.<sup>36</sup> It seems that there are those who mostly collaborate within their own functional or process phase group and on the other hand those who have wide and active connections to other functional and process phase groups. The survey results show that *people mostly use email, face-to-face meetings, phone calls, virtual meeting systems and informal “coffee room” discussions when they collaborate with each other*. The use of video conferencing once more popular has diminished due to quality problems and the increasing use of virtual meeting systems combined with a conference phone.

From the *communication and interaction perspective face-to-face meetings* (96%) were *clearly regarded as the most useful means*. Approximately half of the respondents considered *email* (55%) and *telephone calls with one other person* (45%) useful. *Work-related coffee room discussions* (38%) and *virtual meeting combined with conference phone* (27%) came next. *Video conferencing* (3%) and *virtual environments like discussion*

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32. Outside the data corpus of this study, a person in an SW integration department stated that they are actually doing “social integration” work in their department, they “make sure that the right people talk to each other”.

33. Using another scale this would be: 42% use 10-30% of their time for collaboration, 39% use 40-60% and 19% use 70-100% of their time for collaboration.

34. The options given were based on the process phase and functional group division typically used within the case company: research, R & D system, R & D SW, R & D HW, R & D integration and verification/validation, R & D other (e.g. product competence transfer or customer documentation etc.), project management, product marketing and product management, marketing, process & tool & quality development, support functions (e.g. assistance or HR/HRD etc.) and delivery operations.

35. IT department, legal department, customer accounts in different countries, account management/sales, customer business teams, line management, middle management (business and R & D), business management, senior management, management at other locations, business development department, finance and control department, customer services, customer care, technical support, partnering organisation, business development, IPR/patent, regulation experts, R & D mechanics, production engineering, pre-production, factories, laboratories, SW configuration management group, sales organisation, product design, standardization, solution development, R & D forums, manufacturing, several entities in other company business units and true testing organisation of forthcoming products.

36. 51% of the respondents used 70-100% of the collaborating time with their own group, 30% used 40-60% of their collaborative time with their own group and 19% used only 0-30% of their time with their own group.

forums (1%) were regarded as useful by only very few people. *The mode of operation seems to be built around a varying set of means used for cooperation.* This was noted in earlier studies as a factor increasing effectiveness, especially when geographically dispersed projects were in question (cf. McDonough et al., 1999, Sosa et al., 2002). *Extensive use of email* was characteristic of the mode of operation in the case organisation. In addition to email there is a set of synchronous means in regular use enabling immediate feedback. The *very rare use of virtual environments* is somewhat surprising, as the case organisation and the people in it are technologically oriented.<sup>37</sup> Face-to-face meetings were clearly considered very useful and also extensively used. Email seems to be problematic in the sense that it is used much more extensively compared to its perceived usefulness.

*Virtual meeting system combined with a conference phone was mostly appreciated by the interviewees and also in the comments of the survey.* People, however, felt that face-to-face contact is needed for co-creation and the fact that travel restrictions had at the point of the survey hindered people from meeting face-to-face, was much regretted. “Net meeting, I talk to that grey box [conference phone] day after day, huh!” On the other hand, the fact that one did not need to travel to all meetings was considered a positive thing. One interviewee mentioned that the virtual work (and virtual mobile work) has increased the efficiency of work when one has a choice to concentrate on the essential and prioritise one’s own work based on the needs. (26% of the survey respondents spend almost the whole collaborative time in virtual mode. 30% use 40-60% of their collaborative time in virtual mode.)

*Drawing on a flipchart or on a piece of paper was considered an essential tool for co-creation.* However, in virtual meeting systems drawing is not practical and the virtual meeting software does not replace a flipchart. Interactive creation and on-line co-creation might be reduced in virtual collaboration. “In virtual meetings someone has pre-thought the picture that he/she comes to present, and it’s all on the slides. In the old times we were, you know, drawing it together in the meeting.” Other things related to virtual meetings were also mentioned. It is difficult to know who is speaking if there are many people at other locations. It is difficult to get the floor, especially for those at remote locations. The “main site”, or the location where the meeting chair is, “leads” the discussion. And the introverts do not easily get the floor unless the chair is very active in getting everybody involved. In the picture below the two employees are drawing on a flipchart in an open space office. Even though open space was complained about, the advantage is the opportunity for collaborative work on a need basis (see *Figure 29*). The interviewees and survey respondents had noticed that creative drawing on the spot in virtual meetings is not possible, which is one of the disadvantages of that mode of collaborating.<sup>38</sup>

37. *The data was collected in 2003. Since then more interactive web based methods like Wikis, blogs and social networking have increasingly gained ground.*

38. *More about the benefits and drawbacks of the open space office can be found for example in Vartiainen et al. (2007, p. 37).*



**Figure 29.** Collaborative work (drawing on a flipchart) in an open space office

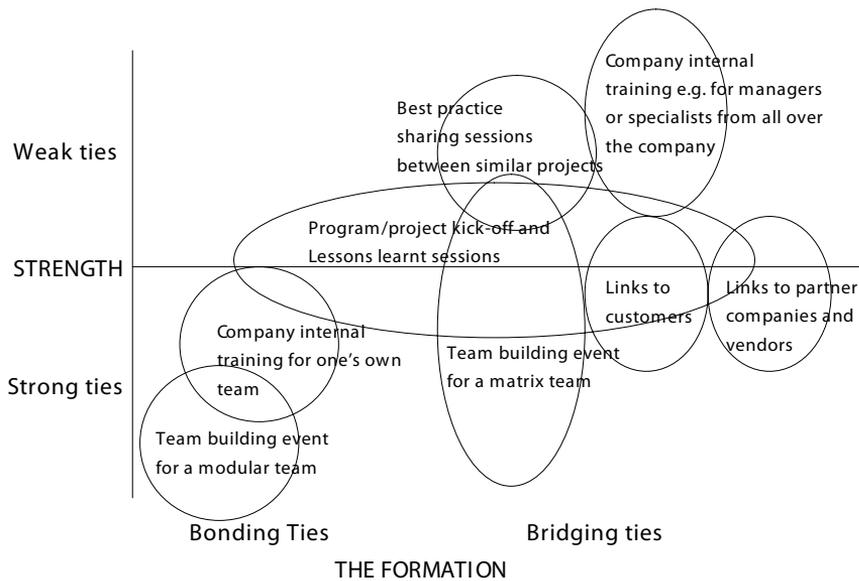
When the interviewees were asked where they start digging up knowledge, their first option was asking people they know. *The importance that people attached to personal networks* was slightly surprising as compared to the electronic sources of information like documents and intranet. This finding concurs with that of Döös et al. (2005), who studied another global company developing network infrastructures; they also noted that people networks were a major source of knowledge. “*Ask anyone anytime*” or “*policy of open door*” were mentioned by many interviewees. For any detail that one needed to know or any bigger area that someone started to scan, the first thing to do was to contact a person or people who might know about it. *Heavy interdependence between people* in the network is related to the changing nature of knowledge as well as to the need to apply the knowledge. In a climate of trust heavy interdependence can be a very powerful efficiency factor. Often it is not enough to check some *information* in the intranet; usually one needed to have *knowledge* from a person, who could adapt his/her answer to the enquirer’s situation and background, i.e. tacit knowledge in some form (cf. Polanyi 1966, Nonaka & Takeuchi, 1995). In fuzzy and unclear matters, starting to wind up a problem is much easier if the adaptive field is larger (cf. Gratton, 2005). It was widely understood that work is about knowledge seeking and sharing. “We have always supported the fact and considered it normal that not everyone knows everything and everybody supports each other.” “There ain’t no guru here who would know everything, and that kind of thing is not expected. That kind of thing cannot exist.” “This works quite a lot through personal networks. Especially the more unclear the situation is the more important the network is.” *The pursuit of*

*open and on-line communication and information sharing* was apparent in the way the interviewees described their way of working within projects. “I try to make it available in the intranet as soon as possible.” “I always make sure that if something important arises, my team will immediately get to know about it.” There is a strong effort to share and communicate knowledge and information.

It is really difficult to be a lone driver here, as this whole system is far too big for anybody to handle, and if you have a restricted insight into some specialty and you want to do your work alone, then there will be all kinds of problems and friction with the interfaces. (Project Manager, Female)

At this point in the project I need to make sure that there is a daily continuous discussion contact with them, with the reps of each sub-project. (Project Manager, Male)

Gratton (2005, p. 156) identified the following elements that enhance the formation of network ties in the case company: modular teams, modular architecture, regular organisational re-configurations, job rotation, strategy/roadmapping sessions, induction and university links. This study shows that regular organisational changes and job role changes are definitely very powerful catalysts to create network ties and enhance the creation of the adaptive field within the company. “It important that you have worked in many different bunches, because you always get those new acquaintances and new people, who learn to respect you and whom you learn to respect.” *Figure 30* lists further tools that enhance network tie formation in the case company in addition to those identified by Gratton (2005). Those identified in this study are: best practice sharing sessions, company internal trainings, program/project kick-off sessions, lessons learnt sessions, links to customers, partners and vendors and finally team building events.



**Figure 30.** Further tools to enhance the formation of network ties (cf. Gratton, 2005, p. 156)

Various team building events as well as training specifically organised for a certain team were considered tools to enhance bonding ties within the teams. Program kick-off sessions and lessons learnt sessions enhanced both bonding ties and bridging ties towards other organisational entities dealing with parts of the same program. Team building events were deemed important to enhance network ties within the matrix teams. Best practice sharing sessions as well as company internal trainings e.g. for managers or specialists from all over the company can be seen to fulfil the same purpose as the strategy/roadmapping sessions in creating weak bridging ties. In addition, the links to customers and partners and vendors are important in network ties over the boundaries of the company.<sup>39</sup>

Following the line of thought of social capital in the spirit of activity theoretical thinking, “productive trust and possibility to learn emerge when network participants share a motive of developing something new together and use their complementary resources and know-how for this purpose” (Miettinen, 2005, p. 27). It is evident from the data that within the case company of this study, the mutual trust and willingness to help and collaborate is built into the way of working. It even works between people who have not met each other face-to-face. In order to be able to work closely with people

39. In *lessons learnt* events people reflect on a past project and learn from what went well and what did not go well. Documenting lessons learnt in the project end report is a process requirement; however, people reported that it is really no use to only document the lessons learnt unless one goes through the results and discusses with someone who has been involved. In *best practice sharing* sessions someone induces others to adopt a practice that has proven good in some other context. For example, in the council that gathered representatives from all departments of one site the “best practice sharing” was a standard agenda item.

one has not even met requires a culture of trust and respect (how at ease people are with each other and their propensity to trust each other (cf. Gratton, 2005)). “There are many people with whom I deal with daily, weekly but whom I haven’t ever met. If you don’t ever meet, well, keeping contact can succeed quite well but it makes it easier if you have some kind of visual contact.” In the case organisation it is *product and project based trust* and *strong shared identity* that give reason to collaborate. They create and contribute to the *object based trust*. Products and projects create the integral structure of the organisation (as opposed to the structural organisational “hierarchies”). Project based trust and object related trust are temporary in nature and constantly changing. Within the loose boundaries of a project or a program, it is legitimate and justified to contact anybody. By helping others people trust that it takes the common object related work forward. (Related to the shared identity, it is actually legitimate to contact anybody within the company. People trust that by helping others it takes the whole business forward. Based on the interviews, the participation rate to the company strategy sharing events is very high.)

I don’t know in which organisation they are, to be frank. It changes all the time. Some are at site, some are where they are, but they are all working for X [product]. (Senior Manager, Female)

One finding was the *internal customer-service provider relationships and service mindset* that definitely enhances the efficiency within the organisation. The interviewees often named who and what part of the organisation were their “internal customers”. In these cases their object of activity is a product or a service that someone is expecting to receive. These products or services can also exert influence, even if indirectly, on an end-product to be sold to external customers. For example, the technical competence development people work on and develop the competencies of the R & D/product development people so that they can create the products. Such relationships and mindset also enhance the functions not directly creating the products to go into crisis mode with their customer organisations on a need basis and thus synchronize and add value to the common good and common object of activity. Whether it is the product or service intended to be sold to the external customers or a product being developed for internal customers, it gives a purpose to one’s work in which one can take pride.

So, it has basically been that maintenance, installations and support. Let’s say that it is kind of like that; lab, projects and other parties are in a way [our] customers. (Engineer, Male)

What I miss the most at Nokia are definitely my own customers. The customers were just great, and it was real fun to work with them... and you always got good feedback on your work. Now when I don’t operate as close to a customer interface, so it is very difficult to ensure whether the customer is satisfied. So that is a thing I miss... It was so that we did

what our customers wanted us to do, that was the most important for us... The customer was anyway always the one who defined our job profile. Because as human resources developers we needed to do what the personnel needs... When we had such demanding customers. The customers were demanding but really nice. They definitely demand good work, the kind of half-way was not good enough for them... You always got hm, you called the legal specialists; you called them and asked some contract related, you always found some specialist from your network to support quite easily. Everything was hm, the service was working quickly and efficiently, if the specialist didn't know something at the other end, so they just acquired it from somewhere. The machinery here is just enormous. (Specialist, Female)

Only when what you are doing really benefits the real business, the product development and R & D, then you'll get thanks for your work. You kind of need to know how to bake your thing into the R & D integrally, in other words, the application of your HRD knowledge is the thing, not only the HRD knowledge, and in order to be able to your work this way you also need at best to have knowledge about R & D. (Specialist, Female)

There were some of *indications of areas where trust and reciprocity, essential components of social capital, might be diluting.* One such area is related to *knowledge sharing.* People might “*protect their knowledge*” and not share it for the common good especially in *organisational change situations.* They might do this in order to make sure that they would be selected for new positions in the new organisational setup due to their knowledge level.

In organisational change situations, of course it depends on what kind of a change it is, my experience is that everybody withdraws to their own bunkers and protects the knowledge they have. Knowledge, kind of, becomes power in those situations. (Specialist, Female)

There have been these organisational changes so often, teams have changed a lot, people have so much transferred from one place to another one, and where people sit has changed, that there has been a little too much of this. In a way, I think that it is good that there is job rotation; that is for those people who want to transfer. But then there are those people who like their work, and the bunch they're in, and they are quite happy with what they have, they are thrown just in the same way from one box to another, and in my opinion the productivity has suffered quite a lot, because you have somehow lost the homely feeling. When we had the feeling of home, we had a certain pride in working for this company and not just for any company. And because we were in this specific company, that also obliged us to do stuff little bit better. But now when there has been so much of this box game, now we are just working here and I think that both the productivity and the quality have suffered because the communication between people does not work so well, and then the fact that there isn't that tiny extra commitment... When they got enthusiastic about the box games, when there were these outsourcing experiments, partners were taken and no

one knew any more who is doing what and what is coming from the partners and what we are doing ourselves. And they were organising, one day this and the other day that. And the software people we were working with sat one day there and the other day on the second floor and the third day they had a different name and the fourth day two of them were combined into one department and the fifth they were split into three... had it even been every one and a half years, but when it was every half a year. (Project Manager, Male)

In my opinion we perhaps used to have in some respect the kind of smaller teams, the kind of bunches that could just amongst themselves do some part to a product. Now it has maybe grown, the products are more massive and more complicated and more difficult to manage overall. At that time the whole bunch could gather around the coffee table and all had their rooms around the coffee table and people could very quickly agree on all kinds of things. Now we have activities on many sites and the product development is so much more complicated, more difficult and slower. The kind of small team of people was very easily welded tightly together and it is the kind of team spirit that is created in such a bunch. I believe that through this kind of thing we achieve the results too, one person cannot do very much on his/her own, but a small tightly knit team of people can really achieve a lot. (Manager, Male)

The second area is related to the *modular teams*. The importance and significance of the modular tightly knit teams was very highly appreciated. There were, however, comments that indicated that possibly some dilution had taken place with the modular teams. Again, this was due to the recurrent organisational changes and job role changes. Also, it might be the case that in a more complex environment there is a need for people to have more bridging ties instead of a bounded group of bonding ties. It is possible that the role of modular teams has evolved into something different from what it used to be. It is equally possible that decaying modular teams and bonding ties and trust also undermine people's engagement and commitment. The third area is related to the *bonding ties* overall. There seems to be no doubt that the adaptive field especially with bridging ties keeps expanding along with the number of organisational changes and job role changes. Within a highly volatile environment it is possible that the role of bonding ties has also evolved into something different from what it used to be.

### 8.3.2 VARYING SET OF MEETINGS AND KNOTS WITH DIFFERENT PURPOSES

People mentioned a great number of all sorts of informal and formal groupings and meetings that they attend and form part of: e.g. group, team, bunch, operational team, business team, management team, steering group, project team, workgroup, council, line team, task force, virtual team, special interest group. Managers' calendars especially seemed to fill up with all kinds of meetings and sessions. Self-management and protecting the boundary around the work day is needed (work and free time). People

have their electronic calendars where the regular meetings are settled well in advance. The irregular ad hoc sessions can be “shot” to the free slots in the calendar even at a very short notice. This happens especially if there is some “crisis” ongoing related, for example, to some customer project or an organisational change. Even though the *possibility to organise meetings ad hoc* is undeniably efficient, it can also be considered to be an intensity factor as it is impossible to plan one’s calendar very well ahead. From an organisational perspective this is a feature of self-organising.

The culture is very bad if we think how one could reserve working time for oneself. If you have free slots in your calendar, let’s say between nine and four perhaps, anyone can freely shoot meetings in there... Then if you are in some more demanding job, some special stuff, some organisational change stuff, then people can send invitations for the time between eight [a.m.] and six [p.m.]. (Senior Manager, Female)

During the first study leave period I participated in three meetings as an observer. The first one was a “council” meeting that gathered locally people from different business groups and product lines to discuss local items and to share best practices. I attended two monthly council meetings. In Tuomi’s (1999, p. 273) categorization the council would be a heterogeneous stable community. The council convened monthly face-to-face on Networks Tampere site.

If you think of the council work, it is a good example how with a relatively simple means, we can increase knowledge transfer. Typically these competence areas are in that respect independent units, so that people just work in that unit, and they don’t have very much connections to the other competence areas. Now when we have here people from all over, we can easily, with this bunch, transfer, or see such things how people work in other organisations. [You] see, we have for example in our standard agenda; every time some one from some competence area tells about an example of a best practice. There is a need to utilize those best practices. People don’t talk enough over the organisational boundaries... It is funny how the organisational boundaries, they affect so powerfully all we do. That sure is surprising... (Manager, Male)

The second meeting that I attended was an Information Design monthly meeting of one business group. Information design people are responsible for creating, designing, deciding on the format and channels of the product and system information. This information is targeted at the customers and internally at all stakeholders, and those to be trained for the respective products or systems. This meeting was a project dimension of one function or social system. From an activity theoretical perspective (see *Figure 19, p. 141*) the system customer documentation project and the product competence transfer/product training project are gathered in this meeting to deal with their synergies. A third view in this meeting was the internal information de-

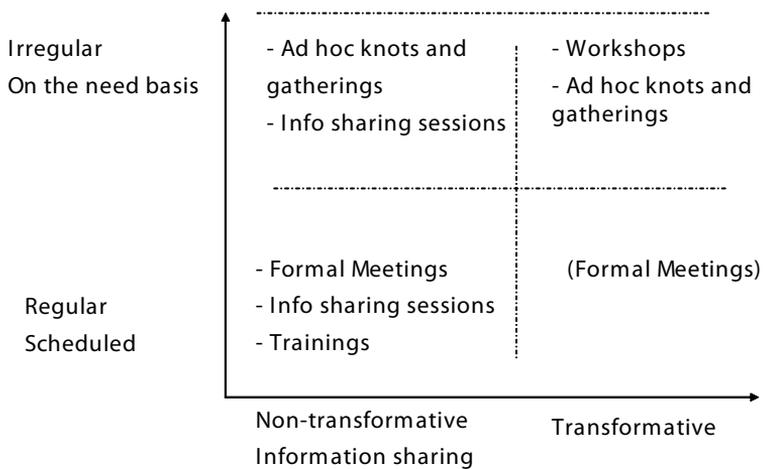
sign, i.e. people who plan how the internal R & D information would best be made available across the boundaries. These three previously separate functions or groups (customer documentation/technical writing, product competence transfer/product trainings and internal information design) had recently been combined into one organisational entity and the assumed synergies related to tools, storing places etc. were being negotiated and challenged. At first sight this meeting could be categorized as a homogenous and stable meeting, because these three activities were under the umbrella of the same organisational entity. However, when taking into account the separate interview scripts it was revealed that actually the three views still remained within their own boundaries and had just started to negotiate the synergies between them. The strategically identified synergies included firstly common resources for producing all product and systems related information and secondly common tools and storing places for modular reusable information. Thus, the meeting was actually in between the heterogeneous and homogenous stable meeting. It could not really be considered a meeting of an institutionalized organisational department, because the meeting itself was about the current projects within a certain business and because the views combined under one organisational umbrella had not yet been institutionalized regarding their ways of working, processes or tools. This meeting convened monthly through a conference call and web-based meeting system.

The two fora that I attended during the data gathering study leave were both stable communities. Even if they were not institutionalized communities, it was still easy to see that the temporary nature and the urgency of working on a common target were missing. Both meetings were mostly about information sharing. The contrast was made even clearer when towards the end of the study leave period I attended a couple of sessions related to my new job role. Quite clearly there was constantly an enormous number of ad hoc sessions convened where urgent, acute issues were taken forward or resolved. The case organisation supports the latest findings on how people work together in co-configuration type organisations in a flexible knotworking mode (cf. Engeström, 2005b, Engeström et al. 1999). *People work in rapidly changing networks where task force type configurations are formed and then dissolved.* New knowledge seems to be created more in the informal "knots" of the network rather than in formal, regular meetings. For external researchers it is difficult to find their way into these sessions that feature the informal and ad hoc side of the flexible knot-working. I have documented one incident of a temporary knot as an example in *Section 8.4.1* that deals with the discretionary work design.

Well, actually, we don't use the term "team". That's just the way it is. Let's say that there are dozens of, kinds of combinations of people, depending on the size of the system. They can be bunched up any time during the project. You don't make them a sub-project or anything like that. To solve a problem we just generate a group of people and then it dis-

solves again. Yes, these groupings spring up all the time and there are continuously dozens of them. (Manager, Male)

One perspective on how people collaborate with each other is depicted in *Figure 31*. Based on people’s stories about the sessions and interactive situations they participate in and the meetings I observed, I have split the sessions on a simple chart. The chart differentiates on the one hand between the parameter regular/irregular and on the other hand transformative/non-transformative. This is a high level view and generalizes to an extent but still gives a picture to the varying set of meetings and knots people engage into and how they differ from each other with the given parameters.



**Figure 31.** A varying set of meetings and knots classified into the categories regular/irregular and non-transformative-transformative<sup>40</sup>

In *Section 2.2*, it was argued that knowledge creation is generally more efficient the more temporary the structure of the knowledge creation is (cf. Tuomi, 1999, pp. 263-275). It would be easy to conclude that the more temporary the knowledge creation community is the more transformative the knowledge creation situations can be. This is not, however, completely true looking at the upper right hand side corner showing that both ad hoc types of knots and gatherings and more “organised” workshops were

40. *The names of certain collaborative situations (meeting, session, council, workshop etc.) do not tell too much about the nature of the sessions in relation to the given parameters. I have thus, generalized to an extent the labels I have given to certain type of collaborative session. For example, the two fora I attended are closest to the regular, non-transformative meetings. Naturally people learn even in regular non-transformative events and there is always a possibility that a seed for a transformative idea (germ cell) is initiated in this kind of sessions. All types of meeting and knot types have their place in an organisation.*

described by the interviewees as fruitful situations from knowledge creation perspective. The workshops specially can be considered as purposefully created circumstances or conditions for “learning activity”. As knowledge is contested and changing, *reflexion* needs to be a constant way of working. Reflective learning seems to take place more in informal knots formed on the basis of need than in formal meetings. Indeed, people reported that quite often spaces for *planned reflection are organised in the form of workshops*. “I really feel that I learn so much better, hm by just doing the work, talking with people and you know, going to workshops that deal with my work, and then it kind of boils down to the real thing and projects.”

In meetings there is usually a fixed agenda, but then again we organise, every now and then, this kind of workshops, hm, around some issues and really discuss and try to go deeper and find some things that we would need to develop or change, for example. (Specialist, Female)

*Information sharing sessions* for teams or for bigger audiences may be regular or organised as need dictates. *Ad hoc knots or gatherings* may be either transformative or non-transformative/information sharing depending on the case. *Training and formal meetings* are often regular and non-transformative (more information sharing). Formal meetings may be transformative, so the borderline between (formal) meetings and workshops is blurry. However, *workshops* were considered to be events that could more easily be transformative and they were convened on a need basis. It seemed that in meetings the multiprocessing and multitasking (parallel work with electronic devices) is allowed and not so much attention is paid to the collaborative and engaging methods like group work and dialogue. In meetings people sit around the table behind their laptops (see *Figure 32*) or participate from their own office via the virtual meeting system installed on their laptops. Workshops on the other hand, are closer to the concept of *ba*, a certain time and interaction space for the concentration of resources to create new knowledge (cf. Nonaka & Konno, 1998). This feature could also be studied from the *learning activity* perspective. The workshops are irregular and organised on the need basis. The practice of organising workshops when needed is close to the kind of institutionalized learning activity that Engeström (1987) and Ahonen & Virkkunen (2005) refer to. In learning activity, practitioners distance themselves temporarily from their daily work and indulge collaborative inquiry and developmental effort to investigate and elaborate the system of their practice over the boundaries of activity systems or within one activity system. People were specifically describing how in many information sharing events and “training” sessions, parallel communication channels (laptop, mobile phone) are used while listening and/or participating in the event. However, when it comes to the development workshops or strategy workshops, the ground rules usually include full participation without parallel working on electronic media. Thus, concentration and a full contribution are expected in these workshops.



**Figure 32.** A formal meeting conducted via a virtual meeting system and a conference phone

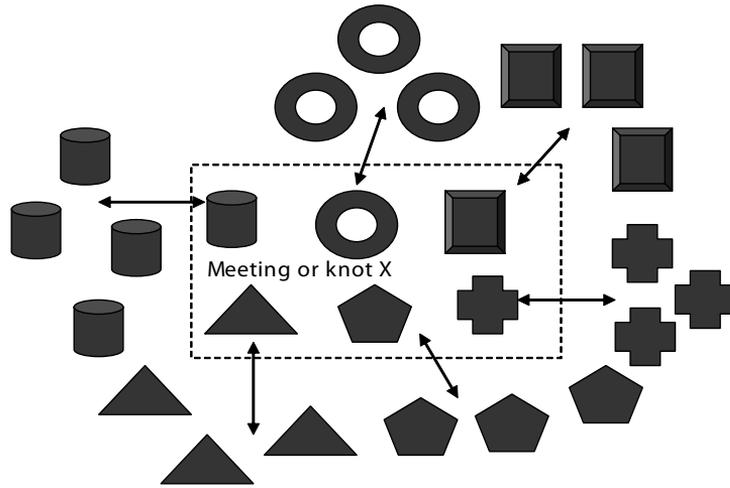
Different kinds of methods can be used in workshops to lead the participants into and through the collaborative inquiry. Internal and/or external methods and facilitators can be used. One example of a method to guide a group of engineers through the collaborative reflection process developed within the case company is RaPiD7 (Kylmäkoski, 2006). RaPiD7 is not a revolutionary facilitation method but has been planned to suit the specific context in this organisation to make the collaborative creation in the definition phase more rapid and participatory. RaPiD7 “describes how human interaction is planned in software projects and how documents are to be created in facilitated workshops”. It can be considered a formalized means to break boundaries in specification workshops. “I think that there is a good idea in RaPiD7 when the focus is on doing together and the focus is in the first phases of doing. Even simple things like this need to be productized.”

I have kind of thought about it that we have this RaPiD7 model, you know, so I have tried to have a bit the same kind of way of working, that we have tried to involve the experts into this and then I try to challenge them every now then that “what do they really want?” and then again try to consolidate it and ask if this was what you wanted, to model with this process, or something else. (Specialist, Male)

### 8.3.3 OPTIMAL REPRESENTATION IN MEETINGS AND CASCADING KNOWLEDGE CREATED OVER BOUNDARIES

Firstly, it is important to ensure that the right people are invited to the meetings and knots. In a volatile environment this is not self-evident. In a changing environment there is a need to constantly *negotiate what is the sufficient comprehension and scope of people in all types of meetings and sessions*. Negotiating the optimal representation in meetings and knots requires continuous interface work to get the right participants over boundaries participate in a meeting. Experts of certain fields can be invited to (formal) meetings outside of normal participant list depending on the agenda topics. (There was one comment that this habit has diminished. This might be related to the vertical boundary possibly turning more impermeable in the organisation.) Boundaries of meetings and knots are open for the negotiated participation (unless some confidential issues are handled).

Secondly the expectation is that knowledge and information flow in both directions through the individual participants, to the meeting via the participants and to the participants' own interest groups or contexts. Sometimes this information flow can take place on-line. "So always there is a need to have a representation to weirdest sessions, and there are plenty of them." "Basically it has been so that there are representatives from different areas and they tell their own status." The representative of a certain interest group or an organisational part, chops up what the outcome of the meeting means for his/her interest group and cascades it further. One interviewee reported that he writes an on-line memo of the management team meeting to his team and sends it out once the meeting is over. Also, during the meeting a participant could dig up needed information during the meeting from relevant sources via using the available tools (laptop, mobile phone). It enhances self-organising when the knowledge flows on-line to and from the surrounding organisation, possibly crossing several boundaries. This practice is about cascading the results, decisions, new information or knowledge generated in a certain meeting. It enhances the synchronization over the boundaries in the organisation. *Cascading generated knowledge over boundaries* is very important for the ability to activate the latent structure of the whole network into an efficient "concerted effort" to satisfy customer needs (cf. Docherty et al. 2002, p. 6). *Figure 33* depicts the continuous negotiation of the optimal representation from over boundaries in meetings and knots and cascading the generated knowledge over boundaries.



**Figure 33.** Optimal representation in meetings and cascading information and knowledge

They are kind of like task force type, you know, there is a thing, something that needs to be done and then a group forms there, that is collaboration, so the bunch forms around the task. My feeling is that often this works quite well but then sometimes you consider whether you have a sufficient comprehension from all sub-areas in this bunch and if we take there all that comprehension, then would the collaboration work any more?, how it should work? and can everybody have an influence on it? questions like this. (Specialist, Male)

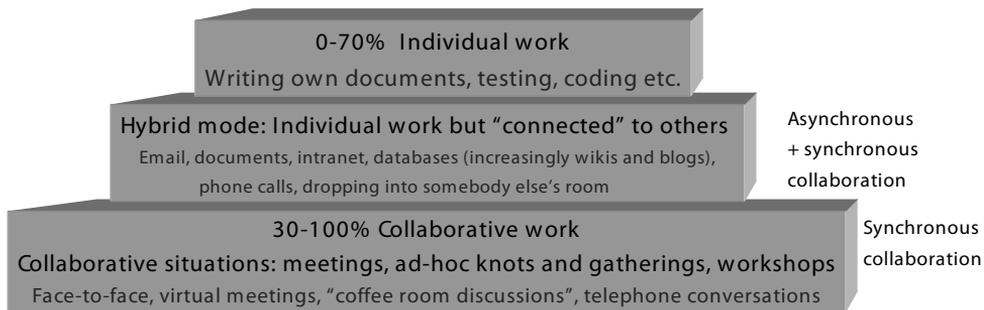
Another one are these official organisational channels. The project management holds regular sessions and there we discuss things and then again, it is on the responsibility of the sub-project managers to take it further down. Most of the information is probably transferred, in a way, over the boundaries of the sub-projects when thrashing out different problems... On the other hand, at least I have the kind of expert network, whom I consult, in a way, over the boundary of the sub-project. It is kind of informal. (Specialist, Male)

### 8.3.4 BLURRY BOUNDARY BETWEEN INDIVIDUAL AND COLLABORATIVE WORK

People found it difficult to specify what individual work is and what collaborative work is because they are quite seamlessly interlinked with each other (see *Figure 34*). Mostly they thought about meetings, telephone calls and all kinds of encounters with people as belonging to the collaborative work. When they worked “on their own” they would create documents, test or do SW coding. Managers, for example, would create presentation materials. “Writing mails I count as doing on my own, but that too is kind of semi-working on my own when the mail anyway goes to many, even close to a hundred people but anyway, it is on your own that you bunch it up.” *R & D work is*

thus a seamless activity where the individual work and collaborative work alternate. Once again creating things on-line and in parallel, as the overall development proceeds, is the striking characteristic of the product development work. It is a must to keep pace with the product development latest phases and retain its grip. “The knowledge is created here and now when working on it... and it is valid knowledge.”

Quite often [new knowledge] emerges in, yes, in different kinds of meetings. Even if engineers are a quite uniform bunch, still everybody usually thinks in a different way how things could be done. Generally speaking someone comes to present something and then they ask that “why this way?”. Those are the situations where most new information springs up...As such, group work is a combination of individuals’ work. Of course if someone gets a new idea and someone else goes on from there... I can’t say where the boundary goes. Both are extremely important. (Project Manager, Male)



**Figure 34.** Blurry boundaries between individual and collaborative work<sup>41</sup>

The boundary between individual and collaborative work is blurry; even when “doing individual work” people are at the same time checking or writing emails, checking some documents created by someone else, checking some data in the intranet or in some database (like a software configuration management tool) or some other tool or making a phone call or dropping into someone’s room. They are thus rescuing to both asynchronous and synchronous collaboration on a need basis. Likewise during collaborative work, for example, during some meetings, one might read or create documents or do some other individual work or even have mail or SMS conversations with people not present in the meeting. This kind of *multiprocessing* or *multitasking* may mean that there is no proper concentration on any one thing. “During a meeting some of the people in the meeting may have a discussion on some other topic using their laptops.”

41. The percentages reflect the variation between the respondents’ answers when they were asked how much of their working time they use in collaboration with other people and how much working individually. From the quantitative data it is impossible to deduce what people mean by individual and collaborative work.

Another thing is that if we could properly concentrate on something, so the meeting practices are pretty bad, so that some of the people are always in the email... That has gone down hill. Then there is this culture that now, when you answer your phone, so that is quite lost, so that some people always answer the phone when it rings [even during the meeting]. (Senior Manager, Female)

Depends a bit on the work phase, so, so how could you say it? Would it be half and half, that could be quite close? You know, we have quite a lot of all kinds of idea sessions, and reviews, and we do quite a lot of joint exercises). (Engineer, Female)

Let's say that if you have an [office] room mate, and even if you do your own spec [specification], so still it is a kind of collaborative, because always when something occurs, you can ask immediately. So that when you have a room mate, then you can say that something like 80% is collaborative. And then on the other hand, you notice that we have this kind of policy of open doors; so that when you know that someone in this floor knows about a certain matter, so then you basically walk and ask directly and the same goes for X people, so I would walk downstairs rather than call or mail. Of course I sometimes call but it is nice to see and inquire face-to-face. Well, sometimes you almost feel that you should go to some box, so that you could finish up some work; there are so many of these bits and pieces, so that it doesn't take it forward, or at least it feels that it doesn't take forward the spec but at the end of the day it does... I haven't so far done, but I have considered going downstairs to the self-study room... I guess it would be the golden mean so that when you need, you could work in your own peace and then again work in a kind of a team type. (Engineer, Female)

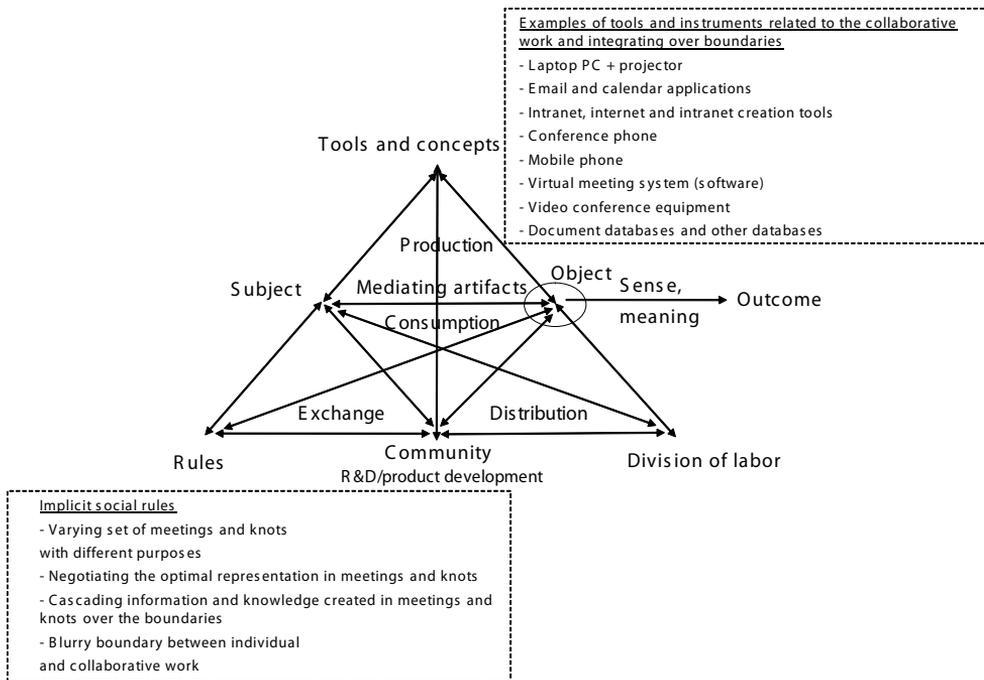
One related finding was the *changeability of the emphasis and rhythm between individual and collaborative work*. The research participants claimed that the amount of time used for collaborative and individual work varied a lot based on the job role, phase of the project, other people in the project and many other contextual factors. "Then at times there are weeks that you sit 100% in some workshops." Again Vartiainen & al.'s (2007) findings are surprisingly similar to what I had concluded from my data prior to even familiarising myself with their findings:

The work of knowledge workers is a continuous process and a mixture of solo work, asynchronous and synchronous communication and face-to-face meetings. In large meetings, employees often turn to the mode of solo working. They start to concentrate on their own tasks and work asynchronously: reading and sending e-mails and SMS, chatting, reading documents and writing them... Working days of knowledge workers are "blurred", meaning that when working in solitude as well as when working with others employees were often interrupted by virtual collaboration and communicative actions... The workdays of employees is seen as a series of work and communicative actions as episodes taking place in hybrid workspaces that are imbedded mixtures of physical, virtual and social settings. The

settings are, in practice, intermingled and change dynamically as an employee during the day flexibly moves from one episode to another working some time physically alone in solitude and then with many others face-to-face... The study also found that the work itself is blurred. The results of this study suggest that it is rather difficult to separate working in solitude and collaborative work... Thus the nature of work seems to have become all the more blurred at several levels. (Vartiainen & al., 2007, pp. 10, 48-49, 62-63, underlinings mine)

### 8.3.5 SUMMARY AND INTERIM DISCUSSION

In Section 8.3 I looked at the boundaries from the *collaboration, network tie and social capital* perspectives. In this section I first described the *context and environment of collaborative work in the case organisation*. Secondly, I shed light on four *features of collaborative work identified in the case organisation*. These features can be interpreted as *implicit social rules in the R & D/product development*. They are related to the exchange sub-process in the activity theoretical framework. The identified social rules were: *varying set of meetings and knots with different purposes, optimal representation in meetings and knots, cascading information and knowledge generated in meetings and knots over the boundaries and the blurry boundary between individual and collaborative work* (see Figure 35).



**Figure 35.** Rules and tools related to the collaborative work and integrating over boundaries

The *collaborative context* in the case organisation is built around a varying set of means used for cooperation. People mostly use email, face-to-face meetings, phone-calls, virtual meeting systems and informal “coffee room” discussions when collaborating with each other. The importance people laid on the *personal networks* was very high. References such as “*ask anyone anytime*” or “*policy of open door*” were commonplace in the interview data. There were also many remarks related to the *striving for open and on-line communication*. *Heavy interdependence between people* is related to the changing nature of knowledge and to the need to apply the knowledge.

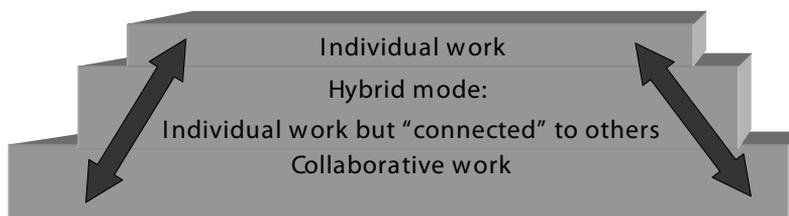
In the case organisation it is the *product and project based trust* and the *strong shared identity* that give people reason to collaborate. *They create the object based trust*. In an environment of strong shared identity it is appropriate and justified to contact anybody to find missing pieces of information. A related finding was the *internal customer-service provider relationships* and *service mindset* that definitely enhance the efficiency within the organisation. If someone or a certain function was not contributing directly to the end products going to the external customers, they still felt the urgency over their own product or service going to an internal customer. In the spirit of strong shared identity, it is also easy for them to go into crisis mode with their customers and see how their product or service indirectly contributes to the end-product to be sold to an external customer.

The first *implicit social rule* in the R & D/product development (exchange sub-process) was the *varying set of meetings and knots*. I classified various meetings and knots on a high level using the following parameters: irregular/on the need basis versus regular/scheduled and transformative versus non-transformative/ (information sharing). Within the category of regular and non-transformative there were (formal) meetings, info sharing sessions and training. Ad hoc knots and gatherings and info sharing sessions are often irregular and non-transformative. Some of the (formal) meetings might be regular and at the same time transformative. On a need basis workshops and knots and gatherings are most often transformative. *Workshops* often seemed to be spaces for collaborative inquiry, negotiation and development effort. They are close to Nonaka’s and Konno’s (1998) concept of *ba*, a certain time and space for the concentration of resources to create new knowledge. The practice of workshops is also close to the kind of institutionalized learning activity that Engeström (1987) and Ahonen & Virkkunen (2005) are referring to. One of the differentiating features in this classification between (formal) meetings and workshops is multiprocessing and multitasking; in meetings people often use their electronic equipment to deal with tasks like email or documents whereas in workshops people usually concentrate more fully on the topic.

The second implicit social rule was the *continuous negotiation of optimal representation from over boundaries in meetings and knots*. In a volatile environment it is important to *constantly negotiate that the right people, the sufficient comprehension of people, are present in meetings and knots*. Experts of certain fields can be invited to meetings and knots in addition to the normal participant list depending on the agenda topics.

However, there was one mention this being decreasing. (This might be related to the higher impermeability of the vertical boundary implied by the interviewees.) The third implicit social rule is the *cascading information and knowledge created in meetings and knots over the boundaries*. The expectation is that knowledge and information flow in both directions through the individual participants. It is expected that the individual participant brings knowledge to the meeting from his/her perspective and duly *cascades the new information or knowledge generated in the session to his/her team or interest group (network)*. Sometimes this information flow may take place *on-line* during the session using electronic devices.

The fourth implicit social rule is the *blurry boundary between individual and collaborative work*. Even when doing individual work one constantly needs to use synchronous and asynchronous collaboration means to consult others. During the meetings one might multiprocess and collaborate with people not present in the meeting through electronic devices. The emphasis and rhythm between collaborative and individual work varies depending on the job role, process phase and many other contextual factors. It requires an effort from people to navigate between *collaborative, hybrid and individual work*. Depending on the situation one constantly assesses which of these options would be the most feasible for each situation (see *Figure 36*). Time-wise this occurs vertically and horizontally. An individual assesses where to position him/herself at a certain moment in time (should I do this individually, in a hybrid mode or in collaboration with other/s?). The same happens during certain periods of time (should my focus be on collaboration, hybrid mode or individual work in this specific job role or process phase?).



**Figure 36.** Constant boundary negotiations between individual and collaborative work

*Hybrid mode between collaborative and individual work* definitely makes the organisation efficient in many ways. However, there are also many question marks related to hybrid mode between collaborative and individual work. What is the value added of people being constantly accessible, available and on-line, even in meetings, where they might multiprocess with their electronic devices? Should the boundary around the meetings be re-established and strengthened? Would it pay back some efficiency if people switched from half-presence to full-presence?

All the implicit social rules identified are actually elements of self-organising in an organisation. *A varying set of meetings and knots* allows people to pick the kind of session needed for different kinds of purposes depending on the situation. *The blurry boundary between individual and collaborative work* has brought forward an area between these two: a hybrid mode between individual and collaborative work. People can flexibly navigate between collaborative, hybrid mode and individual work depending on the situation. *Strive for optimal representation* allows flexible negotiation on whom to invite to meetings and knots. After a meeting or a knot these participants can *cascade* not only the formal memo but possibly a *tailored memo to their own team or interest group* over the boundaries. This can be done on-line or after the session. The boundary dynamics dealt with in this section were related to the way people dynamically integrate over boundaries to collaborate with each other.

## 8.4 BOUNDARYLESS JOB ROLES?

After discussing the collaborative work and integrating over boundaries through network ties, I will move on to investigate the *division of labour* and more specifically *people's job roles* in the case company. The section is divided to four sub-sections. The first describes the *context of discretionary division of labour*. In a volatile environment it is absolutely essential that critical tasks are completed. In the context of discretionary division of labour, *who completes the task is variable*. This means that it is possible to use people from various teams and organisational entities flexibly to work on some task. In this connection I will also describe a few organisational means that enhance discretionary work design. After describing the context I will continue by describing the *discretionary job roles* from individual people's perspective (8.4.2). In a volatile environment *people's job role contents are variable* and *job role changes* are recurrent. These are manifestations of discretionary division of labour in the case company. *Sub-Section 8.4.3* illuminates some of the *threats and advantages of discretionary division of labour*. Finally I will outline *a configurable structure of main job role types* in the case company (8.4.4). A combination of more bounded and unbounded job roles acts as a structure that enables both vertical and horizontal knowledge building. These different types of main job roles form a basic job structure in the volatile environment and thus contribute to the viability of the organisation.

### 8.4.1 CONTEXT OF DISCRETIONARY DIVISION OF LABOUR

Discretionary division of labour proved to be more about a state of flux rather than a static structure of positions. I have already in earlier papers (Luoma, 2004, 2006)

called the flexible and shifting job role construction within a company a *flexible patchwork*. People are located at a certain point in time somewhere in the company internal reconfigurable patchwork of work slots or more traditionally jobs. The patchwork is in a constant state of shift, rotation, transition and movement. The construction and roles and competencies needed evolve constantly as a whole along with the strategies, projects, products and technologies. Overlaps and gaps in the patchwork are constantly negotiated and unanticipated changes are common. The *boundaries of people's job roles and responsibilities are collaboratively constructed in this dynamic patchwork. Gaps can be filled or overlaps removed by negotiation*. Some of the jobs may be unique assignments done from scratch and when done, someone else will take care of the maintenance, if needed. "This is something that no one has done before me and no one will do after me, so, well, there is really nothing anywhere for it, my bosses do not know anything about it." If someone goes on maternity leave or on sabbatical, all planning of the future job role is virtually impossible because when returning the previous position has almost certainly changed or disappeared.

When I left for maternity leave, of course I knew that whenever I come back there would not be the same kind of job any more, because you know, things just keep changing, and well, of course the first question is that when you return to work that to what job are you returning? (Project Manager, Female)

The following extract is from the field notes. The described ad hoc knot gatherings took place towards the end of my first study leave. I was still in the heavy process of gathering research data whilst in parallel I already started work in the case company. I have thus been personally involved in this incident of coming up with a job role to fill in a gap in the reconfigurable patchwork. The extract describes how a patch, Manager, Collaboration IT, emerged and was filled in. Earlier this had been one of those "general areas that was nobody's responsibility" that the people interviewed had mentioned as areas that are difficult to gain knowledge of. This was also related to a weakness in the external boundary; the collaboration with the R & D partners could have been more efficient had the IT infrastructure supported it from the very start. There was thus a great need to fill this particular job role gap in the organisation.

A new patch in the reconfigurable patchwork emerged on the boundary of collaboration function<sup>42</sup> and IT tool development, namely Manager, Collaboration IT [information technology]. This was caused by the great need to develop more efficient ways to exchange codified knowledge between companies (commonly accessible storing systems) as well as more efficient ways to hold common virtual meetings (virtual meeting software systems). The signals coming from several directions led to forming a flexible knot with people

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42. *Collaboration people are those who coordinate cooperation with external partners; i.e. other companies. Their job role includes creating project orders, developing the way of working across boundaries and also steering partners' work.*

from all relevant parties to negotiate where this new position/job role would be located in the organisation. This knot of people met virtually a couple of times and proposed at the end of the day to a formal management team a home base organisation for the role. Somebody had also proposed a name of a suitable person to the discussion. The proposal was approved in a management team, the planning knot dissolved and the negotiations of the transition of the proposed person were initiated. (Extract from the observation note diary, December 2003)

When someone leaves a position/job role permanently or temporarily an opportunity to check its relevance opens up. The position may be filled with one person or two people or not replaced at all. In the latter case the responsibilities cease to exist or they are distributed among existing people with other responsibilities. Even more often the recurrent organisational change situations make it possible to check if the current job roles are relevant and discontinue those that are no longer relevant. The real need and buy-in for all projects is also tested in this kind of flexible environment.

They [trainers] have disappeared to some other work in the organisational changes and they haven't been replaced in any way... Some have moved to organisation X, some to different organisations to do completely different stuff, some have transferred to Y, those who were previously trainers. They have just disappeared somewhere. Usually when there are organisational changes, people look at their own position and think if this is now the job that I want to do. (Engineer, Female)

That project was originally on the list of the prioritized development projects yes, but there was no real buy-in for it, it was like selling snowballs to Eskimos, I don't know if I was persistent enough, and it wasn't really rewarding any more, so I transferred to another project and that felt then more useful. (Project Manager, Male)

There is a constant effort to stabilize the roles and interfaces in the reconfigurable patchwork. People's job roles seemed to be very much defined in their relation to other roles and people in the reconfigurable structure of job roles. *Continuous definition work is needed to negotiate one's own position and its relation to other positions in the network.* "So that the responsibilities and roles are a bit "vague", so that people need to understand what it is all about and people then define and agree interfaces between themselves. Not so that it is given from above." In fact people's work is about "*interface management on all levels*" as one interviewee called it. Interface work is about negotiating the way of working with interfaces on all levels. Interface work touches upon the roles and responsibilities, too. In Orlikowski's (2002) practices this is about "knowing the players in the game". The importance of continuous interface management becomes crucial in a hectic and frequently changing environment where the "responsibilities are new and shifting (i.e. unclear)". "The network is now built

up and the aspiration is that people wouldn't change so often." "Staying for a while in one organisation brings you the needed street-credibility and there is time to build up the network." Paradoxically, however, in the reconfigurable patchwork the job roles cannot be too rigidly defined.

In a volatile environment it is absolutely essential that critical tasks are completed. *The organisation or a team from which a person is working on a certain task varies dynamically.* Further, *task division within a project or a team can change according to the situation.* Task division is flexible and the attitude is often "everybody is doing everything". *Temporary ad hoc help can be provided from other teams and organisations to teams with work peaks.* This can be done on the need basis or there can be specific teams from where "loans" can be obtained. *Agreed setups to help other organisational entities over the organisational boundaries during rush periods* may be used. "Department boundaries are not too carefully guarded, so that I couldn't lend this person to you because it might eat up my own power, but it is kind of quite flexible." *The way people stand in and cover for others is flexible and enhances the breaking of job role boundaries.* "I have myself been a substitute too, and so the first job you get is a complex thing and full responsibility." "Tasks are changing at times, so that really in the lab, there has been everything from one end to the other." "They [responsibility areas] also go a bit via the needs, so whatever they need we aim at supplying it. Basically it is flexible in a way that at times they need more stuff and then they ask for more." "Product support group, they usually do those trips and if they don't have time, they agree that they contact us, our manager. Managers then always ask us if there are volunteers, who want to go, whom it suits to go."

This kind of 3G adaptation, currently we are doing it ourselves here because we have a good person to do it, even though he really doesn't belong to these adaptation projects.  
(Project Manager, Male)

Yes, this is a very small team, so that we are only four people working on this product. It means that everyone is doing everything. So of course everybody has got their own responsibility areas but we do work very tightly together as a group. And well, that probably boosts or expands a little in a different way compared to being in some bigger project.  
(Engineer, Female)

Just because there is a need, there is a shortage of testers, it must have been initiated like that so that we need to get things done, and then I have always said that if my schedules just allow, I am quite happy to test. (Specialist, Female)

But currently the thing is that we jump from one project to another and I must currently be in at least four projects and do a little different stuff in all of them. So currently I try to install a kind of a whole package that should be sent to a customer. Then I hop into the next

project to plan a kind of a stability plan... The day that is finished I will go to this kind, when a new operating system is coming that we should support, so how could we then get a system that works. After that I will again jump in here, maybe to take care of just this testing... There are a lot of other activities in between. Our Department Manager has said that we are a kind of a fire department that goes wherever there is a fire. In other words if a customer has any problems so we might sit down and start solving them... we are in the system platform. It doesn't kind of get boring when this job profile is quite varied... In this [organisation] X, there is this [entity] Y that would be my right place then. Elsewhere I am kind of on loan. (Engineer, Female)

*The person doing a job may be changed if deemed unfit to fulfil the requirements of his/her job role.* This can be done most easily during the organisational changes. In the quote below a project manager explains how it is possible to change a manager if need be. In this specific case the manifestation of “the rot that has set in” is the fact that people started to flee from the team in question and apply for jobs elsewhere in the company.

In this kind of organisation it is quite improbable that there would spring up sub-areas where the management culture changes to be completely different from other parts of the organisation, because if the rot sets in some team, it would be visible very far. But we have of course had them and they occur every now and then but generally, because people nowadays are quite courageous to start changing jobs so it usually happens that people start dramatically to disappear from that certain area and in that phase, of course the site organisation needs to make a move... It often means changing some manager or re-organising the whole area. I have followed from very close quite recently and even gone to HR to talk about it even though it is not my work, but because I was annoyed when the kind of people were leaving who were important to us and others. Site organisation then had their chance to show that something needs to be done. (Project Manager, Male)

On a high level, the *large size of the organisation* enhances discretionary division of labour. If a certain business area is not successful, *people can seek their way to business areas where more competencies and resources are needed at a certain point in time*. “What I have seen is that it [internal job rotation] has been realized so that folks have left to X [business group] now when we have difficult times.” The *project mode* overall brings flexibility to an organisation. A project is formed around an important topic and resourced flexibly until the project finishes or is run down. People may be allocated to several projects at a time. The option to play with *different organisational designs* (e.g. a line or a matrix organisation) brings flexibility to the organisation. Furthermore, *partnering* and *external temporary labour* give flexibility to the usage of internal competencies and resources (these two being about the numerical flexibility (cf. Felstead & Jewson (1999), Dyer & Ericksen (2005))).

On this UI [user interface] side we had a situation that a subcontractor called X or previously Y implemented this completely earlier but now we have here three of our own guys doing it, too. We have taken this product Z basic functionality into our own hands and X is doing just separate and low risk parts there, so that they don't implement the whole system. (Project Manager, Male)

#### 8.4.2 DISCRETIONARY JOB ROLES

The *contents of people's job roles are discretionary*, i.e. the boundary around the job roles may be relatively blurry. The *boundary around the job roles forms flexibly according to the requirements and expectations* (based on the global job profile, grade and individual job description), but also based on the *situation, context, surrounding network*, the *interests* of an individual as well as his/her *competencies, style and skills*. Discretionary division of labour would not be possible without the discretionary job roles and individuals who are ready to flex.

In my opinion we respond to the markets, customers are important. We are quite flexible, and this organisation wouldn't be very good if we functioned, you know, if we functioned rigidly like the organisation says and the job profiles say, so this wouldn't function at all. I wouldn't say that the organisation is flexible, but I would claim that people are flexible. They kind of take responsibility for the whole, and ponder what the big picture is and act in the way one has to, in order to get to the common targets. It starts actually from there; that is kind of the most important source. (Senior Manager, Female)

[When I first came] I got the kind of power so that I could do as much as I wanted and you got to do what you wanted and how you wanted. In my current job it is the same. It is still a big benefit here, what I know about other companies and have experience of them, so there is a certain freedom and good spirit here... Surely there can be some kind of rivalry over some positions or rank, but at least on my level, if it is obvious that there is something that needs to be done and if I do it, nobody comes to tell you that this is none of your business or that I have stepped on somebody's toes. (Specialist, Female)

*How and why there are changes in the content of one job role varies a great deal.* In interim phases (e.g. related to organisational changes or job changes), *a person can do two jobs in parallel. People can take on tasks additional to their job over the horizontal boundary* (e.g. from another field) *or over the vertical boundary.* Some people might do "voluntary work" on top of their own tasks. "I have been in this kind of voluntary ring for a long time that is doing these language checks." In some cases there can be "jacks-of-all-trades" with a "more free job description". Such people might be needed to cover for and back up people who are on leaves of absence or doing some unforesee-

able work. This kind of work might also be allocated to someone for whom there is nothing more specific at that moment. Furthermore, *people may be allocated to several projects at a time*. “In fact it was quite inconvenient at that phase, so that I was allocated, how many percent was it, out of my working time, to that project and then I had these things in my own unit.” In one of the examples below the person did not have enough to do in her current job (non R & D) but was also motivated to try out tasks in other fields (R & D). This can also be done purely in order to *enhance learning or to motivate someone*. A motivating effect might be, for example, in *vertical job role boundary expansion* when a secretary or assistant is assigned a task to write the meeting minutes of some management team or project management team and at the same time attend the management team meetings. In another example of a *vertical job role boundary expansion* in the opposite direction, a Test Project Manager is assigned some testing work. He assumes the actual testing work his team members are doing because he transferred to be a Test Project Manager without actual testing experience.

I knew this job beforehand and I started this already in December, when I was still a solid line manager, so I kind of did two jobs in parallel. I kind of had those skills already somewhere hidden in me. (Manager, Female)

Then little by little, hm, already in my secretary days I was taken along to the customer documentation part in NET and I got some additional work to do quite nicely. It felt meaningful and relatively reasonable at that point, that project work, and from then on, gradually, we thought about different options, how I could better develop professionally. (Engineer, Female)

I have this Project Manager who hasn't done the real work, but he leads the testing process, or a project really, not the process, or well yes, he leads the process too in a way, but he hasn't tested himself, so he says that he feels that it is a kind of a deficiency, so we planned for him that now this autumn you go and test with a certain percentage. Even if that is not good for the project where he is in, probably there is no harm, but it is good that he can better guide that work when he knows himself the daily issues and problems there are. (Manager, Male)

It seems that in a highly volatile environment the formal titles, job profiles and job descriptions appeared to be a very relative concept. “For some people the job title can remain the same but what it contains changes completely.” “Actually my title does not really correspond to what I am doing. Anyway what I am making changes so often that it is not worth the effort to always change the title.” *Officially imposed job profiles or titles did not always correspond to the reality*. The challenge is to keep pace with the changing and drifting discretionary job roles. Moreover, people claimed that the *same work was done differently at different sites and locations*. A position may also contain

features from two or more different job profiles. “Then you need to decide which one is dominant even though the focus is changing all the time.” Too rigid job profiles or job descriptions do not seem to work. “Often there is friction anyway between what you are expected to do and what in reality needs to be done... and personally, I really don’t know at all by what process the job profiles are made”.

My title, it seems has not been updated in the Phonebook... [What my title is] is a good question. We have had a couple of IIPs, something like development manager or a development project manager, something like that... it is not static, this chaos is related to this.  
(Manager, Male)

In our organisation the job profiles are really confusing and it is very unclear to people what they are doing. This organisation has been in a constant chaotic flux for the last couple of years and we have had this problem that our roles were constantly changing, and then at some point you found out that your job description is like this, and in fact the work that you do every day was something completely different. (Manager, Female)

For some the job description is like the Bible, and he/she counts on it if he/she takes a certain task, and it is tiresome, but of course, it creates again a kind of safety and sort of boundaries, so that you don’t need to accept all, and you don’t need to take all tasks.  
(Manager, Female)

Even if there is a constant flux, the company wide basic job profiles and the practice of creating personal job descriptions were considered useful. A senior manager considered the company wide job profiles “surprisingly good” taking into account the volatility of the environment in which they are used. At best, if they are not used too rigorously, they can bring a certain structure and sustainability to a boundaryless environment.

*In addition to the changing nature of the content of one job role, the job role changes are also recurrent, i.e. people clearly changing from one job to another.* The company’s head of HR claimed in a magazine interview (Rainisto, 2004, p. 21) that “the pace of internal rotation was quite usual; approximately every third person changes jobs yearly. The ideal would be if one person could stay in one job for at least for two to three years.” It is firstly extremely difficult to gain an insight into the people transitions since they constitute a very complex phenomenon; one cannot easily find out about the nature of change in the HR reports. In some cases the job role of a person and the competencies needed might change radically even if there is no change indicated in the HR systems and vice versa; even if there seems to be a radical change systems wise, the person might actually go on doing almost the same job. In any case, it seems that what Orlikowski (2002) refers to as “contracting expertise annually” (practice: aligning effort) takes place in the case organisation, especially if one counts both formal recruitments and all the flexibility and agility that otherwise occurring around jobs.

There were several commonly shared and constantly repeated stories emerging from the interviews. These stories reflect a value base that supports change. Such commonly shared stories can be seen as part of the encultured knowledge in the organisation. “People change jobs here every six months.” “It takes half a year until you are productive in a new position.” “It is good to be in one position for two years.” “You are thrown into a fast-flowing stream and let’s see if you can swim.” “In individual development discussions renewal is discussed every time: what is your next step? What new can you learn in your current position?” “There are organisational changes at least once a year, often twice a year, at Christmas and in the summer.” These storylines imply that the employees need to be prepared for very frequent changes, that learning is needed in every new position and that performance is expected from them after the learning period.<sup>43</sup> Further they imply that initiative is mandatory and that one constantly needs to consider one’s development and the next step. (There was one exception to the comments related to the time period people usually are or should be in one position. “So they say that it is from five to seven years in one place when you have to change.”<sup>44</sup>) These storylines correspond somewhat to the reality and the underlying messages correspond to the official values of the organisation. Through such tenets newcomers are soon socialized to the environment.

Well, now we have probably gone from one end of the continuum to the other, when it was at its most heated, then there were weekly those messages in the email that this one is going there and that one there. And now people are not changing that much. There is exactly this middle of the road, that would be good if there was this chance for rotation and the company supports it too and considers it good, but I guess it must be quite difficult to manage, there shouldn’t be any mass exodus, so that suddenly many are leaving or want to leave, and then on the other hand, if in a long time nobody changes, that is probably not good either, so that one should every now and then shake it up a bit. (Engineer, Female)

The perceived importance of organisational changes as the catalyst of job role changes was surprisingly high. The interviewees reported that organisational changes were the points that caused most of transitions in the job roles. As a consequence of an organisational change people explained that they were “re-employed” by: being asked for a new position, being told what the new position is, by applying for a new position in the new organisational setup, continuing basically the same (and the changes took place around you) or making a decision to apply for a completely new kind of job in a new organisational setup or in some other organisation. One interviewee expressed uncertainty and anxiety over not knowing which of these methods was in use, i.e. not knowing whether one should apply for a new job in an organisational change or not.

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43. *In the organisation’s leadership review process the high potential leaders identified are expected to “perform well under the new and challenging environment” and thus be productive almost immediately.*

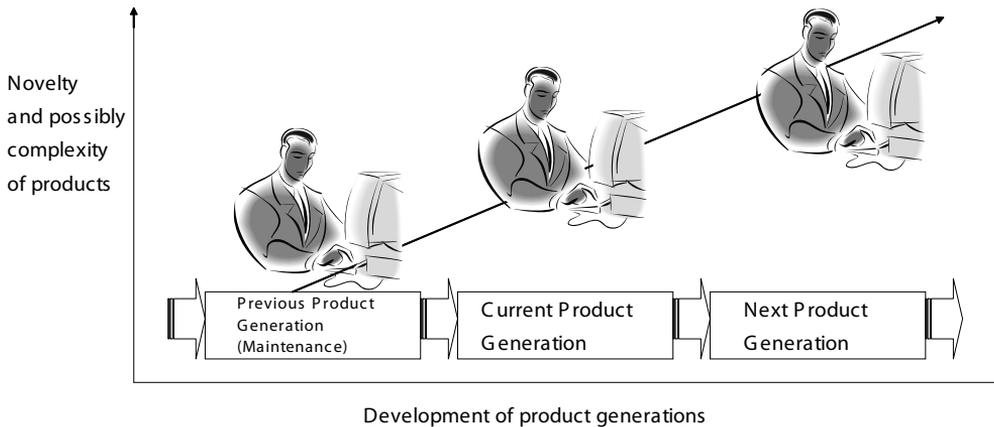
44. *This quote is by a male engineer.*

Often there were no “real” changes at the grassroots, as one interviewee put it and people wondered what “the hassle was about the change”. In between organisational changes new gaps are identified or new projects are set up and positions open up accordingly. Overall people seemed to understand how difficult it is to manage the job “rotation” and to find “the middle of the road” with job role changes.

*There are two perspectives on how people move within the reconfigurable structure of job roles.* First one is the *active element*. Based on their style, interests, competencies and skills people start to gravitate towards certain types of jobs.<sup>45</sup> In practice everybody has their own style of fulfilling a certain position, i.e. defining the boundaries of the amoeba form of their job role patch. *People to an extent make their own job.* There are also many other factors affecting this area; the size of the project has an impact on the division of labour. In bigger projects there are more diverse jobs whereas in smaller projects the jobs might include more variation and additional tasks i.e. are more of generalist type of jobs. There were four *dichotomies related to how people make up their jobs* that stuck out from people’s descriptions. The first of these is related to people’s behaviour and the other three to what kind of work and environment they are looking for. Thus, the first dichotomy is *active-passive*. The active ones “keep themselves alert”, “have ambition” and “seek out their own work” by themselves. With the “passive” people the job role might more easily remain the same. The second one is *risk-security*. Those looking for security look for “the must things in products”, where it is not so obvious that all of a sudden teams will be closed down or transferred to some other work. For some it might even be *an individual strategy to spot the safest product areas, to speculate which product or business would be a safe or stable area in the long run.* “If you have a very stable area or it is a must thing, that needs to be done in any case, then it is very easy to keep the job the same.” The third dichotomy is *hectic-steady*. Project managers are good examples of those seeking to have “catastrophes” and “crises” in their work. Then there were those who preferred a more steady pace. The fourth dichotomy is related to the *maturity of technology: mature technology-novel technology*. There are those who feel at home with the newest cutting-edge technologies that were still under definition. Others enjoy more dealing with the current technology generation or the maintenance phase, where no development of new features any longer takes place. Crossing the boundary towards new technologies means leaving a more mature system behind and stepping out into the insecurity and immaturity of a new system. The varying interests in working with the different technology generations are depicted in *Figure 37*.

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45. *Performance management and talent management are organisational means to ensure that those performing and/or with potential are rewarded and career and development opportunities within the company. I have excluded these organisational means from the scope of this study.*



**Figure 37.** Varying interests to work with different technology generations

If you don't keep yourself alert around here so you can surely be buried in your stuff and in a couple of weeks' time no one even remembers you're there... Maybe at some point they would notice and the salary would stop coming (laughter). You need to kind of look out your own work yourself around here. (Senior Manager, Female)

I guess that [product X] is anyway something that the customers will need anyway, it is, so to say, at the core of what the company is doing, I don't know, I guess that there is a bit of work in the future too around here where to stick to. (Project Manager, Male)

I kind of like this hectic environment where things happen, you need to know on-line what is going on and you know, there are catastrophes and stuff, and, I kind of know that it is somehow not so hectic, or at least I think so, in the proper research side, but anyway I wouldn't like to work only in research. (Project Manager, Male)

I say that there are also those kinds of passive types who like to do their own stuff and they don't have ambition to place themselves and transfer, who don't know how to find the way or don't even want to. I know many around here and their tasks remain about the same. It depends of course on what program module you are working on or what your task is... And then the organisation around can change but the tasks remain the same. Well, I don't know if there are so many of them at the end of the day. I would say that around here the tasks do rotate quite a lot in general. And through that, there are also the kind of top experts in here. It is probably so individual, like how much you can absorb and digest new things and how big a cake the new task is. (Engineer, Female)

I admit that at least as far as I am concerned, hm, I quite like the future oriented speculative programs, like the next generation systems, and when a new system starts to concretize, I quickly move to the next generation (laughter). (Manager, Male)

*In a volatile environment the active element is not enough to describe how people move within the reconfigurable patchwork. The second element is more passive.* This view manifests itself as “*drift theory*” or filling in jobs based on “*availability*” from the individuals’ perspective. From the systemic perspective it is about intelligent balancing and negotiating (self-organising) to fill in gaps and reduce overlaps. Many interviewees felt that in an optimal situation people were selected for a position according to their “competencies”, “experience” and/or “willingness”. However, there were also many who brought forth that people are selected to projects and job roles based on some kind of “drift theory” or “availability”. “Drift theory” and availability are interesting comments. In a floating environment like the case organisation is, one would be surprised if watertight systematic planning of resources and competencies was always possible. The concept of availability in itself assumes that anybody “available” can learn new tasks and/or competencies at least if they are close enough to what the person has previously done. Or “if the person is just the right kind, he/she can learn and do anything” as one manager commented. In any case, great learning capability and courage are required of individuals.” For people moving in the job role structure based on the drift theory or availability can open up opportunities for learning and development, even the kind of horizons they could not have planned or foreseen themselves. It can also require compromises and at its worst ultimately lead to decaying engagement. “One thing [in this company] is that how many people get to do so many different jobs? or dare to take on so many different jobs? or actually to drift to them.” In some cases the previous competencies might be far from the needed new ones. In these cases a drifting transition is at the same time a radical boundary crossing in terms of learning. From the human resource strategy perspective these features are related to the “optimization of the internal fluidity, the ease and speed with which the continuous self-allocation of existing talent and effort occurs” (cf. Dyer & Ericksen, 2005).

And the way projects are manned, it is a real mystery, can anything describe that process, you can say who the players are but how the process goes, can anyone say it, when we have the X [tool] and others, you know... People select tasks and vacancies on their own initiative, so actually the line and the project together look at that, so, generally speaking the competencies, hm, so the line and the project should basically do that based on the competence and the availability but I kind of would say that the availability goes first, which as it turns out, is quite funny, because the competence should be the first. (Senior Manager, Female)

In a way it is a very flexible organisation, and it is not that much about the education or the title, if the guy just knows the stuff. It is not so rigid that you're just in that box and stick to that box... It has contributed to the success of the company, this atmosphere, that the work community is good and the atmosphere is flexible on what comes to work and in other senses too... Well, it hasn't come just like that, so there are some thousand people here in Tampere. So sometimes you get to think that what good is it with one person's contribution? But in this organisation the contribution of so many people has been organised reasonably well. I guess it depends on the people and their attitudes. You need to be ready to flex and you need to have imagination and organising skills. Basically you need to have that readiness for change all the time. (Engineer, Male)

#### 8.4.3 ADVANTAGES AND THREATS OF DISCRETIONARY DIVISION OF LABOUR

*Freedom* was considered a clear positive thing in this organisation. “And then one’s own freedom, the flexible working hours, the kind of basic things, you have freedom to come to work when you want to, you can stay all night if you want to, and you can go to the gym classes here. And the manager trusts 100%, even though he/she didn’t even know what we were doing.” The counterpart of freedom is *responsibility* that forces people to commit to their assignments, which can at times be overwhelming. All interviewees considered it an advantage that in a big organisation it is possible to find a slot that best suits one’s ambitions, preferences and way of working. The fact that people seem to be able to more or less choose between various “patch” options is an important motivational factor. (How much people are willing to flex also gives input for the performance based pay.) Another advantage is that the number of network ties, social capital, grows when they work in different positions. “We are definitely given the responsibility and the communication comes whenever needed. And as long as the work progresses well, so it is ok, no one meddles, if the project progresses as planned, and you know, with good performance, so it is ok.”

When you compare these two workplaces [the previous job in another company], so here you have the kind of freedom, but the work also brings you the kind, a lot of responsibility. They just tell you that you should now do this and this and this, but they wouldn't then tell how to do it. But then again, there are those dates when it needs to be done by. Whereas there [in the previous place] it was like that at eight to work and at four home... But then at times it feels that when you are busy all the time, so that when you go home you kind of think of these things even at night. (Engineer, Female)

A couple of interviewees reported that they had tried out certain jobs out of personal interests, realised that it was not really for them but they wanted to see whether they liked it or not. *Trying out* is probably easier in the boundaryless environment compared

to a more established environment. It is possible to try out tasks from other jobs and even from other fields than one's own. "I wanted to try out kind of in practice those things I had learnt. I had seen so many problems in our projects; it was a pretty good place to learn in the sense that you saw widely that activity around here." On the other hand, uncontrolled "job rotation", *uncontrolled level of job transfers*, was not always considered good. Some managers stated that if people do not stay in a project to the end, they might lose the feeling of responsibility and achievement related to the results. Or along with constant changes, an individual does not learn the requirements of any position thoroughly enough. Some interviewees hinted that there had been, especially during the period of heavy growth, conscious "job hopping" in the organisation in the pursuit of advancement in job grade or title. A specialist tells about her spouse who is working in the same company:

The job has changed all the time and just when he gets into that and as an expert, now then he got into it quite well and he's real enthusiastic about the X and he became really, he reached the expert level, so now he needs to change and a completely new job profile is coming and it takes another half a year or a year to get an induction, to get kind of a bit into it. (Specialist, Female)

The continuity tends to suffer, the teams should be allowed to live so that they get to show what they can achieve and the individual should hold his/her horses, do the exercises and then show what he/she can do so that yes, stay as long as he/she can develop the work. And then he/she can change but if they change in the very beginning so you can't see the horizons that it brings. (Senior Manager, Female)

The weaknesses and threats that people had experienced were related to *lack of time*, *too loose supporting networks*, *fear of not gaining "proper" expertise*, *weakening of engagement* and finally individual *endurance* in the longer term. Very often the time spent in one job was considered too short to learn or the learning requirements were excessive. The *fragmentation of job roles* and *disintegration of job role contents*, *multitasking* and *recurrent job role changes* might also be experienced as burdensome. At its worst there is no time for induction, competence transfer or learning. "I have a constant feeling that I have missed the boat." Constant changes might prevent one ever learning anything profoundly but only superficially. When the changes take place continuously, hurry is an everyday reality and in many teams the resourcing is tight, the proper planning of back-up is difficult. (See also Reardon, 2004, whose conclusions of engineering work are similar.) Often backing up someone or job role changes requires intensive learning. "With this pace there is a danger that you never get real competence in any area that would be useful and you would not get any merit out of your competence." "The only thing I have been annoyed about, is that now that I am leaving, only now do I start to get an overall picture of it, because it has changed so many times."

With a new job you always think how laborious is this going to be, how long-lasting effects has it got, and for how long are we going to be in this job and you kind of start to become sceptical about how long you are ALLOWED to do a job and whether you have time to learn enough before there is another organisational change or something... I don't know really... somehow the motivating part should be handled and then reserve time for flexibility, so kind of possibility to affect, so that it is not only that you are handed out just something, so that you could have some kind of say in the direction, like how you want to flex, it is easy to say, but I don't know in practice how it could be implemented, it is anyway so much an individual feature, I mean the flexibility, but on the other hand it cannot be only that "flex, flex, flex", ... even an elastic band snaps at some point... of course it is about cost efficiency but this is definitely one thing that should be taken more into account. (Engineer, Female)

The tutor told me that it really doesn't matter if you don't always know. You just express your stuff in a convincing, way so they will believe you. Well, if everybody is following this guideline then it definitely is quite wild. Best guesses are lingering about and product decisions are made based on these, so it definitely is quite crazy but I guess that this is the way it goes, that this is the kind of controlled risk-taking. (Engineer, Female)

From a systemic perspective there were a few elements that caused the workload to be distributed unevenly in the reconfigurable patchwork. *Uneven distribution of work* is also one threat related to discretionary division of labour. Work seemed to be unevenly distributed as a result of recurrent changes and high mobility of people. Thus, in a volatile environment such phenomena possibly surface more rapidly than in more stable environments. Even though the workload seemed to be very heavy everywhere in the reconfigurable patchwork, some *bottlenecks* in terms of workload could be identified based on the analysis of the data. People were wondering if management was aware of such bottlenecks. Not only those who happened to find themselves in such areas but also people in more stable areas recognised the fact that there is more work and learning in some parts of the organisation than in others. In an agile, hectic environment the pace of change is high. It is natural that bottlenecks appear here and there. In order to dissolve bottlenecks (compaction points) the job role structure needs to be flexible and people need to be ready to flex. From the resourcing perspective there might also be areas, *thinning points*, in the reconfigurable patchwork. At the thinning points the workload then falls on the shoulders of those who remain. In a large organisation where there are many opportunities it is easy to gravitate towards other areas. One reason mentioned earlier by an engineer was organisational change, during which people might "flee" from a certain organisation to other parts of the organisation. Another reason for a mass exodus was mentioned to be poor managerial work. There might also be *isolation points* in the reconfigurable patchwork. This became evident from various comments related to the geographical isolation from the

survey data. The geographical isolation is exacerbated by the virtual mode of working. Isolation from the others can also be an intensity factor (Docherty et al. 2002). Such bottlenecks, thinning points and isolation points can probably surge or surface more easily in a volatile environment.

It's very worrying that the most burdened people have far too much to do currently so that they cannot handle and then the burden is not evenly distributed around the house... That is one of my worries currently that what could you do about it? But from my current job not very much though. (Project Manager, Male)

Sometimes you may be the only one at your site attending a meeting where others are in one meeting room on another site. You cannot know who is speaking and sometimes the white board is still used... Also, you may be forgotten. (Extract from the survey answers)

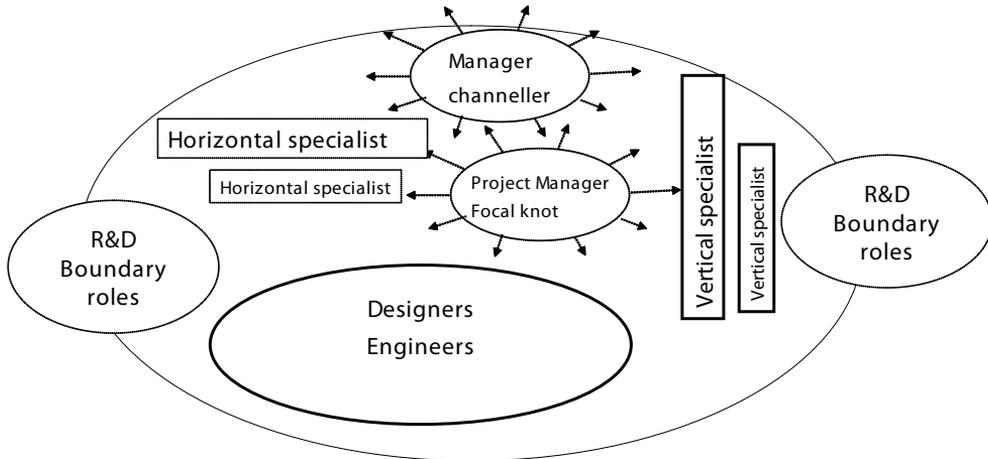
*Individual people* who have been long in one patch or are otherwise more knowledgeable than others can become *bottlenecks of knowledge*. This can lead to people excessively consulting the people in the bottleneck causing an imbalance in the network of reciprocal knowledge sharing. In a volatile environment this possibly happens more easily than in more stable environments. "A couple of guys I tend to appreciate more than others and perhaps I harass them maybe too much." "Those who learn, they get more responsibility and they get more work and they've got a bigger workload." Thomas-Hunt & Phillips (2003) claimed that constant membership and task changes in teams in dynamic organisations might obscure information about who has expertise in the group.<sup>46</sup> It is possible that the experts becoming overloaded might remain unrecognised by the environment because the questions come through various means and tools. In addition the person's manager might not be aware of this because the managers keep changing. In any case, in dynamic environments, where there is heavy interdependence between various players, it is important also to take care of those who are more knowledgeable than others (cf. Döös, 2005). *Projects dealing with new products or technologies* can also bring an excessive workload in terms of learning new things and setting up new ways of working. "We are learning and developing the new product and related processes in a fire-fighting mode and there is no-one you can ask." In this kind of spearhead areas it is not as easy to gain support from the available links over the border practices like competence transfer, induction, handover practice and product competence transfer. *Urgent customer projects* were also mentioned as something bringing temporarily an excessive workload to those involved.

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46. Thomas-Hunt's and Phillips' (2003) explanation for the obscured information about who has expertise was based on the increased use of inappropriate status cues; i.e. the individuals displaying higher levels of confidence are perceived to have expertise.

#### 8.4.4 RECONFIGURABLE STRUCTURE OF MAIN JOB ROLE TYPES

Even if the job roles flex according to the situation, the needs and the person in the job role, there still seemed to be certain types of job roles on a high level. These *different types of main job roles form a basic structure of jobs in the volatile environment and thus contribute to the viability of the organisation.* These main job role types in R & D are shown in *Figure 38*. The classification is based on especially how the interviewees described their own but also other people's roles, work and task division.



**Figure 38.** Reconfigurable structure of main job role types in R & D

In all roles people need to network with others in the organisation and participate in co-creation. However, the roles of *project manager, manager, horizontal specialist* as well as *R & D boundary roles* came across as being quite unbound in terms of networks and how widely they needed to know the organisation and how wide networks they needed to have. *Vertical specialists, designers and engineers*, on the other hand, were somehow deliberately given permission to concentrate on a narrower arena of content or activity, i.e. their work was more bounded.<sup>47</sup> On high level the boundaries of managers, project managers, horizontal specialists and R & D boundary role employees can be described as *more unbounded*. Those of designers, engineers and vertical specialists can be described as *more bounded*.<sup>48</sup> *A combination of these forms a reconfigurable structure of jobs in a volatile environment. This structure enables both vertical and horizontal knowledge building thus contributing to the viability of the system.*

47. Note that the interviewees belonging to the boundary roles are described as being managers, project managers, specialists or engineers within their own boundary role function. In the same manner the process, method and tools development people were described according to their role.

48. Some vertical specialists can have wide networks within their own specialist area.

Specialists and chief engineers and project managers, they sure use most of their time for discussions and pow-wows. I wouldn't mind having more discussions and more teamwork. It would definitely be a good thing, when you sometimes think, when you hammer some machine all alone for a whole day. So you think of some customer service where people come and go and you deal with people. [Here] you spend the whole day with that machine, talk to that machine via the keyboard. There one gets to think that there might be some variation, too. (Engineer, Male)

In Luhmannian (1989) thinking on social systems, based on the shared code of communication and identity, the overall social system here would be R & D and more specifically product development.<sup>49</sup> R & D at large would form *the major social system* and R & D boundary roles/functions would form the *minor social systems*. These are sometimes called R & D support functions. Most people related to the R & D major social system did not raise the option of stepping outside the R & D field. Some were more and some less willing to cross boundaries but mostly within R & D. An engineer's identity is much closer to the professional identity in the traditional sense compared to those in R & D boundary roles. "The kind of guy who hasn't learnt as much as the others may not be as much engaged with his heart as the other software people usually are."<sup>50</sup> Engineering or technical education seems to have a very high impact on the work identity formation.

The extracts below describe the internal ranking system where product development comes first, tool & process & method & quality next and the then support roles. Those in boundary roles need to justify why their projects are important and worth doing. On the other hand, this also tells about a culture where nothing is taken for granted and the proximity to the products being developed is constantly being considered. "My current work is to some extent the kind of consultancy work in the area of process development, so I try diligently to adapt these processes to their [business area's] use. On the other hand the business areas wouldn't like so much to invest in this organisational fat, i.e. in this business development." Clark (2001) has interestingly conceptualised technical writing to belong to a boundary area between the technical and the social.

To all others you need to justify all the time even with examples, so that "think about this now!". You need to kind of all the time explain that, in a way, because it is knowledge management, so really, it does not exist, it does not produce any software, it is not about code lines. When it is not code, it does not exist, or it has no significance. This is anyway an engineer led company... If it is not software or code or a piece of hardware, the engineers in a way cannot see it, what is it there that is important. You need to all the time to justify

49. *Within the company there is a separate organisational unit that concentrates specifically and practically solely on research. At the time of data gathering the name of the organisational entity was NRC (Nokia Research Centre.)*

50. *Indeed there is evidence that many "scientific professionals" orientate rather towards working with things than with people (Clarke, 2002).*

that if we do not support this for you like this, so you don't have time to do your core work, or you don't have time to manage those people who are doing that core. (Project Manager, Male, Boundary role function)

And basically we do not have any business in there, if there is no product, so there is no us either, and the fact that I rather consider us as a kind of a support for a product, that is a kind of an essential part of it, it is no nonsense part, but it isn't quite in the same scale as some product team for example. (Engineer, Female, Boundary role function)

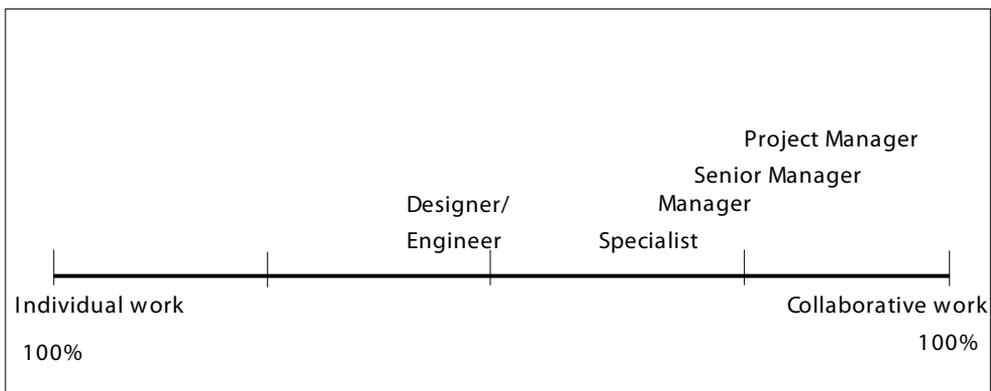
The weakness of product development is that they value technical knowledge over everything else and especially in Nokia the system knowledge is emphasised... People don't really even realize that there are other kinds of knowledge in the world, for example learning solution creation, human resources management, project management skills, that it is a real professional area, and it is something to be valued and developed. In product development these are, well surprisingly difficult issues... probably the persons who seek their way to product development, the technical skills is that interesting part, and in the technical universities you focus on that, that there really isn't anything else, in basic courses there might be some work psychology, but the timing is completely wrong, they [students] don't understand the significance. Later on they figure out but it definitely is, the atmosphere is technical. (Senior Manager, Female)

In the actual R & D, those people are probably very much stamped to the R & D and technology environment, so it's difficult to imagine that they would be doing anything else. There are probably not many jumps outside of that area. Well, there are those examples so that someone moves from the SW design side to the SW collaboration or to product management. (Manager, Female)

*Modular teams* consisting mostly of designers and engineers drift more often as whole groups in the organisational changes. "That secretary's work is an individual sport... so it is quite lonely work, and you didn't in a way belong to anything. Now you are clearly in a production group and in a product development group, quite clearly a group, teamwork. So that is the biggest difference." Managers and those in support functions, sometimes project managers, specialists and those in R & D boundary roles, drift especially more often as *individual movers*. Also, the interviewees referred to *global roles* and *local roles*. The individual movers, especially managers, project managers and sometimes specialists, more often have global roles. In a global role the work scope covers more than one location. Those in modular teams would more often have a local role. Naturally the above classifications are generalizations in a blurry environment. For those in modular teams the significance of one's own team is probably more important than to the individual movers, for whom the significance of the wider network is more important. *Figure 39* depicts the average amounts of collaborative

and individual work people do in each job role group. (I have picked the percentage from all people interviewed in set II.) Engineers and some of the specialists do more individual work. Project Managers, other managers and some specialists tend to do more collaborative work.<sup>51</sup>

Currently I work on my own about 20%, maybe less. I am a project manager, so my task is to be constantly in contact with my people. I am quite a lot inclined to a guideline that says that “management equals to communication” and then I need to be on stage, whether it is about sitting in meetings or writing info mails to the whole group or to a smaller bunch. (Project Manager, Male)



**Figure 39.** Job roles mapped on the continuum of individual – collaborative work (based on interview set II data)

The first extract is from an R & D person who had recently taken a radical boundary crossing to R & D. Adopting an engineer’s identity without an engineer’s education seems to be close to impossible. “Well, I don’t have an engineer’s education, so how could I have an engineer’s identity?” The second extract is from an interviewee with an engineering education who claims that the skills she needs in an R & D project manager’s role were not actually acquired in the engineering education.

But I don’t feel like being such a nitpicker type of a person that I could call myself an engineer, so big lines still for me...[I have] too down-to-earth scheme of things still, so there’s definitely a long path to go still, so it requires coding kilometres still, a lot, before you gain a kind of a vision. (Engineer, Female)

51. *The range of the project managers’ collaborative work was 80-90%, senior managers’ 70-80%, managers’ 70%, specialists’ 50-80% and engineers’ 20-50%. The assistants’ split was 50-50%.*

I am not as technical as many engineers are, so the technical solutions, they are not my thing. Organising and so on is more of my thing. So I don't specifically feel I am an engineer. There definitely are also those engineers too, but maybe they are more in the actual coding work, those proper engineers. I am a project manager, but my work is not very technical. The technical background is beneficial, it is good for you, if you understand what is all about, but mostly my work requires anyway, the kind of organising skills, settling down things with people, a capability to see things like what we will need next, what we need to be prepared for and some kind of risk management as well. Well, these kinds of skills, they are not acquired in engineering education. (Project Manager, Female)

*Project managers'* role was perceived as a focal point in the reconfigurable patchwork. The size and type of the projects to be handled varied a great deal. In the R & D context they were mostly product development related projects or some development/improvement projects (e.g. tool, process or mode of operation). The interviewees called project managers of bigger projects program managers. Project managers'/program managers' tasks vary throughout the process phases and the life cycle of a project. In the definition phase there is more individual planning, whereas in the implementation phase it is all about "info sharing", handling the "crises" and "running the roulette". The project managers' themselves perceived their role as predominantly an *information sharing role*. From the project members' perspective the project manager was the one from whom all relevant information concerning the schedules, contents of the project and possible changes came. There were many remarks that a project manager or a program manager can be a real "bottleneck" if he/she does not handle the information sharing task well.

In program management tasks there is this funny side that when you have defined the schedule, so then you start moving according to that schedule and all along you tackle moving tasks, those different cycles and your contacts change all the time. For a couple of months you collaborate extensively. Then you reach the turning point and you transfer to collaborate with a group and at the same time you try to handle all this communication that covers practically everything. (Project Manager, Male)

Now I have kind of activated those buddies who fix the previous release, so with those we keep on a daily continuous discussion contact, on an hourly level approximately... So even the history has been such that the communication is open, so that all knowledge is always available to all project members. That was kind of banged into my head too when I came to this project manager's task that all knowledge needs to be available at all times... So this is kind of my full-day job that I gather information and tell it to others via email and in project meetings, so always, to everybody, all the time. (Project Manager, Male)

The most important information always comes from the program manager, and I have good experience of this one [program] manager who leads meetings that they don't last infinitely and still people get all needed information. And if I call him, he knows immediately what the issue is. In other words, he can keep two million things in his head all the time. He understands from which perspective I look at it and he can answer so that I understand. (Project Manager, Female, Boundary role function)

Project managers liked to describe their work with expressions like “*crisis*”, “*blow*”, “*a monstrous problem*”, “*we wept and spent the weekend at work*”. The time passes quickly when there are sudden, unanticipated issues that need to be taken care of. Project managers even appeared as extrovert people of action who enjoy changes and surprises. Project managers' descriptions are well in line with the crisis situation descriptions of Pascale et al. (2000) and Dyer & Ericksen (2005). Chelani et al. (2002) claimed that in an uncertain, complex and rapidly changing environment detailed planning may be a waste of time or even risky. On the other hand, in Orlikowski's (2002) practices that enhance the navigation on the multiple boundaries were included the aligning of effort. Aligning effort entails use of project management models, planning tools and structured systems development methodologies. In light of these findings the project managers seemed to be the focal crossing point where much of the *balancing of the unanticipated, the “crises” and the systematics of project management practices takes place and cross over*.

I myself, I couldn't keep in my seat in some SW engineer's job, so I wouldn't keep in my office room 90% of my time, so I definitely, kind of, want to be a little on the move. And myself I have drifted into this role probably partly due to this. Then some SW engineer guy, so he will find his way finally, you know, at some point. I did surely start from the SW engineer's stuff, but it didn't suit me anyway, so kind of naturally I strove away from those. Maybe this SW engineering guy really enjoys very much doing his/her own stuff like for example this X, so he has been here for eight years already as a SW engineer and is really motivated with his job and likes it. (Project Manager, Male)

It depends a bit on the phase, when I started this in February-March, at that point I was working quite a lot on my own, kind of was gathering information. But then immediately like after the E1 [milestone], when we started the implementation, that immediately increased my amount of work too. You could say that when the project starts to proceed, I kind of not really do anything, for example today I just happen to have a kind of a crisis ongoing, with different gangs then I keep casting around what we should do next. All kinds of crisis sessions... You could really say that at the moment, the time really... goes completely to running this roulette. So I just try to, these bunches, help them and try to get them together, you know so that they would talk to each other and that sort of thing.

Maybe soon again when this worst crisis is over, we start to plan the next one and that is then a bit more independent work. (Project Manager, Male)

*Specialists'* role was perceived as "the role where the real knowledge lies". "So much depends on them." At best they have profound knowledge of their own area of specialty and they were ultimately expected to be up-to-date about their own area. "Specialists kind of give input, share their knowledge with the managers who steer. Managers steer in the desired direction and they make the decisions. Managers trust the specialists, and lean on them and make use of them." System engineers, system specialists and other specialists could be classified into this category. Based on people's descriptions two types of specialists could be identified: first the *horizontal specialists* with a wider but more superficial knowledge base, and secondly, the *vertical specialists* with a more narrow but more profound knowledge base. The boundary around vertical and horizontal specialists differed in terms of horizontal specialists having wider networks and vertical specialists needing more time to concentrate on their specialty area. "Those who are doing specifying work need to have extensive networks at all levels." The vertical specialist type of people can more often be referred to as being the real "techies" or "nerds". People's conceptions of vertical technical specialists were such that not just anyone could do that "as you need to be both extremely interested in your field as well as highly capable technically." As a consequence, such specialists are also highly appreciated. Horizontal specialists possess more general knowledge whereas vertical specialists are the "real hard-line experts" with "very special competence" that they master "all the way to the very bottom."

Quite few remain their whole career in one narrow technical sub-area, but that needs to be respected too, and then they stick to the same, so there are those who have stayed in the same and who have truly internalized that one sub-area of a system, of course the environment changes and the network changes, so you cannot really say that it is the same job but the line [of job], let's say so. (Senior Manager, Female)

An expert has got a thoroughgoing competence of his/her own expertise area, it may be technical or something else like, for example, communications. So specialists, there can be two different types, kind of, so it can be very special competence or then it can be more of possessing general knowledge. So the first are real hard line experts, so they are more on the nerd side. Then the kind of general specialist, so there definitely is a big difference... so those who have the limited tough competence, so they don't perhaps value those who have a more extensive, or maybe in some way they do, but anyway, they think that this person doesn't understand this through and through and anyway that's the way it should be. Both kinds of people are needed. If you are profound there, so your way of thinking is different and it needs to be different, so you need to concentrate. (Specialist, Female)

In knowledge work the borderline between specialist and managerial work has been and continues blurry. Specialists are attached to the integral side of the R & D environment (see *Figure 21* in this study) whereas managers can be attached to the structural side, too, and can be more affected by the changes on the structural side (organisational changes). The work load of many specialists needs to be constantly balanced up so that it doesn't get excessive. This was also one finding of Mäkinen (2006) from the same organisation. There is a constant battle to keep the workload reasonable in terms of not including too many managerial tasks in specialists' workload or in some cases preventing other people from consulting them too much. The fact that there are their own "career paths" and training for specialists was appreciated but there was also concern about the reward side. There were a couple of remarks of people being too easily nominated as specialists, e.g. the appellation being "a reward for hard work." One interviewee stated that promotions were easier to get on a managerial path than on a technical specialist path.

*Managers'* role appeared as a channelling knot in the reconfigurable patchwork and a *protector of the specialists in his/her organisation*. Among the interviewees there were many different types of managers or people who had been in different kinds of managerial roles during their careers: with staff, without staff, team leaders, competence managers, line managers, project managers, combined roles of project and line manager, department managers, competence area managers, R & D managers and senior managers. As a generalization there are managers who manage organisations (content and people), pure line managers (handling mostly people issues and line management issues like competence development) and project managers (usually with no people management responsibilities).<sup>52</sup> As their special skills managers named *people management skills* (e.g. recruitment and resourcing), *decision-making*, *strategic thinking* and *long-term planning*. Managers were also to guarantee peaceful working for their people so that they could concentrate on the essential, i.e. product development related tasks. "I can deal well with the introvert engineers." Further, they prioritize work, distribute and channel work, communicate and share and filter information. "It is via the manager and the department manager that generally the most important [knowledge] is coming, so they filter it." The allocation of work in a volatile and boundaryless environment is not a straightforward task. Not only can managers recruit people for certain positions in their team, they also need to take into account the constantly changing environment and the means provided by discretionary division of labour and job roles. Managers were seen equally as learners as anyone else. They consult colleagues, subordinates and superiors to keep track of what is going on and in order to be able to fulfil their channelling task in the patchwork. (Reardon's (2004) findings are somewhat in contradiction with my findings; in his data there was

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52. *In some cases a specialist who needs to meet recurrently with customers or external company representatives is given a manager's title because in some other organisational cultures the discussions between companies take place between managers.*

practically no learning up or down vertically; learning was almost all peer-to-peer.) Their visibility is more extensive than that of specialists, their tentacles stretch farther; they can also help their people in seeking relevant contacts. “This is only getting the others do, to network and build, and to create premises.” “I have always been of the opinion that a manager’s task has been that the subordinate can do his/her work as well as possible, whether it was the line manager or project manager, but that is the most important task.”

Currently my role is that of a leader, in other words I navigate my group in the right direction, so that they do the right things....Then another part, which is very important, is to enable my subordinates to work, the kind of productive work. In other words to take care of the bureaucracy and filter the bureaucracy, so that they don’t need to do that bureaucracy and see to it that they have the daily chances to do that work and to solve their problems and that kind of thing. (Manager, Male)

And everybody knows that the manager allocates the tasks, and arbitrates them and he/she is there close to you... In some places there is quite a lot of the kind of thing that people are put in a pecking order but not here. It is not so that the managers would be somewhere higher up so that you couldn’t talk with them just about anything. In quite many companies there is a big gap there, but here you don’t have it. (Engineer, Male)

Contrary to the previous quote, several interviewees, both managers and subordinates, reported that their immediate line manager had no idea of what their subordinates are doing and cannot thus give them direct product or technology related guidance. “And the manager trusted us completely even if he didn’t know what we were doing. I felt that, like last year, so there was a big chance to have an influence over what one is doing.” The challenge for the managers was indeed to assume their role as a manager and leader in situations where the detailed technical knowledge of their people exceeded their own knowledge. This is about the the changing nature of the *authority boundary* brought forward by Hirschhorn & Gilmore (2002). The informants emphasised the importance of “*authority over content*”. Content authority is possessed by the one/those knowledgeable of the integral part of the system (technologies, projects, products). The importance of content authority was emphasised in relation to line management type of authority. (One of the senior managers interviewed proposed that after a period of ten or twenty years the managers might be already so alienated from the latest technologies that the organisation would prefer to replace them with younger ones whose technology knowledge was fresher.) As a consequence people need to learn *self-organising* and *prioritization skills*. This probably happens more often with senior people and more often with the individual movers than in modular teams (though there were indications that it happens in both). In any case, *trust is an essential element in this kind of environment of self-organising* that goes far beyond concepts like delegating or empowerment.

My group manager does not read my project reports and he probably never had, you know, a proper understanding of what I am really doing... On the other hand, if he doesn't understand your stuff, even that much that he could at least say something intelligent to your questions, so that kind of thing is not very good. Then again it has taught me a kind of self-direction. I just tell him that we are now doing like this... In my opinion this self-direction is a very good thing because I don't like very much being bossed around. And on the other hand, when you have gotten to manage yourself, so then you have also learnt to prioritize. I don't still know how to do that perfectly and still I use much time in that in vain... In my opinion it is important that people get to prioritize by themselves; that way they are much more productive. (Project Manager, Male)

For me it [project management] is a way to be knowledgeable about what is happening in Nokia and outside the company. I don't want to, which would anyway be possible, become a line manager, so that others would do the project work. In this kind of expert organisation you lose your credibility pretty quickly, in two or three years you lose your credibility if you don't do anything. Well, you could take the line management tasks, but you wouldn't have any authority over the content. Here [in project management function] you can really affect things, when you contribute to something real. (Senior Manager, Male)

When you go and talk with some real technical expert, so half of the stuff is beyond me, what he/she says, but there is one thing, at least I have experienced it, is that when you say "sorry, I am just a manager, I don't understand a word you're saying. Could you make it real easy and simple?" They definitely make it easy and simple. So I have never experienced that someone would have said that "don't you understand anything about that?" (Manager, Female)

They do their work very independently, and they do not always even report to me, but to the project they are working for. Especially now when I came to this new position, I came like from outside, so I don't have this, X is their main product, I don't even have detailed knowledge of what it has eaten, and then you must trust your subordinates; they have the knowledge... Maybe it is good for them too that I don't know, they cannot hide behind [me] the boss and hope that I answer, but I don't answer!, because probably I cannot. (Manager, Male)

In some cases a manager's role also appeared as the *sounding board for people's development and career considerations*. All research participants stated that the ideas concerning their possible active job role transitions emerged from their own thinking. However, there were several mentions of managers who had been excellent coaches or sounding boards when the person was reflecting on his/her development and possible next steps. Some managers had been involved in supporting their people in radical career transitions by providing learning opportunities and new job roles in the team. There

were also managers who had been actively helping their people to find a new position outside the team if the person was looking for the next step. “A good manager does not try to keep you by force but discusses with you about your true motivations, mentions outside contacts to help you forward, well, and gives all kinds of hints and tips.” Based on the official company concept, career self-reliance, a person him/herself is responsible for his/her career. This policy also seems to be the reality in the case organisation. However, discussions with one’s manager can help in achieving a realistic self-image, i.e. not building up too low or too high expectations. Career and development topics are discussed and negotiated between a manager and his/her subordinate in the IIP (Investing in People) and PDP (Personal Development Plan) discussions. Again, sometimes there is a need to put the “Nokia hat” on when a critical person from a team is planning to leave.

Then again those organisational changes, when they are guided from outside, so they were really tough, you feel like being quite powerless here in a big stream, but the thing that with your closest manager, you still kept those, that you have those development discussions and they are held, so they are always held twice a year. You’ve got the IIP and you have a right to discuss with your manager. (Specialist, Female)

There have definitely been situations when I would have liked to keep someone, a key person in my team, but in those cases you must put the Nokia hat on and really think where each and every person can best contribute looking from the perspective of the whole system. (Senior Manager, Male)

*Designers and engineers* who often are in the modular teams<sup>53</sup> were perceived as the ones doing the implementation work e.g. writing the SW code or testing SW. In many cases the boundary between implementation and design or specification is blurry. “The basic coders, maybe they are often the kind of, that they have very strongly their own identity, that they are the kind of basic engineers. [They] emphasise expressly hard technical expertise. They have a very strong identity that they are the engineers, the nerds and technical people.” One manager contemplated that the appreciation of “real work” is not high enough as the “best SW people are striving for managerial positions “even if their value added would possibly be at its best in the implementation area.” People who do not want to focus on network building find themselves in their comfort zone in the implementation tasks. There were a couple of mentions that designers and engineers might not have as good a visibility to the overall organisation

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53. *A person can basically use the title “engineer” after having attained a related qualification or degree. In Finland engineers graduate from technical colleges or polytechnics. In Finland, engineering is defined in terms of education and formal degrees (Tulkki, 1999). Engineers with a university degree (Masters of Science in Technology) graduate from technical universities or even universities (Masters of Science). However, within the company all these people (and those without a formal qualification) get the title engineer or designer if they start in design or engineering jobs. In reality the spectrum of titles varies a great deal. There are design engineers, designers, engineers and test engineers.*

as have managers and some specialists. “On a certain level the perspective and the visibility changes. For a designer, management is a remote and abstract thing.” The way engineers and designers were seen was somewhat stereotypical; shy and security seeking people. “When we talk about designers, they are surprisingly security-seeking people.” From an individual engineer’s perspective, if the modular team happens to be often affected by changes, a great deal of flexibility and learning might be needed. It is possible that modular teams provide a tool for those who opt to rescue to the “capitulation” strategy introduced by Casey (1995, p. 191). Modular teams could possibly be a better place for those needing private psychic settlements within corporations that Casey is referring to.

Well, I guess it is split in two. There are those seniors or people in specialist positions who have their own network that has been created over time and they of course need it in order to be able to do their work, then there is also that fraternity who do not have that network. So that the network only consists of one’s own project and own team and the contacts towards the outside are very few... Often those R & D fellows, they are basic engineers and they haven’t developed any social skills. They can definitely handle C++ in any possible way or some Java coding. It is perhaps in some way also a selection based on character, so that if you want it, because not everybody wants the kind of very wide social network at least in the workplace. You cannot force anybody to build a network, but maybe it can be facilitated. (Specialist, Female)

But then the rest of the team!; in the beginning I was totally fed up with them. Well, they were shy engineers; they were just watching me like “this must be eating me alive”. But then when you got into deeper cooperation with them, so I still remember it after five years that it has been the best team I have been in, because they were just fantastic. (Project Manager, Male, Boundary role function)

Well, now when there have been so many of these changes so it doesn’t jerk you in any direction so in that sense it is ok, like I have now been in this task for a half a year... of course it is always laborious to learn new things...when you always need to orient yourself to a certain small sector, a small piece in such a big project. (Engineer, Female)

Finally there were those who were working *on the boundary of R & D*. At least three types of *R & D boundary roles* were identified from the interview data: *technical competence development* people, *technical documentation* people and *product competence transfer* people.<sup>54</sup> In some cases they are understood to be part of R & D, but often they

54. *Delimiting the R & D boundary roles into these is also a matter of research economy. In reality there are probably more R & D boundary roles or functions. Within R & D, for example, product marketing or customer service could be examples of these. In addition, within the following functions, at least some roles might be close to R & D boundary roles: communications, finance & control, IPR (Intellectual Property Rights), Legal and Quality & Process Development.*

also form a function of their own. Their basic task is to “*translate*” R & D knowledge or information to another format. These roles are thus translation and intermediate roles. Also, at least in Finland, many people in these roles do not have an engineering education. “There are many R & D support functions for which there is not really any basic education.” In Finland technical writers are in general humanists, whereas in Sweden it is expected that a technical writer is an engineer by education or at least has studied some technology. In Central Europe it is the same, and there a technical writer is predominantly an engineer, who for some reason knows English. Here it is the other way around, which definitely causes quite a lot of problems.” The technical competence development personnel’s main task is to translate technical innovations into learner-friendly learning solutions. The technical writers’ task is to translate technical information into understandable and reader-friendly format for users. Those working in these functions interpreted their role as a translator of technical information into some other format or language. Boundary role holders can bring a *different perspective* to the discussion in collaborative situations. “Engineers, when they discuss with each other, it’s very technical.” Adding another perspective is not straight-forward, it demands courage and a great deal of background knowledge. The nature of the boundary role also requires *adaptation* skills. “I am kind of quite good at inquiring from people how you should act with this function and to snoop from others how it would be best to act and then I adapt it.” Quite many of these people during their studies had already had an unusual subject combination and possibly a feeling of being different. One person stated that she had already studied two quite different subjects: foreign languages and automatic data processing. Another had studied marketing and foreign languages and claimed that she had already been deemed a “freak” in her student days. Others had studied languages, education, psychology, marketing, and economics. Being “different” might allow people in these roles to ask “stupid questions” and that might actually be even expected.

Well, then you realize the difference that they are trainers and they know about different things, when you’re on the technical side yourself, they don’t necessarily understand so much about the technical... They then know how the applications work... Nobody looks at your education. It indeed is what you can really do. (Engineer, Male)

Yes, it just is so clearly that you cannot master everything. Or I just have learnt to accept it, so I just say that “sorry, humanist, don’t understand”. And that way, because I haven’t really seen a dismissive attitude ever, so of course you might yourself feel annoyed that you’re slower to assimilate some product things. So for me it is not enough that someone says that “well this is like, this kind of appliance, and there is this and this interface and it works with this form”. Then I say that “yes, but what does it do?” So you need to look at things from a slightly different perspective. I don’t know, I feel that, maybe I am naïve, but I feel that it is also regarded as a richness, at least when it doesn’t disturb work, because usually

I can bring my own perspective into it, usually the user's perspective. Anyway, when my background is in documentation, I have adopted the end user's perspective, what knowledge the end user needs, because they might not necessarily be interested in some small gizmo in it, but expressly want to know why it is used. (Project Manager, Female)

The viewpoint on things is different from the engineers and with that you can sometimes bring into the conversation something that they haven't thought about... for example, when we think of the kind of, things like in sauna evenings or at coffee tables you think of how the networks sell, so an engineer thinks of all those new features and how they sell. Whereas I investigate geopolitical questions...And then they are like, "well, I didn't get to think of this". So, you know, the viewpoint is different. (Project Manager, Male, Boundary role function)

R & D people on the one hand did not mention any special difficulties in working with the technical writing people. They appreciated it if the technical writer had been around long enough to understand about the product; it meant less effort from them in guiding the writer as well as getting the documentation ready faster. On the other hand, people in these functions described at length their relationship with R & D people, whom they called subject matter experts (SME). They were constantly competing to get time slots from the subject matter experts to consult them and to review the learning solutions, competence transfer material or documentation they had produced. One interviewee who had worked in both functions could easily take the perspective of both roles (see the second quote).

I don't know if [having representatives of different professions] has any advantages or disadvantages. I would say that an individual is an individual whether he/she is an engineer or a master of arts or whatever. There isn't necessarily that kind of lateral thinking there even if we came from different educational backgrounds. (Project Manager, Male)

They all are very prejudiced towards the other functions. For example, technical documentation people and software design people, they are both scared of each other (laughter) until they realise that they both need each other. They both feel horror before they notice that they don't even know each other's job descriptions. There you can find this kind of silly thing that both create walls in between...but if both take a few steps towards each other, they realise that not everybody needs to be a technical expert. What one should understand is "why", and "on what conditions we are acting". (Senior Manager, Female)

According to the interviewees, the positioning of these functions was practically shifting between being a function of their own or as a part of product development teams. "CoDe [competence development] is a kind of vagrant." One could easily conclude that the drifting and shifting between various different organisational setups, being

structurally coupled in different ways, would bring advantage to these functions in terms of learning from various perspectives. An earlier cited interviewee working in the technical writing function described the setup where they were split to the product development teams as the “diaspora”. However, one can easily argue that even that period taught the technical writers a great deal about the products and product development processes that they could utilize later in their work. In some cases someone in a boundary role had had a colleague with whom they had worked as a workplace pairing or a duo; these close partnerships can be considered one way of transcending the boundaries and making them more permeable.

Well, in my opinion on the product side anyway, even though people have changed and change all the time, there is all the time the kind of, kind of coherent feeling, so that people anyway work kind of in a smaller bunch and work more tightly together. But in the documentation, well maybe when you get these system aspects so then, then you suddenly get that you should have these tentacles so immensely extensive, so that you must at least remotely know a very big, big bunch of contacts, and I think that in marketing or there on the product management side there is the same kind of situation in the sense that you should know very extensively and they are maybe a little bit more detached and they are drifting along and in the midst of those tighter bunches. (Engineer, Female)

It is actually a funny thing that the Technical Competence Development function is continuously floating between the product development and human resources functions. People debate on whether the product is more important or the type of the learning solution... when the focus should be on building the bridge. I find it a mystery why the organisational location of the function should be so important. (Senior Manager, Female)

*The challenge for those in R & D boundary roles* is firstly to gain appreciation as a “profession” or a proper R & D function and building up the self-esteem around their function. “That is, well, let’s just say it, only writing.” For example, technical writing or documentation is a combination of language and technical skills. The interviewee below emphasises that a technical writer needs to master both and have an interest in both. The managers in R & D also admitted that their knowledge of the technical side is limited. They did not, however, question their “dignity” and “self esteem” as a consequence of this. This may be due to the fact that they are anyway “located” on the R & D core side. Pringley & Williams (2005) in their academic article, for example, ask if “technical communication has arrived as a profession?”.

You need to be ready to be, kind of, humble, to make a fool of yourself every now and then, ask those stupid humanist questions of those engineers, then you still need to have your own professional identity that grows there aside and to be able to keep your dignity and self-confidence, that you know that you are doing valuable work. And then you kind

of need to be a professional of both the language and the technology, a kind of a perversion in a way, that you like it and you can kind of, when you cannot of course understand as deeply as the engineers. With many, the stumbling block is the latter one, so that even if you were formally able to do documentation in English, so they still aren't interested in the technical side a bit and there it then collapses. Either the documentation is complete balls and they don't want to go into the content and they don't understand what they are writing and then they become the kind of technical editors who edit engineers' specs and in my opinion, one simply cannot create professional pride that way. An essential part is missing and you feel like being in a wrong position. The self-confidence kind of runs out, sort of. One mustn't imagine that anyone could do it. It just is so overwhelming, all this. (Manager, Female, Boundary role)

One big challenge for people in these R & D boundary roles is to increasingly understand of the R & D content to be able to work independently and on an equal footing with the "subject matter engineers". The challenge is to strive to cross the boundary towards the R & D core field in terms of truly understanding the product. The very same challenge is there for other non R & D people like assistants. The assistants interviewed gathered that it is difficult to help unless one knows something about the area one's department is dealing with. Within these functions the relationships described for understanding R & D core were quite varied. Firstly, most people in these roles claimed that there had not been anything remarkable in the cooperation; they had accepted their role as interpreter and translator. Secondly, some of these people had developed an extensive knowledge and career within the boundary roles close to R & D. They were the humanists among engineers and they described themselves as unique. Thirdly, for some striving to understand the R & D core reaches the point of the radical boundary crossing towards a new role in R & D core. The insights that these people gradually gain into R & D are very rewarding. There were comments like "I guess there has always been a small engineer living in me". Fourthly, some had come to the a conclusion of not ever being able to fully reach the R & D core and clearly want to continue outside of "core" R & D field.

In the beginning it was damned difficult to understand what these people were talking about and still today, so yes I would like to have better competencies on our technologies. Yes, it has basically been all the time in my development plan that I should go to those courses but I haven't at the end of the day... Not in the sense that, well, many have thought that I am an engineer, especially there outside [the company], they think that I am an engineer. (Manager, Female, Boundary role)

I would say that I am a language person who understands about documentation, product support and language support for SW, and I can in a way see how all these areas are inter-linked and how all the areas have synergies with each other, so I don't really have any generic

engineer's identity but in a way my own identity that I have created for myself through my career and my competencies. I bet that in this company I have a unique identity and that you cannot find anyone like me. (Project Manager, Male)

I immediately felt it was my thing or I kind of remember how dreadfully enthusiastic I was about it when I came to work, namely about the technology, and I really read heaps of handbooks at home, all sorts of materials, and everything I could find. You know the hunger for learning was almost impossible. I was just, kind of, about the technology. So I wasn't that much into the technical writing, because we don't even have schools for that in Finland. So I hadn't studied that in any way. In only have this background in English that, I guess, most of us have here, no other related studies. So if you then think back so I guess there have been a great many coincidences and luck too, so that in the very beginning when the tasks were distributed, so I got the network management and I remember when XX [a manager] was pondering that "this is kind of a challenging area, so that you know then!". And I was only that "yes, just give it to me!" and it did feel real good. And now when you think, so it has been an area that has been there all the time and it has been about the core business. (Engineer, Female, previously in a boundary role)

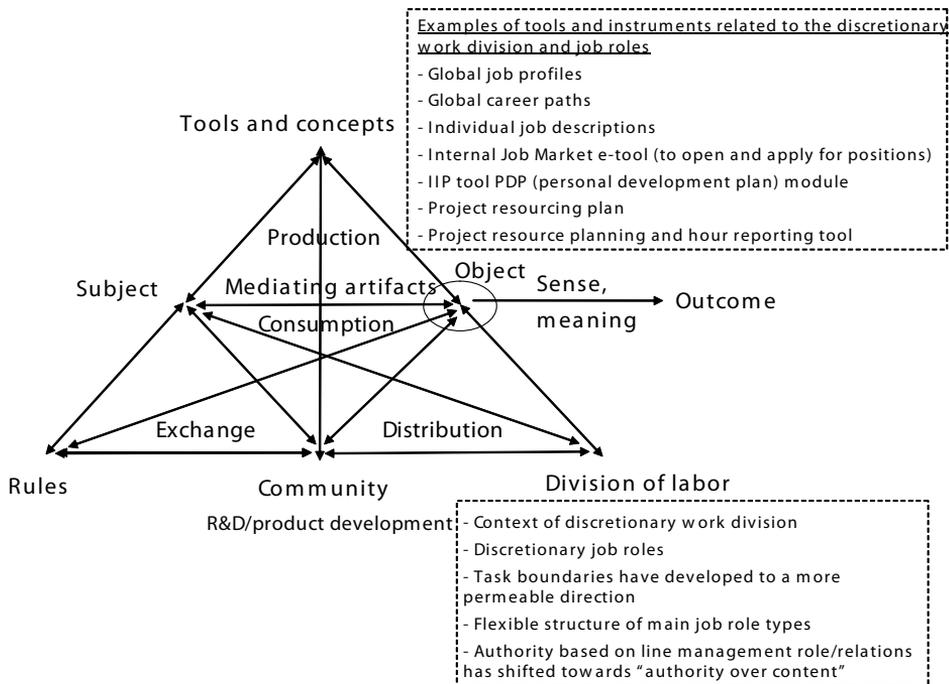
Especially when you don't have the technical touch, it's really laborious... Well, yes some technical barriers have been kind of huge victories when you have, kind of, suddenly grasped what it is all about, so those have been the kind of borderlines that it has been great to notice that you can comprehend and understand the kind of things that "real engineers" cannot. Comprehension, that has kind of been like that... so that I have found in a spec [specification], system operation, testing or somewhere some deficiencies; in testing we for example found bugs and well, in a way, I can kind of drag out that technical bug from the product... This is like, all the time surpassing your own level, especially when you don't have basic education, yes, it demands courage, it does, so in some way I am proud of myself when you think of the starting point so here is the secretary specifying global apex products, so it is true that it's a kind of crazy vision (laughter) ... Sometimes in meetings I have been thinking, when from my mouth there are things coming out that I couldn't have imagined, say five years ago, you kind of stop to listen your own speech and your own behaviour that "what is going on here? Am I in this kind of a situation?" So it is a funny kind of discovery every now and then that you are treated like..., anyway like a technical specialist... There is the kind of scales effect here, the things that have been the most rewarding have also been the most troublesome, I would say that these technical things are the cornerstones that come across. How you internalize them... but when you do, it is very rewarding... it is in fact the technical comprehension that is a great thing and it is rewarding. (Engineer, Female)

I never got to the technology, I never got as deep as I would have liked to. That was by the way quite a strain here when you should have gotten in a way so deep into the products

and to that technology, in which you didn't have any education and then you tried to study those things in English and still when you didn't have any scheme in your head so it was very hard. (Specialist, Female, Boundary role)

#### 8.4.5 SUMMARY AND INTERIM DISCUSSION

In *Section 8.4* I dealt with division of labour and more specifically with job roles from the boundary perspective. The section was divided into four sub-sections. The first described the *context of discretionary division of labour*, the second one dealt with the *discretionary job roles* and the third highlighted the *threats and advantages of discretionary division of labour*. The fourth sub-section shed light on *a reconfigurable structure of main job role types* in the case company. *Figure 40* gathers the findings of this section related to the division of labour (distribution sub-process in the activity theoretical framework) and the tools and instruments related to the work division and job roles.



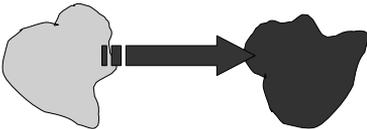
**Figure 40.** Findings related to the division of labour in the activity theoretical model

First I will summarize the *context of discretionary division of labour*. The job role structure in the case organisation appeared as a dynamic, reconfigurable patchwork. The boundaries of people's job roles and responsibilities are collaboratively constructed in the dynamic reconfigurable patchwork of job roles. Gaps are filled in and overlaps removed by negotiation. There is a continuous definition work to negotiate one's own positioning and its relation to other positions in the patchwork. The organisation or a team from which a person is working on a certain task varies dynamically. Task division within a project or a team can change according to the situation. Temporary or ad hoc help can be obtained from other teams or organisations for rush periods. The way people stand in and cover for others is flexible and enhances the breaking of job role boundaries. In some cases a person doing a job can be changed if deemed unfit to fulfil the requirements of his/her job role. This can be done "gracefully" during organisational changes. From the organisational perspective, the large size of the company allows the movement of people between businesses and organisational entities based on where competencies and resources are most needed. Partnering and external temporary labour (numerical flexibility) also bring flexibility to the system. Overall it seems that *the task boundary (who does what?)* (cf. Hirschhorn & Gilmore, 1992) *has developed to a more permeable direction*.

Secondly, I will sum up the results related to the *discretionary job roles*. The *contents of people's job roles* are discretionary, i.e. the boundary around job roles may be relatively blurry. The boundary around job roles forms flexibly according to the requirements and expectations (global job profile, grade and individual job description), but also according to the situation, context, task at hand, other people around, the interests of an individual as well as his/her style, competencies and skills. Discretionary division of labour would not be possible without the discretionary job roles and individuals who are ready to flex. How and why there are changes within the content of one job role varies. People can take additional tasks horizontally or vertically to cover for someone else, to even out a burden of someone else or some other team or for learning or motivational reasons. People can do two jobs in parallel in some interim phase or they can be allocated to several projects at a time. Some might do "voluntary work" to help out with work that nobody is doing. There may be "jacks-of-all-trades" with "more free job descriptions" to appear when and where needed. These were some manifestations of discretionary job roles within the *content of one job*. As a consequence of flexible contents of job roles the official job profiles and titles do not always reflect the reality; it is indeed difficult to keep pace with the changing and drifting discretionary job roles. In addition to the changing contents of one job role, the *job role changes* are also recurrent. The prevailing culture in the case organisation manifested itself for example in common stories like "it is good to stay in one job for two years". The culture supports discretionary division of labour and job role transitions. Organisational changes were considered the points that caused most of transitions in job roles. As a consequence of an organisational change people can be asked to move

to a new position, told what their new position is, they can apply for a new position, continue in the same job role or apply for a position in a completely different part of the organisation. In between the organisational changes new gaps are identified, new projects are set up, and positions open up accordingly.

There are two perspectives to *how people move within the reconfigurable structure of job roles*. The first one features an *active element*. People shape their own job on the basis of their style, interest, competencies and skills and they start to gravitate to certain types of jobs. Four dichotomies related to how people make up their jobs and enhance their gravitation in the desired direction stuck out from the data: *active-passive*, *risk-security*, *hectic-steady* and *mature technology-novel technology*. The first is related to people’s behaviour and the last three to what kind of work and environment they are looking for. In a volatile environment the active viewpoint is not enough to describe how people move within the reconfigurable patchwork. The second element is more *passive* from the individuals’ perspective. This view manifests itself as “*drift theory*” or filling in jobs based on “*availability*”. In some cases people who are available drift to new emerging job roles. From a systemic perspective it is about self-organising to fill in gaps and reduce overlaps in the reconfigurable patchwork. It seems actually that the *boundary between the changes in the content of one job role and an actual job role change is blurry*. “During the sabbatical, I once tried to make a list [of titles] in a linear mode, and then I tried with jobs, but I got at least twenty; ten might be enough but they overlap a little.” *Figure 41* highlights the difference between the change in nature within one job role, a proper change in a job role and the blurry boundary between them.

Type of the job role moves	Description
	Changing nature of one job role
	Blurry boundary between the change in one job role and a switch from one job role to another
	Switch from one job role to another

**Figure 41.** Blurry boundaries between the change in one job role and a switch from one job role to another

The third summary concerns the *advantages and threats of the discretionary division of labour*. *Freedom* was considered a clearly positive aspect of the organisation. One can have an influence on how to do the work and when. The counterpart to freedom is *responsibility* that may at times be overwhelming. The option to *shape one's job*, to *try out different kinds of jobs*, *development and learning opportunities* were counted as advantages. On the other hand, *uncontrolled level of job role transfers* was not considered good. If people do not stay long enough in one place, they might lose the feeling of responsibility and achievement related to the results. The weaknesses that people had experienced were related to *the lack of time*, *too loose supporting networks*, *fear of not gaining proper expertise*, *excessive learning requirements*, *fragmentation of job roles*, *multitasking* and *recurrent job role changes*. Ultimately these can undermine the engagement, commitment and endurance in the long term. From a systemic perspective there were a few elements that caused the *workload to be distributed unevenly* in the reconfigurable patchwork. Uneven distribution of work is related to the discretionary division of labour. In volatile environments featuring high mobility, this kind of phenomena might possibly surface more rapidly than in more stable environments. The *bottlenecks in terms of workload* (and possibly learning requirements) can surface for example in *projects dealing with new products or technologies* or in some *urgent customer projects*. Equally workload may condense in areas from which people for some reason or other flee elsewhere (e.g. due to business situation or poor managerial work). Individual people with more knowledge can also grow to become bottlenecks of knowledge. In volatile environments their high workload might more easily remain unnoticed by the environment (due to e.g. virtual interaction or recurrent changes of their solid line managers).

Fourth, I will summarize the results related to the *reconfigurable structure of main job role types*. Given how people described their job roles and those of others, there seemed to be a certain type of job role structure on a high level. These different types of main job roles form a basic structure of jobs in the volatile environment. The job roles of *managers*, *project managers*, *horizontal specialists* and those in *R & D boundary roles* are *more unbounded*. People in these roles need to reach out more outside their own patch and to network with others. *Vertical specialists* and especially *designers/engineers* have *more bounded* job roles. They can concentrate more on a narrower field of competence. *A combination of more unbounded and bounded job roles forms a reconfigurable structure of jobs to a volatile environment. This structure enables both vertical and horizontal knowledge building, thus contributing to the viability of the whole system.* Table 11 summarised the main job role types and their main features from the boundary perspective.

Main Job Role Type	Description
Managers	More unbounded job roles Need to reach out more outside from their own patch and network with others.
Project Managers	
Horizontal Specialists	
R&D Boundary Roles	
Vertical Specialists	More bounded job roles Can concentrate more on a narrower slice of content.
Designers/Engineers	

**Table 11.** Main job role types in the reconfigurable structure of job roles

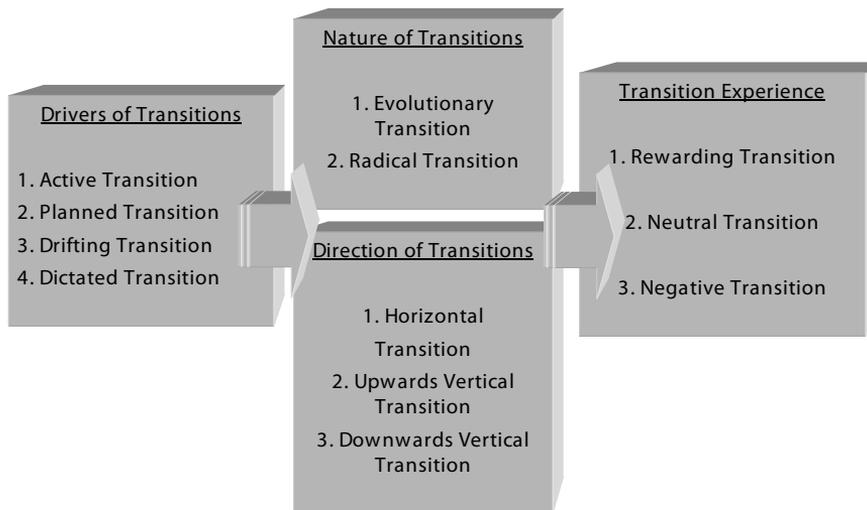
One interesting finding was related to the *authority boundary (who is in charge of what?)* (cf. Hirschhorn & Gilmore, 1992). The informants emphasised the importance of “*authority over content*”. Content authority is possessed by the one/those knowledgeable of the integral part of the system (technologies, projects, products). The importance of content authority was emphasised in relation to line management type of authority. The results indicate that *authority based on line management role/relations is shifting towards authority over content.*

In this section the boundary dynamics under spotlight were related to job roles and the job role structure. I brought forward the context of discretionary division of labour, discretionary job roles, the advantages and threats of discretionary division of labour and the reconfigurable structure of main job role types. Next I will move on to careers and career boundary crossings.

## 8.5 BOUNDARYLESS CAREERS?

In the previous section I examined the division of labour and the job roles in the case company. Job roles and careers are interrelated. A job is a certain momentary view of one person’s job role at a certain point in time, whereas the chain of jobs is what forms one’s career (horizontal view). A career includes various consecutive job roles and transitions, i.e. boundary crossings between them. The previous section revealed a highly volatile environment where the nature of work is such that people are often in transition between job roles. This section will focus on these transitions, i.e. career boundary crossings. I will investigate these transitions from four perspectives: the *driver of the transitions*, the *direction in the organisational structure*, the *nature of transition with regard to learning* and the *transition experience*. Figure 42 describes the structure of this section. The main point is to examine how the boundaries and boundary crossings appeared overall. There are some exemplary extracts about career boundary crossing

histories from some interviewees though not complete career trajectories. All in all, the perceived importance of organisational changes as the driver of transitions was very high, as already noted for discretionary work design and job roles. They are the points where it is easy to “look around” as well as drift into a new job or to impose a new job role on someone. I have mostly used the data from interview sets II and IV for this section.



**Figure 42.** Parameters describing job role and career transitions

## 8.5.1 DRIVERS OF CAREER BOUNDARY CROSSINGS

### 1. Active transitions

Overall the environment seemed to be such that it encourages people to think of what they want and boundary crossings are possible to those who are so inclined. An *encouraging climate is the most important pre-requisite for any boundary crossing*, especially the active transitions. “I think that the atmosphere all in all just is kind of encouraging”. “At least I feel that you do not, at least not very easily, pigeonhole people, whether it was the head of the department or a coder or anyone, I think that there is a kind of egalitarianism. This definitely supports learning, when the chances definitely are offered, whoever wants to.” Those who actively sought to change jobs were either pushed or pulled into a new job. The most important pull factor was learning or looking for some variation. There were many who mentioned that they started to consider leaving immediately they felt that “they could no longer contribute in any new way to the position.” “When I have learned everything and when it starts to be routines, well then my feet start itching.” “I have tried to avoid start doing something that I

already know.” People had also changed jobs for reasons of trying them out. “Then I popped in for one year, I was in Y [product line] as a quality engineer.” Other pull factors were variety, interesting opportunity, expanding one’s competencies and career advancement. The most often mentioned push factors were: too heavy workload, no buy-in for the project, dissatisfaction with the manager or too long a period in one place. (It is clear that at bigger locations there are more job opportunities for active transitions than at smaller locations.)

When I came to Nokia, at that point I didn’t have any plan or even a thought about going to study anything, so maybe the environment had an influence, when you got a chance to do everything you wanted. I wanted new challenges, more salary, more interesting stuff, so it occurred to me when my forties were approaching. When I went to the technical university, I thought that it would be difficult but when it went so well and was so easy, so I thought that why wouldn’t I, at the same go, get a [master’s] degree. (Specialist, Female)

I think that it is the availability of opportunities and the openness, so that the opportunities are offered, so that had led to this, when you think of these ten years, I have found my own field when I have had a chance to be part of these organisational changes and one has been able to think of and influence on what work one has done and what wants to do. So it definitely is very liberal and trusting here, kind of, people trust that a human being can step over one’s own historical boundaries, there is this kind of courage to trust, that a person can do something totally new. You know, I think that this is Nokia’s strength, so that it is, kind of, a forerunner in this kind of thing. In my previous place of employment, it was stiff and they were focusing on the 20 year-old certificate. Somehow the atmosphere just is like that here. Of course our managers don’t as such have any kind of education for this, kind of, but the recruitment has gone, hm, is unprejudiced and creative, style a health nurse can become a comms [communications] specialist. (Manager, Female)

The organisational attitude towards career transitions was described mostly to be positive on both the sending and receiving end. The knowledge from different areas and previous experiences of those transferring were appreciated. “When I moved to this new business to a completely new area my experience was that the new community welcomed me and supported me really well and my knowledge was appreciated.” Even young newcomers were asked about the latest taught at university and especially their potentially fresh view of the new context and ways of working. People reported that they had been asked if there was anything to improve or change, things that those who had been longer around had become blind to. In some cases it had been the manager who had told his/her team, as a generic “rule”, that after a certain period (in the latter extract below two years) it was the time to switch jobs. In some other cases, the employee had taken up the issue with the manager. “To be a good manager you can tell about your plans, of course you need to be good yourself and do your work well,

otherwise you don't have the nerve." In cases of active transitions the self-examination mostly takes place before the transition. "Of course it was a risk to change jobs and even the business group, here I would have had a familiar environment and not so much to learn, but in my case I had been thinking of it for a quite long time." Mostly those who had not initiated active transitions themselves but had rather drifted in the reconfigurable patchwork, felt that even more focus could be put on encouraging people to change jobs. A few of the interviewees mentioned that there should be more "job rotation". In this connection one might ask for what reason, as it did not clearly emerge from the data; maybe they did not have enough courage or maybe they were expecting their managers to be more active in this sense.

When someone has obvious pressure to leave, to move forward and the final countdown has started, everybody takes it really well, of course the manager tries to do everything he/she can to keep you there... but if it seems obvious that the person is leaving anyway, then usually they are let go and wished good luck. (Project Manager, Male)

Our group manager told us that he would like us to be in this job for about two years. Then it would be a good time to move forward, so that you can renew and progress and keep virile. If you want to stay, so he wouldn't stop us, and let's try to look for something new as a part of this job, but that he definitely recommends that you leave when the two years are up... In my opinion, well, I have now been for almost two and a half years, and I could have done this a little longer, but now it just was a natural time to leave. (Project Manager, Male)

## **2. Planned transitions**

There were several cases where a proper development plan was put in place to support a boundary crossing to come. The transition was therefore in a sense planned after the employee and manager had come to the conclusion that this kind of boundary crossing would take place at some point. In these cases it was also often the person him/herself who had come to the conclusion that a change of career was needed (but not in all cases). In other words, it is often the person who makes the initial decision that he/she wants something new and after that the manager also becomes involved in planning the next steps.<sup>55</sup> In this sense planned transitions could be a sub-class of active transitions. The differentiating feature would be the longer-term preparation for the career transition within the existing job role as well as possibly a deeper involvement of the manager in planning the career boundary crossing with his/her employee. A

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55. *A great deal of attention is paid to the fact that the right people are selected for leadership positions. The leadership review process of the organisation includes a search for individuals with leadership capability and potential. Based on the leadership philosophy, special focus should be put on the personal development plans of those with high potential. However, planning carefully ahead any career is practically impossible in an environment that keeps changing. The aspirations are reviewed regularly and when new opportunities open up, the potential and aspirations are known to the managers.*

case example would be a non-R & D assistant who was determined to embark on an R & D career and in agreement with her manager created a development plan that started by attending the management team meetings and writing the minutes. She ended up a Product Management Specialist. There was also one interviewee who had been sent abroad on an expatriate contract by the company. *Whatever planning takes place, the time span to the future is relatively short* as the next quote shows. The basic assumption is that the *future is relatively blurry and planning very much in advance is simply impossible*.

That was then the background to why I haven't so much thought about my own future, well currently I have already been nominated to my next stuff, in other words the next program that I start leading and if everything goes as planned, I have a very clear template, you could say for more than one year again. (Project Manager, Male)

Some people seemed to have some plans for the future, some had no plans or the plans were vague. Most of the people interviewed did not consider moving outside the company in the near future a feasible option. In the long run there were some who could imagine moving to some other organisation. People in R & D boundary roles could more often imagine that at some point they would be working outside this company. Those in core R & D roles did not see that option at least in their immediate future. Even if they were ultimately living with constant uncertainty within the company and having a fragmented career within one organisation, they still considered that the case company was the best place for them to work. The location was also considered by one of the interviewees. The perception was that at the location where the interviews were mostly conducted there are not so many options available, especially if one wants to work in a global company. People in R & D boundary roles had more often worked in some other company or organisation prior to entering the case company, whereas the majority of those working in R & D core roles had entered the case company directly from technical university. (The master's student who transcribed the *Set II* interviews also paid attention to this in her summary of findings related to the interview set (Kankaanpää, 2003).) One interviewee's career history contained a boundary crossing outside the case company and then another boundary crossing back to the case company.

Related to the future and age, one noteworthy finding was the *people in their thirties or forties who had already been in relatively many different positions and were somehow wondering "what the next step would be"*. This group of people has been referred to in the literature as *middlescence* (Morison et al., 2006) whom the companies should not forget but to address somehow (e.g. by providing learning and development opportunities). With age the showing off phase is left behind and people tend to settle down. Many of the senior managers expressed concern over their younger colleagues and work mates who were in the middle of the enthusiasm and showing off but at the

same time at risk of burn-out and other side effects of excessive work. The younger ones were also wondering about the future. “Things like performance management have been introduced and all those rankings and things like that and they come stronger and stronger. This kind of age management has not been paid so much attention to. Now when you think that everybody is so enthusiastic and give their best and do long days, so you cannot do that forever.”

I have the kind of life plan that I will now go to NMP [Nokia Mobile Phones] and see how it looks there and if it proves to be so individualistic and individual focused, which I don't like, so I will get myself back here. Probably at some point I would like to get back closer to technical documentation. In a way I am now going again closer to my core competence... So I have thought that I will be ten years at Nokia, maybe a bit more, and one out of those I will spend as an expatriate in Germany and then I want to educate myself to be a teacher and a lawyer so that I have three professions during my life. (Project Manager, Male, R & D Boundary role)

Had you asked a year ago, I would have answered that I have none [vision], but I see my own future in a way that I will probably be somewhere else than X [organisation] but whether it is a year or two, that I don't know. It might be that I am within in Nokia or I am in Nokia Networks or I am somewhere else. More detailed thoughts I don't have... It might be that the kind of work I am doing now could be what I do in the future. The contents of the work or the field might easily remain the same but just in some other part of the organisation. Somehow I have a kind of an itch to be within a product, in developing a product which would be a bit more concrete. (Specialist, Male)

One thing that I find interesting is something that is actually not paid attention to at all, is the overall career of a person, when you should be thirty-forty years in working life, this kind of like, the cycle of a couple of years, in my opinion maybe in, like approximately in ten years the majority of people, if they want to, you know, start developing upwards in organisational tasks, so in ten years about, it saturates. So there you can already see what you can do, what your capabilities are and where you possibly can get. But from the individual's point of view it might be, you know, healthier a little like in more traditional organisations that you kind of get there later, closer to fifty when you have developed, you get to those more demanding tasks, whereas here you are below forty when you are already in very demanding tasks. It probably boils down to the fact that there are so many new technologies here so that if you have been in managerial duties for twenty years, so you're not that well up-to-date, so the aim is then to take those younger guys who have fresher knowledge of the technologies and utilize that. And then on the other hand perhaps, when you're younger you still have the drive to go for it and you get enthusiastic more easily. (Senior Manager, Female)

It is interesting that when people come here, they are 25 so what will be their whole career development? They must not be burnt-out when they are 40, really they should be at their peak and get a lot of results, and become always wider and wider, when usually people's tasks always grow more extensive, whether it was a line or marketing and always a little bigger wholes... They [the young] are rather stop-go type and I wonder what they think they will be doing when they are 40 when they now "want to do this and that". But it is true that most of them have capacity, so you must let them go, even though sometimes I feel that do they try out just because the others have?, even though on the other hand, there are many who have proved that they can [advance in their career]. (Senior Manager, Female)

### 3. Drifting transitions.

Those who had drifted had encountered changes in their job role with organisational changes; someone had asked them to a new job or the opportunity had appeared in some other way. Many of the drifting transition examples were related to the "drift theory" or "availability" in the reconfigurable structure of job roles. In addition, people were given or assumed additional tasks and the task grew to contain more responsibilities or grew in another direction, so that the original role changed to a new one. *The borderline between the active transitions and drifting transitions is blurry.* This is mainly due to the environment where there are constant changes. *The borderline between drifting and dictated transitions seems to be equally blurry.* For example, manager nominations might be such examples. Someone from the team is nominated as a team leader. Usually there are good discussions prior to the transition. Especially during the heavy growth period it was, however, often the case that there were not really many other options and a person was either drifting or ordered to assume a new role. The transition may be experienced positively but it may also feel dictated, especially if a person feels that "it maybe came too early" or if he/she ultimately does not feel at home in the role. The element of *compromise* may thus be present in a drifting transition.

If we take [the jobs] in this firm during these ten years, I came in the first phase in as a SW designer and in that job I was in practice for a couple of years... Yes, and then I was for a couple of years a group manager in the same X product line. Then I popped in, for one year, I was in Y [product line] as a quality engineer, this kind of project management development was my responsibility and this kind of project management assessment tool. Then after that quality engineer stuff, I was one year a Product Manager in Z [product line] so in that one, if you compare it to this current job, so as a Product Manager you would just move in those circles that you needed to find out what the customer wants and do we understand it in the right way?... Then after the product marketing managerial year I came to this department where I have been A's subordinate, in other words, I have been in these enabler projects, in process development I have been. (Specialist, Male)

In the reconfigurable patchwork people can use the benefits from *job complementaries* or “*logical continuum*” as one interviewee called it: one can benefit from knowledge, competence or skill acquired in the previous job. The job complementaries and logical continuum enhance and enable drifting transitions but also all other types of transitions. When the boundaries of job roles are not rigorously specified, it is easy to take over tasks that would not in the strict sense be part of some specific job role. Sometimes it is difficult to make a distinction between the jobs a person has because they overlap each other. In one of the below citations, an ex-technical writer compares the previous job to the current system specification job. There was a point when the person was doing half technical writing and half specification work on the product development side before she finally moved completely to the latter. Thus, the reconfigurable job role structure enables and enhances job role transitions. For example, the percentage of line management and project management tasks in one person’s job could vary depending on the situation. “I have mostly done project management tasks and now the latest thing is a combined role of project manager and line manager.” Or the basic content of the job might remain the same but the business unit or organisational entity changed, as in the case of a collaboration manager who moved from one organisational entity to another to do collaboration management that includes dealing with frame agreements and project orders with the partnering companies. In these cases one still needs to learn the new business and to build up new networks.

For me the process is no barrier, in a way it is a bureaucratic way to do things, so that isn’t any... it comes probably from my secretarial background that this kind of fiddling with papers and this sort of thing is relatively easy, the kind of doing based on a process, so that is not a problem for me, or any review practices, they are all routine, you don’t need to put your mind to it, but then again working on a technical document is quite challenging... Now we are starting to do a feasibility study of new possibilities, and that is completely new for me, something that I have never done before, so but that too is coming, in a way, as a logical continuum to this competence transfer. (Engineer, Female)

Well, the training I got for my previous job was quite close to this current one, so that is was easy to move from documentation to collaboration and then to training collaboration. Had I moved to SW collaboration, that would have required a certain level of content understanding. Well, even in this one, there is anyway really a lot of new stuff to learn. (Manager, Female)

So when you compare this to the writing, there is so much you know, kind of funny actually how many points of intersection. So this is kind of the start of the path [system specification], the other side of the mirror and then there is the end product that is documented, so that is then the other side of the mirror. So yes there is a great deal of similarities.... And then my current job, it was when we started to discuss if we kind of split up first, so that

there would be both writing and specifying and then after the organisational changes we thought that completely to the specification side. (Engineer, Female)

#### **4. The *dictated transitions***

were imposed from outside and implied a bigger scale of change that affected a person or his/her team in some profound way. (Even if a transition was imposed from outside but did not contain a considerable change, it was classified here to the drifting transition category.) Dictated transitions are frequently related to organisational changes. In such cases the *self-examination* takes place mostly *after* the transition compared to the active transition and planned cases where the self-examination mostly takes place prior to the transition. Seven interviewees (out of 24 in set II) mentioned changes that were to a certain extent imposed from outside; four described negative experiences related to these. In *Set II* interviews about 29% described dictated transitions and 17% described negative experiences related to these. As mentioned, the boundary between drifting and dictated transitions is blurry (see for example the second quote). In any case, the element of *compromise* is no doubt often involved in cases of dictated transitions.

Well, that was one of the landmarks that was completely dependent on what the company wants, which is understandable, there probably were no other options. The most annoying part is that you cannot affect, you don't have a say in what direction you want to do, and you cannot implement your own plans. Well it was what it was. (Engineer, Female)

Well, at times it has been my own decision and at times it has been my manager's proposal, there have been both equally. Maybe when I left the documentation was my own decision and the fact that I left the team leader job was my own decision. The fact that I was made Product Manager, that was X's decision and the fact that I was made Team Leader, that was Y's decision. (Senior Manager, Female)

### **8.5.2 NATURE OF CAREER BOUNDARY CROSSINGS**

During one's career one can move on, transfer, drift, shift, rotate, and cross the boundaries. Overall, in the descriptions of the informants there were many references to how learning, development and competencies were related to their career boundary crossings. *With regard to learning, two types of boundary crossings were identified: evolutionary and radical.*

Of course, when you think of the word career, the first thing that comes to mind is the career development where one progresses in a line [management] sense, towards a greater number of subordinates... but then again in our environment, it just doesn't really go that

way. That kind of thing is not in the aim of many, for example that kind of thing is not my personal aim. But maybe that thing, career, in fact means personal development and development of one's competencies in one's field, like becoming better and better in one's work. (Project Manager, Female)

1. *The majority of people had experienced **evolutionary boundary crossings** during their careers.* There were two kinds of evolutionary boundary crossings: Firstly, there were those who had shifted approximately yearly or every second year in terms of competence, skills, grade, process phase, product or job role. This shifting had been to adjacent areas. Secondly, there were those whose work content had remained the same for quite a long time even though there had been radical changes in the organisational environment, e.g. the organisational structures or their superiors had frequently changed. They also maintained that the pace of learning they needed was fast. The borderline between these two was not clear-cut and also depended on the individual's experience. In cases of evolutionary boundary crossings the individual only shifts to a near-by patch still crossing the boundaries of his/her current patch. All the interviewees stated that they had usually had a "job" for approximately from one to two years. There had been some changes related at least to the organisation or to the contents of the job role, most often yearly or every second year. The evolutionary crossings might also take place between various organisational units if the content of the job did not change radically but provided a solid enough stepping stone for the boundary crossing. "I regard this specialist line as kind of my own thing, so something supporting this, or extending or widening, that it would be towards the core. But as things stand, I don't kind of ache for any more radical change in it." The *entry jobs in R & D* in general seemed to be software design or software testing. Moving out from designer/engineer implementation work or from testing to other R & D jobs (specialist, manager, project manager) was considered a natural progression, but none of the interviewees could imagine it happening the other way around (even though there surely are such cases). Designer/engineer and testing type of jobs were thus regarded as start-off roles.

I have been in Nokia for a bit more than six years. I started here as a software designer and then moved to lead a SW design group and then moved, like slid, you know, to project management within a single release project. There I was very heavily involved in partnering and competence transfer to a partner. And through that then I moved to a program manager's tasks and I have been there a bit more than one year. All this time I have worked with the same product, almost 100%, excluding some offshoots that came during the group manager's job, because people were dealing with many products in my group, otherwise with my own product. (Project Manager, Male)

They have all been kinds of continuums; there have been no such jumps. I would say that there is the training planning, manager, and this [product competence transfer], so there are three rather different type. (Manager, Female)

All kinds of jobs, because anyway, I have a background that allows me to do many things. Currently I have been, then, dealing with things related to the care process... I have had one, two, three, hm, seven, just under ten job titles... I have always been in this same business and within the same product. I have seen quite extensively how this product is done, from the R & D point of view. (Manager, Male)

**2.** In cases of *radical boundary crossings* people had either changed between organisational functions (where completely different competencies and/or perspectives are in focus) or organisational units/businesses developing very different products. By radical boundary crossing, I mean reaching toward radically different job role patches, from the perspective of one individual. (This is partly based on the subjective viewpoints of the interviewees; how radical the learning experience was.) Radical boundary crossings involve much more learning than evolutionary boundary crossings. Some people had had good induction and development plans in place but there were also those who needed to cope without any plans. Having a proper plan in place is needed because the learning process in radical boundary crossings is a much longer project and might also take time from actual “productive” work e.g. in the form of attending training courses. One example of a radical boundary crossing was when a former Department Secretary became a Software Engineer. This radical boundary crossing was clearly an active one but also contained elements of a planned boundary crossing.

I simply asked in the IIPs and in certain other discussions that something needs to be done, so either new tasks or something, something needs to be done, otherwise I wouldn't feel good in this company. Then little by little, hm, already in my secretary days I was taken along to the customer documentation part in NET and I quite nicely got some additional work to do. It felt meaningful and relatively reasonable at that point, that project work and from then on, gradually, we thought about different options, how I could develop better professionally. Mostly it was about proof-reading, and writing down new, new implementation in the customer documents and especially coordinating them and secretarial work and handling the meeting rumba. You know, things that one could do at that point, without knowing about the project or the product any better. And well, we came to the conclusion that you learn at work very well, but it needs as a support, some kind of software design related education and well that quite a good package, a very good package that I passed during the winter, so that there we were concentrating on the very basic things that you need here. You know, operating systems, databases, servers, different programming languages, so there was no slack in there, and the requirement level was quite high. And I already did project work, yes. With those parts that I could do and coded, even though I didn't

know what I was doing and in that way it was fun! And there's a lot of bureaucracy too, maintenance of all tools, documentation and studying and investigating and background work then... It was specifically my wish that I can't commit myself to such a big change unless everybody is supporting me because you kind of come out of the blue to the project to do the same work as the others are doing based on four, five years of education. So that it was quite a big step to take, you know. And the group members were also asked for an opinion, like what would they think if we do so. And they were all positive, they have supported me well, and they have just taken the time to listen to my stupid questions, so that it has started really well. This is like managed risk taking, so that it is supported as it says in some big books that at Nokia the individual is respected and supported so this is what it is all about. You don't perhaps notice it so clearly in some other cases; this is such a clear jump from one field to another, so that there you can see that it is really possible... that this is quite obvious, so that at least I feel that I am committed to this just because I know how big a risk my managers have taken here. Of course it does require courage, and it doesn't come just like that and for free. (Engineer, Female)

Other examples of radical boundary crossings between organisational functions were the following: a Technical Writer (with a humanistic background) became a Senior Systems Engineer, an Assistant became a Product Management Specialist and an R & D Manager ended up a Senior Human Resources Development (HRD) Manager. The interviews imply that even the functional boundaries can be crossed at Nokia. It needs to be noted though, that the interviewees who had made radical boundary crossings were purposefully selected. *Courage* and *risk taking* is needed in order to achieve such boundary crossings. It is probably the case, as also proposed by the first interview extract below, that *a field that is in an early growth and development phase is a better breeding ground for a boundaryless environment* than a more stable environment. It is easier to transfer between organisational units or product areas than between functional areas. (Functional areas here are often about social systems with their own identity and code of communication.) Even if these career boundary crossings were radical and some risk taking was required, the interviewees maintained that *when done within one company, it was still a "very safe environment to test oneself"*. People stated that "at least I had the capital of company specific knowledge, so I didn't need to learn everything from scratch." The second extract from a person who transferred from technical writing to software specification describes how the *values and mindset* in the organisation (in the form of encouragement from colleagues), *organisational change* as a point to concretize boundary crossing plans and the earlier experiences of *role switching* in the previous role paved the way for a radical boundary crossing. In this case there was also a period when the person had job roles in two functions simultaneously. Radical and evolutionary boundary crossings are actually interlinked in many ways.

And well, maybe then the kind of courage. Here, it is anyway kind of easy, if you compare, I don't know, when I don't have experience, but I could imagine that in the paper industry, or banking world where they have long traditions, so you could imagine that it doesn't work just like that. But this kind of specialist area of ours, so that basically none of those who enter the house, don't master, so maybe we all are on the same line, so that maybe someone who has just come from the technical university might have passed some telecom courses but very few, say even amongst those, so not very much from the mobile side, it can be something else or signal processing. But it is all kind of basic knowledge, but what you really need in your work, you learn here. So this is probably the big thing. (Engineer, Female)

Well, I think that even before the maternity leave, yes, yes, some group members just threw it in the air, that was X [organisation], it was or just a minute, was it Y [organisation], it was at that point that "why don't you go there?". So they thought that it could be the direction I could take and would be worth taking. I didn't so much myself, I have to say, that I wasn't myself very active like searching for and this is no self-praise but just a kind of a statement that things have just rolled along. So basically, I guess, through my original team because that is well, let's just say it, only writing, even though it is of course what you make it as a writer, but yes it is so much more, and at least myself, when I was all the time testing software so I really felt, at that point that I knew how things function... Now when I'm here at the beginning [of the process], in a specification job, so I cannot be sure any more about the final product. But then when I was in the end [of the process] so I could really talk about the product being top convincing [and saying] that "it really works". So I think that in that job you really learn enormously about the software. And, well, and then these extensions of work stuff come maybe when, people with whom you work, come that "wait a minute, she really understands about things", so these positions have kind of opened up. And then my current job, it was when we started to discuss if we kind of split up first, so that there would be both writing and specifying and then after the organisational changes we thought that [I go] completely to the specification side. (Engineer, Female)

According to the survey data 50 people (slightly more than 5% of all survey respondents) had made a radical boundary crossing over the R & D - non R & D boundary. Eighteen people who were currently working in R & D (research, system, SW, HW, I&V) had earlier worked in R & D support (Product Competence Transfer (PCT) or customer documentation). Nineteen people currently working in R & D had earlier worked in Support (HR/HRD or assistance). Of those currently working in R & D support (PCT, customer documentation) eight had earlier worked in R & D (research, system, SW, HW, I&V). (One of these had worked in two different R & D process phases and one person in three different R & D process phases.) Out of those currently in Support (HR/HRD or assistance) five had earlier worked in R & D. (Two had earlier worked in two different R & D process phases.) According to the survey

(which does not tell the total picture) *such radical boundary crossings are not very commonplace in the case organisation. What the interviewed people emphasised was that there is an opportunity for these if someone wants it.*

In terms of learning a new job, i.e. crossing the boundary to a new area, some boundaries seemed more *permeable* and some more *impermeable*. For example, *software testing* and *documentation* were areas that the interviewees had started off in their R & D work if they did not have any R & D related educational background. One example is a secretary who took testing assignments on top of her normal duties and ended up as an engineer. Another example is a technical writer who likewise tested software for technical documentation purposes and ended up as a system engineer. These are examples of *points of transition from non R & D jobs to R & D jobs* identified in this study. A transition point from a task perspective was *the taking of the minutes or memos in R & D meetings and sessions*. Two of those who had made a radical boundary crossing had done this prior to the transition. It is obviously a task where one can test one's capabilities to cross the boundary from non R & D to R & D. "It was for a while, a kind of a half-job, that I had both in parallel. I was in MT [management team] meetings and took the minutes because I was a quick writer and there little by little I started to understand the content, too."

The boundary from R & D to non R & D seemed harder to cross than the other way around, not due to the capability to assimilate the needed capabilities and skills, but possibly because of strong engineering identity (closer to professional identity than a more generic work identity) and the appreciation of the R & D core (the major social system). Within the group of radical boundary crossings there was one who moved from a clearly R & D core job (Department Manager) to an R & D boundary role (Senior HRD Manager). The identity work prior to the active transition had been lengthy and even laborious. There was a strong feeling of benefiting greatly from the R & D background in the new job and gaining thus easily, as an HRD person, the respect of those in R & D core roles. The self-examination and questioning "what do I want to do in my life" prior to the transition was related to the valuation of various functions and job roles within an R & D organisation.<sup>56</sup> At the end of the day e.g. this radical active boundary crossing was experienced as very rewarding, finding an area that is "truly mine." There was also a feeling of the background in R & D being a major merit. When the radical move takes place the other way around, from non R & D to R & D, the background did not seem to be considered equally valuable. Furthermore, it was revealed that the kind of environment where boundaries are blurry and role switching possible (and no professional diplomas are needed) could act as an arena where women cross boundary and enter the R & D core jobs. Three interviewees had been too stuck in the stereotypical educational paths and they had not even thought about entering a male dominated technical educational field, despite

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56. *In the case company a few R & D leaders have transferred to high-level HR leadership positions during the last couple of years and at least one back to R & D.*

having talent for such an orientation.<sup>57</sup> “If you think of the upper secondary school times, at that point the mathematical subjects were really nice, in a way that there has always been some kind of a background interest, but there just hasn’t been in a way a chance to see what it could be. So that in this house you have seen what kind of work this SW design is.”

I was really scratching my head and thinking what the other people think of this kind of move since moving from R & D to HR is a big thing around here at the end of day, so you know, I was thinking whether they will wonder if I have gone out of my mind, whether this is some kind of disturbance of mind and (laughter)...well ultimately, it is so important to save your face in the community. (Senior Manager, Female)

Well, I hadn’t ever really thought about it [studying some technical field]. Of course I could be wise after the event, so it would have been definitely that if, kind of, at home my parents had been in the technical area and had encouraged me in that direction, so maybe I would have thought about it. I would definitely have been, you know, even talented enough mathematically, so that I would surely have succeeded in getting into some schools, but no, it was never in my mind that way. (Engineer, Female)

### 8.5.3 DIRECTION OF CAREER BOUNDARY CROSSINGS

This perspective is concerned with the direction of transfers in the organisational structures. (This perspective could also be called the traditional organisational hierarchies, especially if the vertical view was emphasised.) Two kinds of directions could be identified from the data: *horizontal and vertical*. In the case organisation a grade is attached to all positions based on the job valuation. The valuation takes into account the scope and business responsibility related to the job as well as the strategic importance or the size of the organisation that a person heads. All kinds of “transition directions” in the reconfigurable patchwork emerged from the data. (The person’s capability to handle a job, his/her competencies and skills also affect the job grade.)

As such it is good, actually brilliant that there is this kind of opportunity to move on in one’s career in some other direction than upwards. So you could think to move sideways, upwards or even downwards in some life situation if you feel like it. This all is brilliant. Of course it can be a bitter thing if one of your key players lets you know one day that he/she is transferring there to do some other stuff and he/she hadn’t talked about it with you, but that of course is then another thing and is not directly related to this question. But otherwise it is great. In my opinion, people have used it quite well too... From the

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57. *In Finland about 80% of students in technical universities are male and 20% female. (Central Statistical Office of Finland, 2005)*

firm's point of view, it is a powerful tool so that if someone in his/her current job has the feeling that there are not enough challenges or there are other reasons, one can aim at transferring internally first, so that we do not lose the competence. Then the experience grows again and from the competence development point of view that is quite a brilliant tool. (Project Manager, Male)

**1.** In case of a **horizontal boundary crossing** a person would cross a boundary to a new area where the *responsibility area and scope* remains more or less the same. Thus there is no effect on the grade or job evaluation of the person even though the content of the job changes. "Now when I am on the technical side, now I only move horizontally from one job to another." The previously mentioned maturity or novelty of technology entails another horizontal structure along which people can move horizontally (see *Section 8.4.2, Figure 37, p. 241*).

I went to do exactly the same thing with a new product... There they were working in a completely different way, and yes, the people were new, but basically the work was the same even though I of course needed to learn about the product. (Project Manager, Male)

**2. Upward vertical boundary crossings** are about the traditional upgrading or promotions based on the expansion of the scope or responsibility area or a clearly increased competence and experience. Mostly the upwards vertical boundary crossings were experienced as rewarding. The traditional valuation of the upwards vertical path seemed to be an in-built value. However, some interviewees, especially managers, had also started to question this in-built value and wonder if it was worth the time and effort invested. Expanded responsibilities may also be negatively experienced if one cannot affect a job transition, if it comes too soon or if there is too much constant learning. One noteworthy aspect of the vertical career boundary crossings, especially in the managerial career path, is the volatility and insecurity of one's positioning in the reconfigurable patchwork. Due to the "musical chairs" game and organisational changes "you cannot keep on one certain level. So if someone wanted to stay on a certain level, it is not possible, but all the time you go up or down." One interviewee without a formal qualification in engineering/technology suspected that the lack of such a qualification might be a boundary to upwards vertical mobility, even in a relatively boundaryless environment.

I have changed jobs quite often. First, I was here for one year... as a trainee, so I hadn't yet finished school and then... I was in a software engineer's job for one year... Then I worked for one year as a line manager. Then I popped into the army quickly for a half a year and got rid of it. Then I started as a project manager in a testing project and it ended in February this year. Then I started in this kind of R & D project as a project manager and there I am still now. It has been somewhat natural for me to take bigger responsibilities when

there have been opportunities around here. There has been the chance, so I have gone for it eagerly when I have felt that things, you know, go just well. (Project Manager, Male)

I have soon gone through all process phases, so it's actually quite a funny system, that I started off as a secretary, and then there was coding, testing and now specification. And now it is actually about quite high-level system feature specification... now when there have been so many of these, well it doesn't any more pull you in any direction, in that sense it is ok, when you have been half a year in this job, well then the mat is pulled out from under your feet and you always, so to say, return to square one, and you never have time to gain a competence that would benefit you and in a way get some kind of merit in some area, so THIS has been kind of infuriating in here. (Engineer, Female)

And then the job I am doing now, well it is a senior level job I'm doing. But the title is not yet that of a senior even though the responsibilities are senior level. This is a thing I criticise a bit, that I am the only one in my team who is not a senior even though everybody is doing the same stuff, corresponding work, well this is such thing, of course I don't have proof of, but then again nor do the others, but maybe this is a point where the fact that I don't have a formal qualification backfires on me, so that the title and salaries are lagging behind, that this is kind of a barrier that comes in a way via the missing formal education... Well, the job description already requires that I take a stand to such extensive matters that it affects what other people are doing. That is one point; you should also value the contribution and not only demand. (Engineer, Female)

So it is so that is you would like to lead a kind of stable family life so you cannot, you know, stay there. In half a year, you go up or down and you wouldn't wish either one of these... I don't personally have any strict objective at least here and now. Well, maybe because I have been able to choose, I have anyway gone upwards. But I am not absolutely sure if I want it myself, it just is kind of an in-built value that it is like fancy when you get promoted. But I am not sure, if you really start to think about it, what you want, then you just get more of the kind of responsibility and hassle, you know. (Senior Manager, Female)

**3. Downward vertical movement** is also possible, and as mentioned already by one senior manager, these can take place quite “gracefully” as a spin-off of organisational changes. These are the kind of movements that usually contain an element of *compromise* from the individual employee's perspective. The fact that there are changes so often makes even these kinds of transitions possible and people do not necessarily feel sidelined. However, this downward direction of transition or career has perhaps still not been made mentally easy enough, even if in the official career development discourse it is underlined that one of the most important factors in how an individual career winds up is the life situation and motivation of the individual. Such transitions may also be positive in the sense that a person is drawn closer to the “real work”, product

development and technologies. This is also an important aspect given that one of the biggest challenges with the managerial roles seemed to be keeping pace with the technology development, the substance and content of R & D. (Again due to delicacy and confidentiality, I do not take a stand of the grade or salary development and whether they were touched upon along with the downward vertical boundary crossings.)

Well, I came here as a system test engineer and I stayed there for a little less than two years and then a new group was founded, it was kind of release testing at that point and I went with that group to be the group manager for that team being founded. It was in 94, so I had been here for less than two years. Then, well, there I was as a group manager for several years. The job profile changed, I remained as a group manager, but the product we were doing changed at least once or twice. Then in 98 my boss, in other words the Section manager X went to China, no, sorry... that Section was enlarged to be a department and we had grown to be such a big bunch that it was split into three and I became in that phase then a Section manager. Then in 2000 I changed into a different department when ours was merged into the product lines at that point. I continued then with the biggest bunch to this department where I am now. Then at the beginning of 2000, at the beginning of 2001, sorry, we were transferred under X [org unit]... In the very same X they had decided that we need to flatten the organisational levels, we have too many layers, when there are group managers and Section managers and then we have, well, competence areas, so that needed to be flattened and managers were eliminated at times with a heavy hand. At that phase then, our Section... where there were only three groups, it was taken so that they started to report directly to that department manager. At that point I started... at Z [a subcontracting function] as one of our agents and then as a project manager. There I had a sub-project that I was leading and now I am a kind of a maintenance manager. In our department I do all kinds of maintenance related, you know, looking after... to get them finished, so that we wouldn't have all kinds of customer prontos [fault reports] hanging around... Well, that kind of a change I have had that when I came to the house so I was one of the product line system test engineers, and then I got to be a group manager and then the responsibilities changed and the number of people increased and then at one point I had 63 subordinates, when we were altogether 64. Then they started little by little to chop it up, to start with two groups were completely removed and it dropped there and in the end came the overall product line chopping up and in the end I had, was it 21 subordinates. And then really when I came to this stuff, so I don't have subordinates at all. So I have now gotten to see this option too, that you are first a solid line manager and then next you are just a specialist, and there are no subordinates. They both have good sides. Of course when the change came, it definitely was hm, when it was anyway given from above and they said that "we will do like this!"; that there shouldn't be so many levels any more" and, and already then I started to think that well, this is nothing more than just another change too, that you're a specialist and there are no subordinates at all. In some situations now I have been quite pleased that I haven't had any subordinates. (Project Manager, Male)

It would be so natural to cool down with age. After the most energetic period in your life, the motivation just changes, which is natural, well... and there are younger people eager to step in. If it wasn't for the pressure from the environment, I would at least, let's say easily move to a job with fewer responsibilities at some point later on. (Senior Manager, Male)

#### 8.5.4 THE PERSONAL CAREER BOUNDARY CROSSING EXPERIENCE

The transition experiences could be classified into three classes: rewarding, neutral and negative transitions. The driving force and nature of career transitions did not inevitably anticipate how the boundary crossing was later on experienced.

1. The upwards vertical boundary crossings were often experienced as *rewarding*. The same went for active, planned and radical boundary crossings, where there had been self-examination prior to the transition. When it is a question of an active or planned boundary crossing, even a radical one, it is easier to see the *logical path* behind the crossing. The **rewarding boundary crossings** were often also the most challenging ones. For example to non-R & D employees the transition to the R & D field was described as being extremely laborious, but at the same time very rewarding. Those transitions contained very profound elements of learning and emerging comprehension of the new area and interlinkages with the wider system. People also mentioned things like “growing to be an expert in a new field” or “creating a completely new career”. Very often the radical boundary crossings were initiated by the employee him/herself and found to be rewarding; being able to actively select what one wants to do was considered an undeniable asset in a big organisation. Furthermore, more evolutionary boundary crossings could also be found rewarding because of learning. “When I had been on the quality side for a while, I wanted to try out kind of in practice those things I had learnt. I had seen so many problems in our projects; it was a pretty good place to learn in the sense that you saw that activity in a wide spectrum around here.” “In a way [I have] my own identity that I have created for myself through my career and my competencies. I bet that in this company I have a unique identity and that you cannot find anyone like me.”

For me it was a clear logical path even though it might have looked weird in someone else's eyes. I had already been interested in this side of things that I'm now doing as my main job; I mean I was already very interested in them in my previous position. (Senior Manager, Female)

It must have passed by so quickly but the one that was the most laborious so it was jumping from X [organisation] or Y [organisation] product support to Z [product], so that must have been absolutely the most burdensome but it has definitely also been the most rewarding. It has definitely been the most laborious because for one year it was about panic-like

intensive learning and not only has it been intensive learning, but the thing that “hey, I could do it!” and “hey, I am a humanist and I understand so much technology, and I could learn this new thing, and I understand where we are going and what the big picture is!”. Of course I still get deeply fucked up with details but, you know, kind of, it has been the most rewarding and there you have been able to, in a way, to create a new career for oneself and now when you start to have a quite extensive vision and understanding that you can call yourself an expert, so that has definitely been really rewarding... At least for me it really is a vital condition; when you really get fed up and when you know that you don't have anything new to give to a job, so you kind of know that the scope that you can use in searching for new jobs is just so much more extensive due to this boundary crossing, and you're not captive in there that for example you started as a localizer [SW localization engineer] so you wouldn't have anything else in life except that... So I would consider this like a lifeline and I know that I'm not alone in this thinking, I know that there are a lot of others who think in the same way that here you can change jobs and you get to do something else when it gets boring. (Project Manager, Male)

**2. Neutral** transitions do not evoke either rewarding or negative emotions. They are considered business as usual, a normal part of work. Neutral descriptions included experiences like: “well, it was just another new learning situation.” Even in neutral ones, the element of *compromise* can be in-built. Even if the person had not been ready for a certain transition, *the fact that the person afterwards realized how much the new horizons had enabled learning, makes the experience even out, and to be rather a neutral one and not so negative. Without drifting and/or dictated transitions people would not get as many learning experiences as they do in this kind of context where transitions are recurrent.* “[New job roles] come like bangs, so that in a new job there is a bunch of new things and they come as a smooth tide, so that it is not one crash within a job.” *Tolerating uncertainty, fatalism and humility* are pre-requisites in coping with the required number of transitions. In the first extract an engineer explains how she is not exactly in the kind of job that suits her the best, how there are advantages and disadvantages in all jobs and how it had turned out to be different from her original conceptions of what this kind of jobs would be like.

For me the practical kind of, down-to-earth work would be the right kind of work I would be good at, not so much in this specification job... I'm not so innovative and that, so that the jobs that I have done require such a different nature... so yes, I have thought about it to some extent, but not really...one needs to concentrate on what one is doing now. In every job there are good and bad sides, so this is not too bad after all, this specification job, in a way very hectic and active. I had had a little wrong conception of this; I thought that it would be only sitting about in one's own cubicle and writing and researching and... but it is much more; active discussions, meetings, and... planning. (Engineer, Female)

The way my titles have been changed, I would say that it has been just the kind of froth. You just put some nice new title but it doesn't affect the job role. Partly it is caused by the fact that this Z [business group] side PCT [product competence transfer] is very small so there is no chance to concentrate on something and another person on something else, so you just need to take the product and you do everything from the start to the end, whatever your title is. (Specialist, Female)

**3. Negative** emotions surface when a transition is too far from an individuals' own interests, if the transitions take place too often or if the required learning is excessive. Negative descriptions contained experiences like: there is far too much to learn, too soon and too far from what I really want to do. Expressions like "pull the rug from under our feet"; "we needed to get back to square one", "the card pack was mixed up" and "you were forced to start all over" were also found in the data. Even though people are willing to learn and develop, with an extremely rapid pace of change they inevitably get tired. This is especially true when one cannot influence his/her own transitions. The element of *compromise* is included in all negatively experienced transitions. Dictated boundary crossings were most often considered negative. It was more difficult for those subjected to dictated transitions and experienced them negatively to see the *logical path* in their career compared to those having had active and planned transitions. There may be long-standing consequences if career transitions are not handled well. Too many and too big transitions may ultimately cause bitterness, scepticism, cynicism and weakening of the commitment. The temptation to focus "outside of the work", on one's personal life increases. People also felt the threat of not bearing this kind of environment in the longer term. "I wonder how many of us are really going to retire from this company."

The work [we had previously done] was reasonably sensible and it was really outrageously handled, in a way the information, that it somehow like, our know-how was not needed and we didn't need to transfer it to anybody, we were just sidelined and let's, well, think of some other tasks for you and obviously we were thought to have knowledge and skills within the same product line to do other tasks, that we had already gotten a comprehensive induction into that product line during the testing period and the guideline was quite clear and there were no options, and we were, how many were we, about ten persons, and the team was broken into pieces even though the majority wanted to go on in testing, because it was very down-to-earth and practical, we all probably asked for the chance to continue in testing, in some other area or something but it didn't then work out and we were transferred to specification work... Your contribution is not valued in a way and experience that you have gained and the whole pack is kind of ripped open and you start all over again... I don't know, the boundary marks have been so much dependent on the company's will that I haven't had any say in them, in a way to steer my own direction, so it has not been, kind of, possible for me to implement my own desired path, so this is the way it just is. (Engineer, Female)

## 8.5.5 SUMMARY AND INTERIM DISCUSSION

In *Section 8.5* I focused on careers and especially career boundary crossings. I investigated career transitions from four perspectives: the *driver of the transition*, the *direction in the organisational structures*, the *nature of transition learning wise* and the *experience of transition*. The purpose was consider certain parameters related to career transitions as well as examples of career boundary crossing histories (but not complete career trajectories). All in all the perceived importance of organisational changes as the driver of career transitions was great.

Four types of career *transition drivers* were identified: *active, planned, drifting and dictated*. Active and planned career drivers are active in nature compared to the drifting and dictated ones, which are more passive from the employee's perspective. Overall the climate seemed to encourage active boundary crossings. People were either *pulled* or *pushed to actively cross career boundaries*. Learning, variation, trying, interesting opportunity, expanding one's competencies and career advancement were the most important pull factors. Too heavy workload, no buy-in for the project, dissatisfaction with the manager or too long a period in one job were the most important push factors. Organisational attitude both on the sending and receiving end seemed to be mostly positive and appreciative.

There were a couple of cases where a proper development plan was compiled to support a forthcoming *planned career boundary crossing*. Planned transitions could also be considered a sub-class of active transitions. In both it was mostly the employee who initiated the career boundary crossing. The distinguishing feature between planned and active transitions is the long preparation for the career transition as well as possibly a deeper involvement of the manager in cases of planned transitions. Whatever planning seemed to take place, the time span to the future was relatively short. The basic assumption among people was that the future is unclear and planning very far is practically impossible. Most of the interviewees in core R & D roles did not consider the option to transfer outside the company a very feasible one, at least at the time of the interviews. One mentioned that in Tampere, where most of the interviews were conducted; there are not too many global high-technology companies. The R & D boundary job holders interviewed could more often imagine working in some other organisation in the future. Often they had already worked in some other organisation or in a completely different field before entering the case company, whereas the majority of the R & D core job holders had entered the case company directly from university. Both in the groups of senior managers as well as in younger interviewees there were those who expressed their concern over what would happen to those in their thirties or forties who had "already given their best" and whose career had reached its zenith or would possibly do so somewhat later.

The third career boundary crossing driver, *drifting transition*, is related to the "drift theory" or "availability". Drifting transitions were encountered when there was a job role change related to an organisational change, when someone was asked to do

a new job or the opportunity had emerged in some other way. In addition, people's job roles might become cases of career boundary crossings when additional tasks or more responsibilities were added to them. The borderline between active transitions and drifting transitions is unclear, likewise that between drifting and dictated transitions. The fourth type, dictated transitions, were imposed from outside and implied change on a bigger scale of change affecting a person or his/her team in some profound way. The dictated transitions frequently seemed to be related to organisational changes. About 29% of the *Set II* interviewees reported dictated transitions and 17% reported negative experiences related to these.

Regarding the *amount of learning involved*, two types of boundary crossings were identified: *evolutionary and radical boundary crossings*. The majority of people had experienced *evolutionary boundary crossings*, where they shift to an adjacent job role. Either there is an evolutionary change in the required competencies, skills or scope of the job or there might be a change in the process phase or a product causing a reasonable amount of learning, or then changes in the environment and interfaces caused evolutionary boundary crossing in one's career.

In extreme cases of *boundary crossings* people would cross the boundary between organisational functions or organisational units/businesses developing very different products. A *radical boundary crossing* means reaching towards a radically different job role patch from the perspective of an individual. It involves much more learning compared to an evolutionary boundary crossing. Courage and risk taking ability are needed in order to accomplish a radical boundary crossing. However, it seems that when done within one company the risk does not feel as great as when stepping over the inter-organisational boundary. One company is a rather "safe environment to test oneself". One interviewee proposed that a field that is in an early growth and development phase would be a better starting point for a boundaryless career environment than a more stabilized field. (One of the big HR challenges is obviously to maintain the environment as such when the field starts to mature and stabilize.) Five percent (5%) of the survey respondents had made a radical boundary crossing between R & D and non R & D. This figure does not contain possible radical career crossings between different business areas or other possible radical boundary crossings from a subjective perspective (for example product, OS (operating system), technology, process phase). The boundary between R & D to non-R & D seemed harder to cross than the other way around, not due to the capability to assimilate the needed competencies and skills, but possibly due to the strong engineering identity and the appreciation of the R & D core (the major social system). There were a couple of radical boundary crossings from non-R & D to R & D core where a female interviewee had not even considered studying (a male-dominated) technology-related field. In these the climate and opportunities in the case company had opened up that path. Overall, one could tentatively claim that there were relatively few radical career boundary crossings in the survey data (some of the interviewees with a radical boundary crossing history

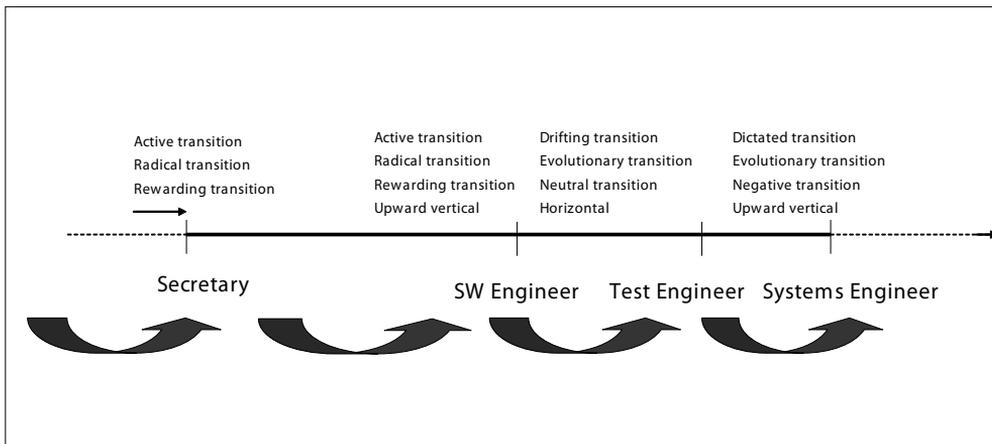
were purposefully selected). Gratton (2006) claimed that the hallmark of the internal job market [in Nokia] is to put people in “coats that are too large for them”. In an organisation maturing from the headcount growth perspective, horizontal boundary crossings could be used more extensively to “put people into coats too large for them”, i.e. to provide opportunities for learning and development that are often good sources for motivation and drive.

Regarding the direction of career boundary crossings, three different categories were identified: horizontal, vertical upward and vertical downward. In horizontal boundary crossings, a person would cross a boundary to a new patch in the reconfigurable patchwork horizontally and the responsibilities and the scope of the job would remain more or less the same. Upward vertical boundary crossings are about traditional upgrading or promotions based on expanded scope, responsibilities or competencies. There were a few comments showing that the traditional appreciation of the upward vertical career path at least still seemed to be an “in-built” value. However, a few of interviewees, especially managers, had started to question this and to wonder if it was worth the time and effort. Downwards vertical boundary crossings are possible and can take place quite “gracefully” as a spin-off of organisational changes. Changing the culture in a direction where downward boundary crossings, depending on people’s life situation and interests, were an even more natural part of people’s movement in the reconfigurable patchwork would possibly make the environment even more sustainable. (This is about the social and cultural acceptance of downward mobility.)

The personal transition experiences were classified into three classes: rewarding, neutral and negative transitions. The driving force and nature of transitions did not inevitably anticipate how the boundary crossing was eventually experienced. Often the most laborious transitions with major learning elements were experienced to have been the most rewarding. Neutral transitions evoked neither deep rewarding nor deep negative emotions. They were considered to be a normal part of the work. Drifting or even dictated transitions can turn out to be close to neutral when a person realizes the related learning opportunities. Desensitization to changes and transitions has possibly mitigated rewarding or negative transitions and placed them in the neutral zone. Tolerating uncertainty, fatalism and humility are pre-requisites in coping with the required number of career transitions. Negative emotions surface when a transition is too far from individuals’ own interests (the person has “no say”), if the transitions take place too often or if the required learning is excessive. Too many and too big transitions may ultimately cause bitterness, scepticism, cynicism and weakening of the engagement.

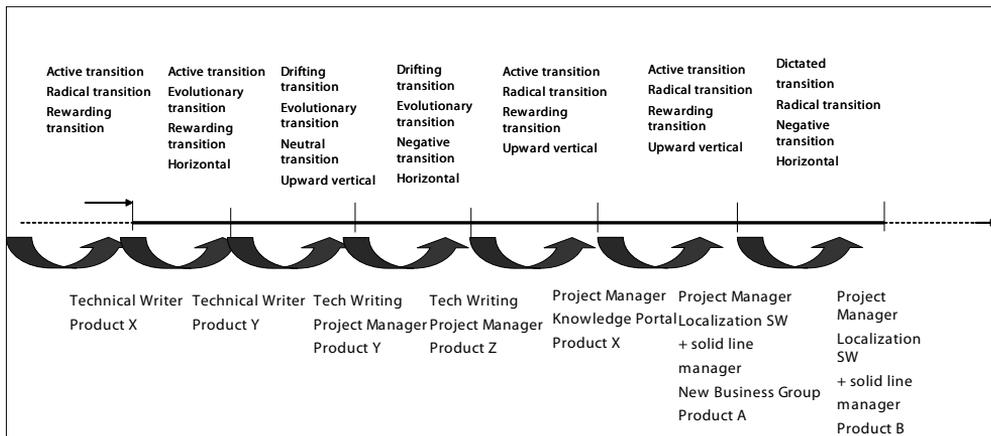
All combinations between driving forces and individual experience were found in the data even though there was a much stronger connection between active, planned, upward vertical and radical transitions with a rewarding experience as also between dictated transitions and negative experience. In cases of dictated transitions the self-examination mostly takes place after the transition compared to active, planned and

radical transitions where it mostly takes place prior to the transition. The element of *compromise* is often involved in dictated and negatively experienced transitions. Compromise may also be involved in drifting, evolutionary, radical and horizontal transitions. I have mapped two career extracts to a time line (*Figures 43 and 44*) and used the parameters above to describe each transition. Case 1 started as a secretary in the case company and was a system engineer at the time of the last interview set. Case 2 started as a technical writer and was a Localization SW Project Manager in another business group at the time of the last interview set. Both these examples also include radical transitions.<sup>58</sup>



**Figure 43.** Case example 1 of a career extract

58. *For the sake of integrity, validity and credibility I contacted both of these interviewees in the beginning of 2008 and asked if they agreed with their own career extract picture and the attached parameters. I sent them both their own picture and the explanations of the career boundary crossing parameters. Both agreed that their own thinking is aligned with the picture drawn based on the interviews. Case no 2 interviewee added that the last transition was definitely experienced negatively during the transition but years after some rewarding elements have stemmed from that specific transition, too. "I really needed to take my time to think this over! Otherwise I agree but I was thinking of the last transition. It can be left like this in the report, but retroactively it has been negative, neutral and also rewarding. During the transition it definitely did not feel positive, so it is better to leave it as it is. Retroactively it has no doubt led to all kinds of interesting exercises, so it definitely is an ill wind."*



**Figure 44.** Case example 2 of a career extract

Ultimately, how boundaryless were the careers of the interviewees of this study? Have the careers turned out to be more boundaryless? On the one hand, people stated that opportunities and premises for boundaryless careers were definitely in place for anyone wanting to use them. They also claimed that even the drifting transitions and evolutionary career boundary crossings kept the level of learning and development relatively high. A large organisation provides opportunities to seek unique careers and jobs, even those that people never knew existed. There were cases approaching the concept of authentic career in terms of how people experienced them as proposed by Svejenova (2005) even if the careers were not artistic as was the case in Svejenova's article. On the other hand, there were several who thought that there could be even more of "job rotation". They did not seem to activate themselves in the spirit of career self-reliance but possibly expected more support from the company or the manager. Further, relatively few radical boundary crossings were identified in the data. The career boundary between R & D core and non-R & D (including R & D boundary role functions) seemed to be relatively hard to cross even though, once again, it was permeable for those willing (and able) to cross it. Moreover, the boundary between the company and the external environment seemed to be relatively hard to cross, i.e. career transitions out of the company (and possibly back) were few. This may be due to the lack of global high technology companies in Tampere, where most of the interviewees were located. In the light of the results of this study Gratton's (2005, p. 156) reference to "job leaps typically taking place across countries, across functions, or across the processes of the company" is somewhat optimistic. From my perspective Gratton's "job leaps" correspond to what I call radical boundary crossings. (Gratton in her study focused mostly on senior managers and executives for whom radical boundary crossings might be more often reality.)<sup>59</sup>

59. *Suntari & Taka (2004) in their study evinced that for global leaders with international careers, the most typical career anchor is pure challenge and managerial competence.*

If we compare the results of this study with Dany et al.'s (2003) criteria for boundaryless careers, one can first say that for some intra-organisational careers have become less standardized and less predictable. However, for many the career paths within R & D are still quite standardized and predictable. People mostly take evolutionary career steps. Secondly, inter-organisational mobility seemed to be on a very low level. Regarding the two criteria above the opportunities for boundaryless options are available. Third, the individual nature of careers and the "myriad of individual experiences" seem to have increased overall due to the indistinct boundaries of job roles and people's continuous movement within the reconfigurable job role structure. Finally, it is difficult to estimate the meshing of individuals' aspirations with the company goals possibly leading to innovative entrepreneurial projects supported by the company. There were no clear signs of such activity, possibly due to the nature of product development, which does not allow as much freedom as for example pure research work.

In summary one could say that some elements of boundaryless careers seem to be prevalent in the case organisation but some seem not to be, at least so far. Indeed, the concept of boundaryless career and emerging features of boundaryless careers should be understood as both an adaptive reaction to the changing organisational contexts and an opportunity for the employees to break free from the strict rules of traditional careers. The challenge is to match and find the balance between what is in the best interests of the organisation and of the individual employee. The very concept of psychological contract between the employee and the organisation has changed. The psychological contract in boundaryless organisations is much more precarious. Organisations can commit to providing opportunities for learning and development and changing, insecure job assignments. Those assignments may sometimes be very different from what the employee possibly envisaged. From the organisational perspective it is what can be offered in the optimal case today. Employees need to commit to constantly developing themselves and to changing job assignments which at best bring variety and increased motivation through enhanced learning opportunities. Sometimes new job assignments may entail greater responsibility and perhaps promotion, sometimes they are horizontal movements and sometimes they may mean a reduction of responsibilities. *Dictated transitions* were clear examples of behaviour bringing *intensity* to the organisation. Badly handled change situations and transitions may impair the engagement to the organisation and cause bitterness. For some *careers are fragmented* and *insecurity* is a constant feeling that one is forced to bear. The new career contract demands good self-management skills, adaptability and even some sort of humility and fatalism. The discussion around the *proactive boundarylessness* (when people choose to move to new opportunities) and *reactive involuntary boundarylessness* (when people through de-layering, restructuring etc. are forced to move on) is indeed relevant (see e.g. Graeme et al., 2006 and Pang, 2003).

It is interesting to compare the results of this study with those of Isopahkala (2005) from the same case company. Would those whom Isopahkala (2005) calls experts (those with the right skills and a positive attitude towards learning) find their way forward in the reconfigurable patchwork through active or at least drifting transitions? And would the non-experts (those whose knowledge is redundant and who do not have the means and resources to update their competence) be more often the objects of dictated transitions? The results of Isopahkala's narrative discourse analysis and the thematic analysis of this study cannot be directly compared. Isopahkala's main argument was that *corporate competence management and development discourse have a major impact on the expertise discourse of the employees*. The informants in her study did not seem to find words to express their dissatisfaction related to continuous job transitions, whereas some interviewees in this study definitely articulated their dissatisfaction (yet the adoption of corporate discourse was noticeable.) In this study some of the active transitions were experienced negatively if the new job did not meet expectations. Even some of the dictated upward vertical transitions were negatively experienced if the person him/herself had no say. (It is difficult to estimate how many others had felt at some point that a certain transition was dictated and they had later more or less consciously forgotten about it or how many did not want to mention it in the interview situation.) Possibly experiences of active or drifting positive career transitions make the dictated ones fade away. At the time of the study Isopahkala's informants were all facing imminent significant job changes and the participants were gathered in a discussion group to go through the transitions. This was not the case with all the interviewees in this study. In Isopahkala's data there were also quite challenging imminent transitions which may have caused a relatively great deal of self-examination and a need to rescue in the organisational discourse that defines people as willing to change and renew. There are also other possible reasons: Isopahkala's data was mostly collected in group situations which might have inhibited people from expressing their innermost thoughts<sup>60</sup> and from the IT department, whereas the data of this study was gathered from the individual interviews in the R & D product development context.

One historically evolved feature in the activity system of the case company is possibly the *friction between the vocabulary "inherited from the previous phases of work design"* (cf. Dyer & Ericksen, 2005, p. 185) and the *everyday reality at the workplace*.<sup>61</sup> Concepts like "job enlargement" and "job enrichment" in their traditional meaning do not fit agile environments. In most cases much enriching and enlargement happens naturally in a self-organising way. It is largely dependent on how much and in what direction an individual person wants to enrich and enlarge his/her amoeba job role. For such people expressions like "job rotation" are contradictory; the old connotations attached to these concepts and everyday reality at the workplace do not fit together. Gratton

60. *There were also individual interviews but the people involved were the same and had already expressed their thoughts and feelings in group situations.*

61. "Job rotation" was defined as "periodic shifting of worker from one work-simplified task to another" by Bratton & Gold (2003, p.122).

(2005, pp. 155-156) called the practice of people changing jobs relatively frequently a “job rotation process”. Her perspective is more the management perspective; how to manage various processes and practices to enhance the creation of network ties that enable boundary crossings within a company. My understanding is somewhat different. My understanding of “job rotation” as a concept is closer to that of Bratton & Gold (2003, p. 122). The concept is applicable to more rigid systems, where job roles and positions are more stable. The results of this study describe a phenomenon that is closer to *job transitions* or *job role flux* rather than mechanical “job rotation”. It is possible to manage job role transitions to a certain extent, to create optimal conditions, even some supporting processes, for the flux to take place. Phenomena like “*drift theory*” indicate that self-organising plays a part in job transitions and career boundary crossings. In such a fluctuating environment the concepts proposed in this study might prove useful when discussing with people about their careers (cf. *Figure 42*, p. 269 e.g. active, planned, drifting, dictated, evolutionary, radical transition). In some cases people need to be ready for *compromises* too in terms of what they would like to have and what is available. The fact that the changes are so frequent probably helps in adapting to compromises because one could expect that the situation could be different in the next change. This was related to the *optimism* created in the “*open state*” when people expect at least some of the non-optimal features in the current setup to be remedied in the new. Thus compromises with the changing job roles have an effect on the career, too. One could imagine that a person with a realistic self-image and aspirations could accept some level of compromises. Obviously what the level is depends on the individual.

A related historically developed feature is possibly *the way the career self-reliance philosophy has been adopted* within the company: quite a few interviewees wanted to see more “job rotation”. They either had not adopted the career self-reliance philosophy or they expected more support from the company or from the manager. Possibly there has not been enough communication about the career self-reliance philosophy, or the employees do not have enough courage (or possibly competencies) to realize more career boundary crossings. (On the other hand, rather stable *modular teams* and *vertical specialists* seem to be needed to keep the overall system viable (cf. Gratton’s (2006) “guardians of key processes”).) The boundary dynamics in this section were related to careers and career boundary crossings. Next I will move on to investigate expert work and expertise.

## 8.6 EXPERT WORK IN BOUNDARYLESS ENVIRONMENT?

To finalize the results section I will mention some further *features of expert work and flexible experts*. This section thus illustrates some aspects of expert work in an environ-

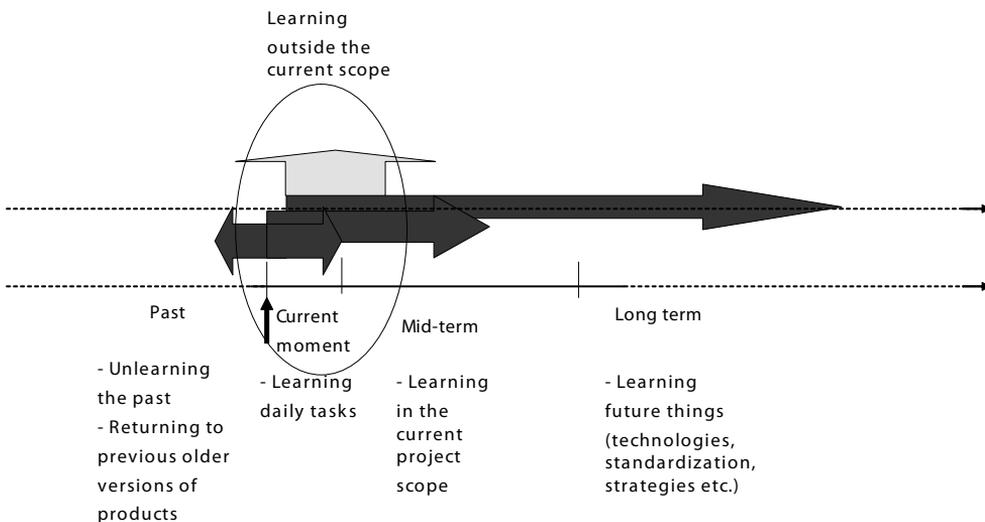
ment where boundaries are many and constantly shifting. The purpose is not to build a complete picture of expert work in the case organisation, but to highlight aspects related to the nature of expert work and requirements of flexible experts emerging from the data. The section is divided into three sub-sections. The first sub-section deals with the *constant need to extend the boundaries of one's expertise*. In a volatile and hectic environment there is a constant tension between reactive and proactive modes of expert work. The second deals with "*detective work*" *intended to cope with one's work in a boundaryless environment*. People constantly need to chase for bits and pieces of information that they need for their work. Sometimes detective work is about discovering completely new things by opening up the problem at hand through the clues one finds along the way. Detective work is about information seeking but also about extending one's expertise in a reactive manner. In the third sub-section I will list some *features of flexible experts* that enhance people's capability to cope with their own work within a boundaryless environment. The list of features was gathered from interviewees when they considered from their respective individual perspectives the most important and useful features enabling them to accomplish their expert work in the case organisation. In the light of these features I made a list of *challenges and questions that the experts need constantly to consider* in a boundaryless environment.

### 8.6.1 EXTENDING THE BOUNDARIES OF EXPERTISE

This section deals with the way people, in different phases of their job roles and careers, need to extend the boundaries of their expertise. When listening to people describing their learning needs in their current job roles, the picture that started to form was rather like an *amoeba state where one needed to extend in various directions depending on the situation* and the most urgent needs. "Somehow people just know the things or then they just study them. If they don't have the knowledge, then they just try to somehow cope with in a certain situation." People were to some extent consciously learning from outside their own area. There were many kinds of conscious efforts to also learn from outside one's own area, e.g. reading books, taking training, sharing best practices, browsing the net, "getting to know what the neighbouring box is doing", attending work improvement projects (the council work as a case example). At a certain moment in time individuals need to ensure that they can accomplish their daily tasks and learn the things needed in the scope of their current project. There may be the challenges of the past: either unlearning the past ways of doing or returning to the previous older (historical) versions of the products and their configurations. At the same time there may be a need to expand one's current scope. In some cases there might also be an interest or need to learn future things (emerging technologies, standardization issues or strategies). The paradox is in balancing what needs to be learnt for one's present job (where the needs and requirements are changing) and what

it would possibly be useful for the present job in the future and possible future jobs. This balancing is related to a tension between the *reactive mode* of expert work and the *proactive mode* of expert work. <sup>62</sup> “It feels that we are in quite a reactive mode in this environment, so that having a break, and for example thinking of taking a training course, doesn’t always work.” The extending towards various directions seemed very much on the spot, on the need basis, here and now (reactive mode).

Figure 45 describes how and in which directions people possibly need to extend their boundaries of expertise in a certain job role. This figure is related to Figure 41, p. 266). The boundary between the change in one’s job role and switching from one job role to another is blurry. There is a constant need to extend the boundaries of one’s expertise in a certain job role. How and in what direction the extending happens depends on how people move within the reconfigurable patchwork of job roles and what kind of career boundary crossings they have (e.g. radical or evolutionary).



**Figure 45.** Extending the boundaries of expertise in a certain job role

Hurry was indeed one of the most disturbing obstacles of keeping pace with the needed extending of the expertise boundaries. <sup>63</sup> “The technical field and competence

62. *Naturally future in itself is the scope of some people’s work. Thus, the tension between reactive and proactive (including future orientation) is relative to the scope of an individual’s work.*

63. *Definitely the proactive and reflective elements make part of expert work in a boundaryless environment. Earlier in this study it was already proposed that organisational change might be a way to make the underlying infrastructures visible and susceptible to questioning and negotiation. It was also proposed that workshops might be considered the type of institutionalized learning activity that Engeström (1987) and Abonen & Virkkunen (2005) refer to: collaborative inquiry and developmental effort to investigate and elaborate the system of common practice. “In my opinion value “Renewal” means that we first of all can renew and we do not get into a rut with the old model that has at some point possibly thought to be a good thing. We do not like stick to that, but we actively search for different kinds of options to renew or to do things in a new or better way. And how it is then realised here, so in my opinion quite well... when the organisation is big, there is always a danger that it starts to stiffen, but I think that pretty well we do still.” Manager, Female*

area is so wide that you can't in any way like master it but you need very quickly and efficiently to learn a certain thing and to take a stand on it." It is a challenge how much extending can be done proactively outside the scope of one's present job and of the future. The boundary towards future expertise needs is interesting. Future needs also include competencies identified in competence strategies based on the business strategies.<sup>64</sup> For those in management jobs, especially senior managers, the future orientation is a part of the job. For those in development work it could mean learning about future technologies. The question is whether there is time to slow down and learn about future things before they are on one's desk. This is related to the earlier proposed paradox between reactive and proactive mode in expert work.

You know, to act as an expert in a field where you are just like, you know, a complete novice. Well then the same happened when you went to R & D CoDe [competence development] side where one was then FORCED to stretch oneself and to study and learn things that you couldn't have ever even thought of... It is a must to study... Or then give up... There wasn't very much of a choice... If you want to do your work well. (Specialist, Female)

Yes, it definitely is about everyday learning, but the learning also requires time and on the other hand, when deadlines are what they are and when there is no time to sit down with it and think, you should have the answers ready IMMEDIATELY, you should have a view and an opinion of things, so this is one thing that is sometimes annoying, when you're a bit late with things but of course then again you learn all the time and learn by doing. (Engineer, Female)

Currently what hinders learning the most is hurry... We should take this into account more even in a business strategic sense, in other words we should really think that in which direction we are taking this business of ours or products, in three or five years' time frame. So that we would start reacting already now to what kind of competencies we should then have in this house. Anyway, you don't cultivate such competencies so very quickly. (Manager, Female)

This has somehow become so busy and hectic that one is just thrown into a task and they say that, "there you go, try to manage". Then you just try to swim and keep your head above the surface and study at the same time, to gain that competence... learning is more of like reactive currently than proactive, there is no time to orientate oneself with things beforehand but only when you encounter them, and then you need to grip them and study and at that phase it takes more time... And then the consequence is that it is an eternal

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64. *In a matrix organisation the project should see to it that people involved in the project have competence development options for issues rising during the project and issues that are needed for that specific project. The task of the line organisation is to ensure that the future competence development needs as well as generic competencies like leadership skills are constantly developed. The interviewed competence development people were already dealing with e.g. future technologies in terms of selecting and developing new learning solutions.*

chaos here... We are in a fire fighting mode all the time and in a way it is visible. It burdens and eats people too much. A lot of energy goes into it. (Manager, Male)

Learning is naturally an important pre-requisite for product development especially in spearhead type companies; it takes place all the time and it is a side-product of the design process. People were well aware of learning taking place constantly and also being a pre-requisite for any activity. On the one hand, there is the constant *requirement* to extend the boundaries of one's expertise. On the other hand, there is also *willingness* and a *personal need* to extend the boundaries. "One kind of gets used to that learning situation." The need for *learning, adaptability and capability for change* emerge remarkably from all the interviews. "It keeps me ticking over and the interest level does not get lower." Learning is at the same time a *medium of exchange*. People were offered and accepted new jobs where they could learn and improve their expertise. "I wouldn't like to work somewhere where there is no requirement to learn. It provides a kind of challenge and motivation when there is always something new." One interesting group was those who actively sought to change jobs and who had almost become *addicted to learning*. They were the ones who most actively sought to extend the boundaries of their expertise. "After having learnt a new job, one gets the feeling that one cannot contribute any more, or have anything new to give." "I have nothing new to give to this position and I start to get the itch to change jobs." They were the ones seeking active and even radical transitions, "electric shocks" as one interviewee called it. They had good self-management skills and a taste for risk-taking, too.

You learn so much in one year. So that you can feel that again. I understand and suss out these things, so kind of accidentally you learn to connect what you have heard from here and there. So that you are kind of greedy... Is it then just the type of person that you get paralyzed unless you get the kind of electric shocks? (Engineer, Female)

*When one enters the company*, there is an intensive period of learning. At that point people naturally also learn a great deal about *company specific knowledge, common language and common ways of working*. For most people learning is a steady activity alongside the evolutionary career boundary crossings. Some of the peak points are when *a new technology or a new product is introduced*. Also *when one changes jobs internally*, the first six months are times of intensive learning, especially if it is a radical boundary crossing. However, when there is no need to learn the company specific knowledge or the processes, one is taken to the new context as someone who can contribute, if nothing else he/she can bring valuable best practices from the previous job and question the prevailing mode of working in the new context. The transition may go smoothly or be rather troublesome depending on the novelty of the product or technology and on the possible existence of relevant contact network. The *newcomers to the company* are not underestimated either. They might have fresh or new knowledge from university

or from some other organisation. They might have a completely new view of some things or they might reveal some less clever practices in the new environment. Some few interviewees mentioned that they actively asked the newcomers to look for these deficiencies while their view was still fresh. People gathered that in three months time a new person would lose the freshest view to seeing the possible deficiencies in the new context.

I was recruited in horrible haste. It was basically about a gigantic rush... So I had six weeks' time to write for that product, and what I did was the on-line help and then the guide and the manual, and I was that "heck, I don't have any experience of technical writing and I need to study it and I have six weeks". I thought that "damn, this ain't gonna work!" (Project Manager, Male)

And now I have had once again a half-a-year period of competence transfer, and a clear area of responsibility has transferred to me as of last month. The fellow who previously did the job is anyhow in the same team now, so I now have a support network in much better shape than in the testing time. We have good subcontractors and so on, and quite a lot of emphasis has been put on training and induction, so that in quite a different manner have I also learnt from this task transfer... (Engineer, Female)

New people when they come and they look at the stuff, how it is done, if they are good, they can even realize such things that "why do you do the stuff like this?" and in my opinion, people here reasonably well; people are even capable of that, they also start reflecting that does it really need to be done this way. Anyway we have a relatively high, the kind of, willingness to change, so that people don't aim at doing things in a way they have always done, if it's not reasonable, but people definitely change the way they are working to a certain extent, and newcomers can even be useful. Good newcomers are like that. (Project Manager, Female)

## 8.6.2 DETECTIVE WORK

The so-called *detective work* proved to be an important means to cope with one's work in a boundaryless environment. Swimming in the "information overflow" required a certain kind of *detective work strategy* that was described in a very similar way by several interviewees. People kept emphasising that a great deal of their working time is allocated to hunting relevant information and knowledge, i.e. to "detective work". "So far it has been detective work. I have asked four persons so far." The new kind of temporary and project based overall trust is essential in detective work. It is about going from one "counter to another" and unwinding the problem at hand. In the process of detective work the network ties and the adaptive field (cf. Gratton, 2005) are also

created or enhanced. The first step in the detective work process is to find the right person, to find those who know. Practically all interviewees stated that if they needed to find new knowledge they usually start by scanning whom to ask. Sometimes the first person can help but very often one needs to unravel a chain of contacts one after another. The point is to ask a work mate or someone unknown e.g. from a name in the company wide Phonebook or intranet. "You ask a buddy what is really behind this". The strong adaptive field obviously helps in starting the detective work but clues gleaned from the Phonebook or intranet can also assist in finding what one is looking for without really having any initial weak ties.

The problems addressed in R & D are often messy, blurry, unbounded and undefined. In a complex environment "comments made in passing" or some "vague memories" from the project meeting are "valuable nuggets" and basic cornerstones in a situation when a person starts unravelling a problem. What they were after were "threads" and "clues". The objective is to get a grip on some angle of the problem at hand. At this point the problem remains undefined and blurry. The interviewees also described their strategies for progressing in a fuzzy environment using expressions and metaphors like "throw oneself into it", "jumping into it", "glean relevant pieces of information", "building up a puzzle", "unravelling" and "to start all over again". The striking thing in "detective work" is the immediacy of the knowledge needed. Problems often arise unexpectedly and one cannot really postpone finding what one is after for too long. The fact that one needed to find the contacts immediately and "to get one's hands on the knowledge" was mentioned. Eventually some of the cues start to yield results and the issue starts "unravelling". "The relevant bits and pieces start to percolate down". "Always somebody knows a cue and then it just starts unravelling and unravelling." The interviewees evoke a picture of a vague, surging setup where one needs to survive, to try to get a grip of the knowledge or information one needs and then start progressing by following the unknown path ahead. Once again, how "detective work" in this case company was depicted is very close to Döös et al.'s (2005) findings related to "learning changing knowledge", i.e. being "on the hunt" for changing knowledge.

- It is kind of heuristic guesswork, trial and error. (Manager, Male)

- It is easy to ask, but on the other hand if you have had a certain network, if it is not completely up-to-date your network, then you go a little like from one counter to another counter. (Specialist, Male)

- A horrible digging up always when you need some knowledge, a lot of handiwork. (Senior Manager, Female)

- First, I would ask from the project and always someone knows some cues, and then it just starts to unravel and unravel... and you always find a person who knows. (Project Manager, Male)

How do you share the knowledge and keep it up-to-date? How can I trust this information? And where do you, like, find it? That is like the biggest challenge. And in fact our technical issues are not very complicated and if we think of some product development programs where there can be, let's say two hundred people for three years or so, the majority, if you think of individual work, most of the time he/she is digging up information to make a decision or to produce some code, so making the decision or producing the code is not the biggest thing in the world but it is the digging up of the information, that is where the time goes, a great majority of our time. Or then you sit in some meeting that lasts for three hours to get a grain of knowledge. (Senior Manager, Female)

*Learning changing knowledge* (see Döös, 2005) and *serial incompetence* (see Dyer & Ericksen, 2005) are indeed related to the detective work. The mindset and need to dig the same knowledge over and over again implies that knowledge is constantly being developed and rarely becomes fixed. *Company specific knowledge* was an important part of people's knowledge base and expert work. Those having experienced radical boundary crossings maintained that it was much easier to start over in a new job even if it was in a different function or business if one had already worked in the company. This boils down to the encultured knowledge people had cultivated (cf. Blackler, 1995) and to the shared company wide identity with many common practices, ways of doing and values (cf. Orlikowski, 2002).

It is no use, I don't even try to recall these things anyway, because next time you need it, it is sure to have changed. In any case you need to take your phone and ask someone who knows to check how it goes then at that point in time, even if you remembered how it used to go and what's related to that, it's still better to check whether it has changed. (Senior Manager, Female)

People felt that the information in the intranet or any other documented, codified knowledge was not enough because they also needed some background knowledge or someone who could relate and adapt the piece of information to the acquirer's previous knowledge. People seemed to strive for knowledge anchored to a specific situation, not just information but topical understanding in a rapidly changing situation. "The more changing the knowledge is, the more human interaction you need." For individual people the *changing nature or instability of knowledge* and "attempting to be one step

ahead all the time” may appear to be a strain factor. *Information overflow* was another strain factor that bothered the interviewees, while at the same time it was considered good that information was available. One of the interviewees who had previously changed companies compared her new organisation and the case organisation in the following way:

Now in this new organisation I’m kind of digging out information from wherever I can find it whereas earlier [in the case company] I was trying to filter and pick relevant pieces from the information overflow. (Specialist, Female)

It is tiresome that whenever you get something working, after giving your best effort to make it work, it is again ripped open and you just have to leave it behind you, and restart, and start all over again, it would be so nice for once to enjoy of what you have built up. (Engineer, Male)

### 8.6.3 FEATURES AND CHALLENGES OF A FLEXIBLE EXPERT

A boundaryless environment is characterized by change, uncertainty, complexity, inter-relatedness and a networked way of working. The future cannot be foreseen or planned in detail. The experts constantly need to extend the boundaries of their expertise and engage in detective work to keep a grip on the changing situation. *The features of a flexible expert who can cope within this kind of environment seemed to form around four challenges: learning, adapting, collaborating and completing.* The challenges and the related questions were derived from the features the interviewees emphasised. The list of features was gathered from the interviewees when they considered the most important and useful features (skills, competencies, capabilities) that enhance their work in the case company.<sup>65</sup> The explicit technology related skills are not listed here and in any case actually more generic features were emphasised by many: “It really starts from the character” according to one of the research participants. (These features do not differ too much from the generic features of a flexible expert working in any environment today. Possibly the level of extending, agility and compromises is different.)

The *learning challenge* entails the following questions: How can I learn about my tasks/s? How can I seize a moving target? How are things interrelated? The *adapting challenge* forms around the question: How can I adapt to the changing circumstances? The question with the *collaborating challenge* is: How do I work with others? The *challenge of completing* entails the following questions: How do I get things rolling and completed? What needs to be done first? What next? The features of a flexible expert who can cope with the *learning challenge* are *learning mindset, meta-learning skills* and

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65. *What are the most important and useful features (skills, competencies, capabilities) when working in this organisation? What features of an expert are the most emphasised in the context of the case organisation?*

*sketching the big picture*. Adapting to challenge can be achieved by *tolerating uncertainty, fatalism and humility*. Collaboration skills, networking skills and interpersonal skills help with the *collaborating*. Many features emphasised by the interviewees were related to the *challenge to complete something*. In order to get things rolling and completed, one needs to have a *capability for self-direction, self-management skills, initiative, persistence, activity and prioritization skills*. These features are close to improvisation and self-organising from the individuals' perspective. In order to complete the assigned tasks one also needs to have *courage and risk-taking capability*. (These are equally needed in constant job role changes, especially in radical crossings of career boundaries.) Figure 46 gathers the challenges, questions and the features of a flexible expert needed in the boundaryless environment.

Environment	<p align="center"><b>Boundaryless environment</b></p> <ul style="list-style-type: none"> <li>• Change, Uncertainty, Instability, Complexity, Interrelatedness, Hurry</li> <li>• Networked way of working, Heavy interdependence between people</li> <li>• Future cannot be foreseen or planned in detail</li> </ul>			
Challenges and questions of a flexible expert	<p><b>1. LEARNING CHALLENGE</b></p> <ul style="list-style-type: none"> <li>• How can I learn about my task?</li> <li>• How can I hit a moving target?</li> <li>• How are things interrelated?</li> </ul>	<p><b>2. ADAPTING CHALLENGE</b></p> <ul style="list-style-type: none"> <li>• How do I adapt to the changing circumstances?</li> </ul>	<p><b>3. COLLABORATING CHALLENGE</b></p> <ul style="list-style-type: none"> <li>• How do I work with others?</li> </ul>	<p><b>4. COMPLETING CHALLENGE</b></p> <ul style="list-style-type: none"> <li>• How do I get things rolling and completed?</li> <li>• What needs to be done first? What next?</li> </ul>
Characteristics of a flexible expert	<ul style="list-style-type: none"> <li>• Learning mindset</li> <li>• Meta-learning skills</li> <li>• Sketching the big picture</li> </ul>	<ul style="list-style-type: none"> <li>• Tolerating uncertainty</li> <li>• Fatalism</li> <li>• Humbleness</li> </ul>	<ul style="list-style-type: none"> <li>• Collaboration skills</li> <li>• Networking skills</li> <li>• Interpersonal skills</li> </ul>	<ul style="list-style-type: none"> <li>• Capability for self-direction</li> <li>• Initiative</li> <li>• Self-management skills</li> <li>• Persistence and activeness</li> <li>• Prioritization skills</li> <li>• Risk taking + confidence</li> </ul>

**Figure 46.** Challenges, questions and features of a flexible expert in boundaryless environment

First, the *learning challenge* amounts to continuous follow-up of how things related to one's own area are developing and possibly changing. The learning challenge was already dealt with in *Section 8.6.1* in connection with extending the boundaries of one's expertise. People need to be able to benefit from what they have learnt previously in new situations and *sketch the big picture* (how things are related to each other). People are constantly gleaning pieces of knowledge about the changing interrelated system they are working with. One important technique or means to do this was clearly so-called "detective work". This type of practice was an integral and recurrent part of the work of all interviewees. Because of the changing nature of knowledge and expertise, the

*learning mindset* has become ever more important. The *meta-learning skills*, knowing how to learn, have likewise become increasingly important. “I guess that I am a kind of an eternal student in my soul.” The unlearning related to openness and capability for change is also important.

I would say that the most important things are the kind of interaction skills, organising skills, and the fact that you can do many things in parallel and kind of sketch the kind of bigger units that one needs to complete. (Project Manager, Female)

There isn't really anything else as important as workplace learning and alongside it, learning in general. It is our most important means to get things rolling. The framework is pretty good. If there is a hurry to fix customer problems, as we have had now, people have quite good initiative and they search for information quite fluently and get to test it [system], too. For example, if we get a request from an application team to study this new Oracle feature named this and that, so then in practice, it means that one of us takes it to a process and starts to look for knowledge about it, either by taking a course or then by self-learning and evaluates, in a way, whether we can use it, what the benefits and drawbacks are, and then tests it, experiments, and does prototyping with it and then tells them what our group's opinion is about this thing. (Manager, Female)

The second challenge was about *adapting*. *Tolerating uncertainty and ambiguity* is an important feature in boundaryless contexts. Adaptability and tolerating chaos are needed in an environment where things often are temporary. In such environments a certain kind of *fatalism* is needed. For a fatalist, a change can be a “blessing in disguise” and his/her attitude is of the type: “this has a purpose too”. This feature is perhaps even close to some sort of *optimism*. Fatalism is also related to the *compromises* that continuous job role transitions can entail. One necessary attitudinal feature is *humility* when one needs often to start from scratch or to unlearn old habits. Undoing and dismantling existing structures in the organisation or what one knows requires a humble attitude. Humility is also related to the fact that in a complex environment one cannot expect to know everything even about one's own field. “There are plenty of tasks for everybody and everybody has huge workloads so nobody has time even to learn perfectly even one's own area.” The changing nature of knowledge necessitates a humble attitude towards what one knows.

- That X arrangement, as it turned out, turned everything upside down. But one cannot always get everything and this has got some kind of purpose too. (Project Manager, Male)

- As it turns out, it is lucky that I have very wide experience of very many different tasks, I would HARDLY have dared to jump to so many different tasks to myself, in a way it has been a blessing in disguise. (Engineer, Female)

- Every now and then one needs to ask something quite stupid, so stupid and stupid one asks, so I don't have any problem to ask anyone and you get the answers quite well. So many are in the same boat and you just need to ask. And mistakes are openly admitted. This morning was the latest [incident] when I have let the others know that it was my mistake. I don't think that we have a problem in saying something like that aloud. (Manager, Female)

- So you know, this really demands this kind of chameleon type of adaptability, so if you don't want to be involved in this, you must then move to some other kind of work. This probably doesn't suit everybody. Could be quite oppressive too. (Assistant, Female)

- Tolerating unclarity, tolerating changes, the fact that it doesn't matter if there are a thousand unfinished things, and the fact that you can deal with them in parallel. (Manager, Female)

The third challenge was that of *collaborating*. This challenge was already addressed in *Section 8.3* in connection with integrating over boundaries through network ties. These skills are needed in interface work and in detective work. In an environment with heavy interdependence *collaboration skills*, *networking skills* and *interpersonal skills* are essential. "Keeping your network up-to-date is actually, you know, learning as well. It's one of your important capitals." In order to take things forward in the networks one needs to have good persuasive skills and influencing skills. Virtual working mode has further enhanced the importance of these features. The new type of trust, temporary, project-based and need based, supports this kind of practice. "Ask anyone" culture further enhances it. The expertise that leans on heavy interdependence and is heavily contextual is inseparable from its constituting practice and cannot be "transferred" or moved. (At best, what can be transferred is data or information.) Heavy interdependence (checking up with those who know best) can be considered a consequence of the changing characteristic of knowledge. One also needs to trust the surrounding network and undertake heavily interdependent network.

You need to be collaborative, so that you need to be able to get along with practically anybody. So quite rarely do we encounter those kinds of people who are on a collision course with someone. (Assistant, Female)

If we think of this Group Manager's work, so the interpersonal skills, a lot, and the kind of mastering bigger entities. They are perhaps the ones. (Manager, Female)

It is like when you needed, as a newcomer, to learn like in one year or so, I sort of learnt things in a year, so if I didn't know how to do something, there was always someone who knew how to do it, so I always got it, so the question was always of "how I am as a person?", that "can I utilize the knowledge and can I be flexible and perform and adapt to

the package?” ... So I have learnt here a great deal of the kind of skills... that I definitely am much stronger in my work now compared to what I would have been without Nokia. The capabilities that developed, they were totally different, maybe not the substance and the expertise as such, that is kind of narrow but the other skills, you know the networking skills. I am able to build networks in quite a different manner, when I have noticed that others do so and it is already kind of natural for me. (Specialist, Female)

The fourth challenge is related to *completing* things. In a volatile environment one needs to constantly adapt to a changing environment. At the same time one must not let uncertainty interfere with *completing* what one is doing. The *capacity to take risks* and *confidence* are needed to take things forward. The tasks one needs to assume are often of a kind never encountered before. Especially in radical boundary crossings there is a need to take a risk. “I kind of respect the management that gave me this chance and yes, in the beginning we talked that this is a risk so that we either succeed or then do not succeed and obviously we haven’t completely screwed up.” Also, the fact that the content of the job roles is constantly changing necessitate a courageous mindset. The *capability for self-direction and self-organising* is one requirement to these well-educated and selected people. They need to have good self-knowledge and self-confidence, to have *initiative*, to *take action independently* and have *self-management skills*. They need to be *persistent* and *active* in taking things forward. “It is not enough to be an expert, you also have to use your expertise so that it ends up in some, tangible achievements and results.” “We reward more the performance here than whether someone has learnt something.” This is related to the performance-based culture. Some also mentioned the flexibility, *imagination* and *organising skills*. “I guess it depends on the people and their attitudes. You need to be ready to flex and you need to have imagination and organising skills. Basically you need to have that readiness for change all the time.” “The kind of continuous pursuit of your own objective; in this organisation you have always needed to set your own target again and again. I am doing it all the time and I already do it quite naturally. It is a learnt thing.” One needs to be able to see the big picture and to decide on one’s own what needs to be done next. It is also about *prioritization skills* based on understanding the big picture and the interrelated parts. “You just need to put things into order of priority.”

- Then the kind of adaptability to a certain kind of chaos, so that you won’t be puzzled if there is some shit coming, so you don’t lose your nerve altogether and you can maybe a little think that “I’m doing it anyway”. (Specialist, Female)

- And the kind of courage when you have been forced to grip things that you don’t damned well understand anything at all about... Still you have grown this kind of courage to seize things you don’t know anything about, just to take them naturally even though you don’t know anything. (Specialist, Female)

- At the beginning when they say to start specifying! You feel that oh no! It is not going to work! It ain't just gonna work! So, a horrible struggle in your own mind that "can I do this? Do I have the capacity?" (Engineer, Female)

- I would think first the kind of free and initiative taking action is, kind of, favoured here. So that everybody should take the initiative in such a way that here you don't necessarily get kicked on your ass quite that much... That's the way I have always thought and I would like everybody else in the project to think that we wouldn't always think of only one's own slot but all the time we would do the stuff as widely as possible, not in a way that these are my tasks and your tasks, but in such a way that if you realize there's a problem somewhere, then you start working on that yourself and not always think "that's none of my business". So this kind of thing in my opinion is emphasised here. So maybe this is just that the working atmosphere and then this kind of initiative. (Project Manager, Male)

- In my opinion here, a really active touch is required so that you are active yourself, so that you make yourself useful to the process and product, so the kind of flexibility and breaking of barriers benefits everybody, and is beneficial for the organisation, so that you have the courage to be active, so that one isn't lulled into one's own niche, so that one is motivated to do well one's own job. (Engineer, Female)

- If you don't keep alert around here so you can surely be buried in your stuff and in a couple of weeks' time no one even remembers you're there. (Senior Manager, Female)

#### 8.6.4 SUMMARY AND INTERIM DISCUSSION

In *Section 8.6* I brought enumerated *features of expert work* and *flexible experts*. The purpose was specifically to highlight aspects related to the nature of expert work that emerged from the data. The section was divided into three sub-sections. The first sub-section dealt with the *constant need to extend the boundaries of one's expertise*. The second section dealt with "*detective work*" as *one means to cope with one's work in a boundaryless environment*. The third sub-section dealt with some *features of flexible experts* that enhance people's capability to cope with their own work within a boundaryless environment. Based on these features I presented a list of *challenges* and *questions that the experts constantly need to consider* in their work.

Building up one's expertise in a certain job role often appeared like an *amoeba* (see *Figure 49, p. 298*) where there is a need to extend in different directions depending on the situation: *past, present and future*. One needs to learn the daily tasks, possibly unlearn the past, return from time to time to the historical versions of the product. Possibly one needs to learn outside of the current scope, within the current project scope (mid-term) or about long-term future things (like technologies, standardization, strategies). Learning is a pre-requisite for product development work. At the

same time it is almost a kind of *medium of exchange*. Often people *expect new learning experiences* and accept new jobs according to how much they can learn from it. A few interviewees seemed to have become almost *addicted to learning*. Are they the brave new race or have they adopted the company's formal discourse more thoroughly than others (cf. Isopahkala, 2005)? Do they derive satisfaction when they are in a steep learning curve and out of their comfort zone? In the learning phase even things that would later feel like routines are new and fresh.<sup>66</sup> The paradox is in balancing what needs to be learnt for one's current (changing) job role and what would possibly be useful for the current job in the future and for possible future jobs. This balancing is related to the *tension between the reactive mode of expert work and the proactive mode of expert work*. In the proactive mode there is time to prepare for the future requirements proactively. In the reactive mode the requirements for one's expertise need to be fulfilled here and now according to the emerging needs. Extending one's expertise in various directions occurs on the spot, here and now. The tension and paradox are caused by the *blurry boundary of one's expertise* and the constant need to extend the needed expertise. Further, knowledge is constantly changing and one's expertise is dependent on the expertise of others.

The so-called *detective work* proved to be an important means to cope with one's work in a boundaryless environment. Detective work is about going from "counter to counter", i.e. contacting different people in order to find "cues" that would help disentangling the problem at hand. Detective work is an ongoing practice and it is related to the changing nature of knowledge. A striking feature of detective work is the immediacy of the knowledge needed. The problems often arise unexpectedly and one cannot postpone finding what one is after for too long. When doing detective work one also gains needed information and knowledge and builds up expertise in a reactive way.

The *features of a flexible expert* took shape around four important challenges and the questions related to them. The first is the *learning challenge* that manifests itself as questions like: How can I learn about my task? How can I hit a moving target? How are things interrelated? The second is the *adapting challenge* that presents the question: How do I adapt to the changing circumstances? The third challenge is related to *collaborating* with others: How do I work with others? The fourth challenge is the *challenge to complete*. The related questions that a flexible expert faces are: How do I get things rolling and completed? What needs to be done first and what next? The questions and challenges were derived from the features that the interviewees regarded as the most important in coping with their daily work in the case company. Features needed to cope with the *learning challenge* are learning mindset, meta-learning skills and sketching the big picture. Tolerating uncertainty, fatalism and humility are significant features in coping with the *challenge to adapt*. *Collaborating challenge* can be

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66. In any case the performance management system is planned to ensure that from each job role there also needs to be output.

overcome with collaboration, networking and interpersonal skills. Features related to the *challenge to complete* bring to the surface features that are close to improvisation and self-organising: capability for self-direction, initiative, self-management skills, persistence, activity, prioritization skills, risk taking capability and courage. Overall the features listed here form a sort of *stretch competence* or *amoeba competence*. *Such competence set is an important part of expertise when everything is in a state of flux.* (cf. Döös et al., 2005) The boundary dynamics in this section were related to expertise. Next I will summarise the overall findings and results of this study.

## 8.7 SUMMARY OF THE RESULTS

I have summarised the main findings related to each results section as a final subsection. Thus, *Sub-sections 8.1.6, 8.2.3, 8.3.5, 8.4.5, 8.5.5 and 8.6.4* summarise the results and findings related to the work context and environment in the case organisation, boundaries and dynamic links over the borders, integrating over the boundaries through network ties, job roles, careers and expert work. This section will summarise and discuss the overall findings and results of this study.

### 8.7.1 NATURE AND DYNAMICS OF THE BOUNDARIES IDENTIFIED

In general people considered that changes within their work context are recurrent and a natural part of their work. Based on how the interviewees described their work, *a set of factors that can change and cause changes in individual people's work and job roles* was identified (see *Figure 21, p. 147*). *Structural factors* are more often things related to how things are organised e.g. organisational structures. Other structural factors may be interfacing job roles, team, manager, location, generic tools, organisation (e.g. function) or process phase. *Integral factors* are more related to what is being made, for example products and what needs to be done inside the product. Other integral factors are projects, product development tools, technologies, domains, processes or process phases. Many things affect these structural and integral factors, for example strategic priorities, project schedules, customer requirements, standardization, technology development, market changes, partners and partner relations. All these can change and have an effect on an individual and his/her work in a certain job role. Consequently the needed competencies and skills (integral side) and also the formal job profile, job description, grade or title (structural side) can change. Changes in structural and integral factors affect the boundaries in people's work and their work environment.

Indeed, the boundaries in the work contexts of the people interviewed were numerous and volatile. The *boundaries that people encounter in their work* may be

*geographical, temporal, time-line (history-future), social, cultural, technological, political, vertical organisational, horizontal organisational, external and customer boundaries.* (This list of boundaries is mostly based on Orlikowski (2002) and Ashkenas et al. (1995).) From the individual employees' perspective it seemed that people boundaries (cultural, social and political), time & space (geographical, spatial, temporal and time-line) and horizontal structural boundaries had become *more permeable*. It likewise seemed that vertical organisational boundaries as well as external boundaries (customers and partners and subcontractors) had become *more impermeable*. In the case of technological boundaries *conflicting drivers* pulling in both permeable and impermeable directions were identified. There probably are such contradictory forces in the other boundary types, too; the aim was to generalise to some extent the permeability of the boundaries and how they had developed before the time of the interviews. These are examples of *patterns* related to the *dynamics of boundaries*. The boundary dynamics identified is about *permeability or impermeability of boundaries*.

In *Section 8.1* I described the context and environment in the case organisation from the systemic perspective by using the frameworks of the activity theoretical model, DOCAS (dynamic, open, complex, adaptive systems) and social systems. *Organisational change* appeared as an important *catalyst that reconfigures boundaries in the organisation*. Organisational changes were often perceived to be changes in organisational structures (organisational design and reporting lines). However, organisational changes were also seen as the impetus for changing processes, people, interfaces, networks or mode of operation. It would probably be possible to study this phenomenon more in detail from the perspective of boundary between the *management activity system* and the *implementation activity system*. The findings hint that the organizational changes are actually changes in the management activity system and that they are more frequent than the changes in the actual implementation activity system.

*Open state* as conceptualized in this study is a state where a certain change (having an impact on the organisational structures) is announced. At the beginning of the open state only partial information on the implementation is known. The implementation is worked out in dynamic and emergent processes involving participants in the planning to varying extents and phases. During an open state *the organisational boundaries are questioned and possibly re-configured*. People described the organisation as messy, chaotic, and dynamically changing. People are expected and willing to take things forward even in messy and crisis situations and stretch if needed. Continuous *interface work* on individual, team and organisational levels is related to the quest for and possible re-configuration of the boundaries. Organisational changes are also the *catalyst that often enables a flux of job role changes based on people's performance*. In other words, job role transitions and career boundary crossings often take place during the organisational changes. Some people move to the new organisational setup as *individual movers* (more often managers, those in support functions and possibly specialists) and some *within modular teams* (more often designers and engineers). The

boundary dynamics identified is about *shaking up boundaries (catalysts that reconfigure boundaries)*.

*Dynamic links over borders* as conceptualized in this study are elements that increase the alignment of the parts of the system over boundaries. These elements enhance the synchronization, coherence and integration of the whole system. Elements linking over the borders are needed in an environment where the parts of the system are in constant motion. Some of the elements linking over the borders identified in this study are *explicit and systematic* (projects, processes, milestones, strategy cascading via the individual objective setting system, R & D incentive/bonus system, systematic means to transfer an object of activity or related knowledge to another activity systems: competence transfer, handover, induction, product competence transfer). Some were *ad hoc or implicit*: role switching, duo working, looking at an issue from the company overall perspective (“putting the Nokia hat on”), familiarizing with the process phases horizontally and strong shared identity. The ad hoc and implicit links over the borders are the type of elements that are either about self-organising practices or they enhance self-organising in an organisation. The boundary dynamics identified are about dynamic links over the borders.

In an environment where the boundaries are multiple and in constant motion, there is also a constant need to integrate over boundaries. *Integrating over boundaries* is about *collaboration* and *social capital*; it is done through *network ties*, sometimes using IT mediated tools. In agile organisations the trust is project like and constantly changing. *A varying set of meetings and knots* was used dynamically by the interviewees for different purposes ((formal) meetings, info sharing sessions, trainings, workshops, ad hoc knots and gatherings). *Workshops* seemed most often be spaces for collaborative inquiry, negotiation and development effort. I propose that the *practice of workshops* in the case organisation, as described by the interviewees, could be close to the kind of institutionalized learning activity that Engeström (1987) and Ahonen & Virkkunen (2005) refer. *The boundaries of meetings and knots are blurry and open* in two senses (depending on the confidentiality of the issues to be addressed). First, there is a *continuous negotiation of optimal representation over boundaries* to attend a meeting or a knot. Second, information and *knowledge* created in meetings and knots *is cascaded over the boundaries* to the relevant network of each participant. Sometimes this cascading may take place on-line. Overall, *the boundary between individual and collaborative work is blurry*. *People constantly navigate between collaborative, hybrid mode and individual work* depending on the contextual factors. These implicit social rules related to integration over boundaries allow and enhance dynamic self-organising to take place in the organisation.

## 8.7.2 NATURE AND DYNAMICS OF BOUNDARIES RELATED TO JOB ROLES, CAREERS AND EXPERT WORK

The job role structure in the case organisation appeared as a *reconfigurable patchwork* or a *structure of job roles*. The boundaries of people's job roles and responsibilities are collaboratively constructed in this dynamic structure of job roles. Gaps are filled in and overlaps removed by negotiation. There is a continuous definition work to negotiate one's own positioning and its relation to other positions in the reconfigurable patchwork. The contents of people's job roles are discretionary i.e. the boundaries around job roles may be relatively blurry within the defined scope and grade of the job. The boundary around the job roles forms flexibly according to the requirements and expectations but is also based on the context, tasks at hand, and the interests, competencies and skills of the individual. It seems that the *task boundary* (*who does what?*) (cf. Hirschhorn & Gilmore, 1992) *has developed to a more permeable direction. The boundary between a change in the context of one job role and an actual job role change is blurry*. There are two perspectives on how people move within the reconfigurable structure of job roles. The first features an *active element* (style, interests, competencies, skills). The second element is more *passive* from an individual's perspective and manifests itself as "*drift theory*" or filling jobs based on "*availability*". From a systemic perspective it is about self-organising to fill gaps and reduce overlaps in the reconfigurable patchwork.

If the job structure overall was dynamic and flexible, there still seemed to be certain structure of main job role types in the case company. *A combination of more unbounded and more bounded job roles* forms a reconfigurable structure of job roles in the volatile environment. The job roles of *managers, project managers, horizontal specialists* and those in *R & D boundary roles* seemed to be *more unbounded*. In these roles there is a more extensive need to reach out from one's own patch and to collaborate with others more widely. The roles of *vertical specialists* and especially *engineers/designers* seemed to be more bounded. They can concentrate on a narrower slice of content and the need to integrate over boundaries is not as extensive as with those in *more unbounded* job roles. This structure enables both vertical and horizontal knowledge building, thus contributing to the viability of the whole system. The informants emphasised the importance of "*authority over content*". Content authority is possessed by the one/those knowledgeable of the integral part of the system (technologies, projects, products). The importance of content authority was emphasised in relation to line management type of authority. The results indicate that *authority based on line management role/reasons is shifting towards authority over content*. The boundary dynamics referred to above are related to job roles, tasks and authority. Within this kind of environment the boundaries around job roles and tasks have become blurry and the job role changes are recurrent.

*Careers* were investigated from the *career boundary crossing* perspective: the driver of the transition, the direction in the organisational structures, the nature of the transi-

tion learning wise and the transition experience. Career transition *drivers* as described by the interviewees may be *active, planned, drifting* or *dictated*. Two types of boundary crossings were identified in terms of the amount of learning involved (*nature*): *evolutionary* and *radical* boundary crossings. Regarding the *direction* of career boundary crossings, three different categories were identified: *horizontal, upward vertical* and *downward vertical*. The *personal transition experience* may be *rewarding, neutral* or *negative*. The driving force and nature of transitions do not incontestably anticipate how the boundary crossing is subsequently experienced.

Some *boundaryless features of careers* seemed prevalent in the case organisation but again there were also some *bounded features*. On the one hand, the opportunities and premises seem to be in place for whoever is willing and able to make use of the numerous career opportunities. A large organisation with a wide range of different types of job roles provides opportunities to seek for even unique careers (cf. Svejnova, 2005). For some the intra-organisational careers had indeed become less standardized and predictable. For many the “myriad of individual experiences” (cf. Dany et al. (2003)) seem to have increased due to the relatively blurry boundaries and people’s continuous movement within the reconfigurable job role structure. On the other hand, there were several who thought that there could be even more of “job rotation” in the company for themselves and for others. Radical career boundary crossings were relatively few. Interorganisational career boundary crossings were also rare. From the perspective of this study the “job leaps typically taking place across countries, functions or processes of the company” proposed by Gratton (2005) seem somewhat optimistic. The boundary dynamics referred to above are related to careers and career boundary crossings.

Building up one’s expertise in a certain job role often appeared as an amoeba where there is *a need to extend in different directions depending on the situation: past, present and future*. One seemed to need to learn about one’s daily tasks, possibly unlearn the past or return from time to time to the history versions of products or technologies. Possibly one needs to learn outside of the current scope, within the current project scope (mid-term) or future long-term things like technologies, standardization or strategies. The paradox is in *balancing between the reactive mode of expert work and the proactive mode of expert work*. In proactive mode there is time to prepare for future requirements proactively. In reactive mode the requirements for one’s expertise are fulfilled on the spot, here and now, as need dictates. The tension and the paradox are caused by the *blurry boundary around one’s expertise and a constant need to extend one’s expertise*. The knowledge needed is constantly changing, the job roles are changing often and one’s expertise overall is interdependent on others’ expertise. “*Detective work*” is one important means to cope with one’s work in an environment where boundaries are multiple and volatile. Detective work is about integrating over boundaries with numerous people, “going from one counter to another” in order to find about a problem until it starts to open up through the clues one finds along the way. Detective work is at the same time about information seeking but also extending one’s expertise in a reactive manner.

Boundary related phenomenon	Parameters that can describe dynamics and nature of the phenomenon	Dynamics and nature of boundaries in the case company
Boundaries	<ul style="list-style-type: none"> <li>- Permeability and impermeability of boundaries</li> <li>- Boundary erosion, boundary thickening, conflicting permeability drivers</li> </ul>	<ul style="list-style-type: none"> <li>- People, time &amp; space and horizontal organisational boundaries had become more permeable (boundary erosion).</li> <li>- Vertical organisational boundaries and external boundaries had become more impermeable (boundary thickening).</li> <li>- Conflicting drivers with technological boundaries</li> </ul>
Reconfiguring boundaries	<ul style="list-style-type: none"> <li>- Catalysts that reconfigure boundaries</li> </ul>	<ul style="list-style-type: none"> <li>- Organisational change manifests as a catalyst that reconfigures boundaries (organisational boundaries are reconfigured, job role and career transitions are enabled, new network ties are created).</li> </ul>
Integrating over boundaries (collaboration)	<ul style="list-style-type: none"> <li>- Boundaries of meetings and knots</li> <li>- Boundary between individual and collaborative work</li> </ul>	<ul style="list-style-type: none"> <li>- A varying set of meetings and knots is dynamically used for different purposes.</li> <li>- Boundaries of meetings and knots are blurry and open: continuous negotiation of optimal representation over boundaries, cascading the knowledge over boundaries to the participants' interest groups and networks.</li> <li>- Continuous navigation over the boundaries between collaborative work, hybrid mode and individual work</li> </ul>
Dynamic links over the borders	<ul style="list-style-type: none"> <li>- Explicit, systematic links over the borders</li> <li>- Ad hoc, implicit links over the borders</li> </ul>	<ul style="list-style-type: none"> <li>- Explicit and systematic links over the borders: projects, processes, milestones, strategy cascading via the individual objective setting system, R&amp;D incentive/bonus system, systematic means to transfer an object of activity or related knowledge to another activity system: competence transfer, handover, induction, product competence transfer</li> <li>- Ad hoc or implicit links over the borders: role switching, duo working over a boundary, looking at an issue from the company overall perspective ("taking the Nokia hat on"), familiarizing with the process phases horizontally and strong shared identity</li> </ul>
Job role boundaries	<ul style="list-style-type: none"> <li>- Boundaries around job roles (more bounded roles and more unbounded roles)</li> <li>- Job role structure</li> <li>- Task boundary</li> <li>- Authority boundary</li> </ul>	<ul style="list-style-type: none"> <li>- The boundary between a change in the context of one job role and a proper job role change is blurry.</li> <li>- Job role changes are based on both active elements (people's activity) and passive elements. Passive elements manifest as a "drift theory" and filling jobs based on "availability".</li> <li>- Task boundary ("who does what") has developed to a more permeable direction,</li> <li>- A combination of more unbounded job roles (managers, project managers, horizontal specialists, R&amp;D boundary roles) and more bounded job roles (designers/engineers, vertical specialists) form a reconfigurable structure of job roles.</li> <li>- Authority based on line management role/relations has shifted towards "authority over content".</li> </ul>
Career boundaries	<p><u>Career boundary crossings</u></p> <ul style="list-style-type: none"> <li>- Drivers: active, planned, drifting, dictated</li> <li>- Nature (learning wise): evolutionary, radical</li> <li>- Direction: horizontal, upward vertical, downward vertical</li> <li>- Transition experience: rewarding, neutral, negative</li> </ul> <p><u>Careers</u></p> <ul style="list-style-type: none"> <li>- Boundaryless features of careers and bounded features of careers</li> </ul>	<ul style="list-style-type: none"> <li>- The driver and nature of career boundary crossings do not uncontestedly anticipate how the career boundary crossing is later on experienced</li> <li>- Boundaryless features with the careers: opportunities and premises in place, some careers less standardized and predictable, the myriad of people's individual job roles and career experiences seemed to be enormous</li> <li>- Bounded features with the careers: more "job rotation" (job role changes) are sought, few radical career boundary crossings, few interorganisational career boundary crossings. Many had evolutionary careers within R&amp;D, which in any case entail a great deal of learning and development.</li> </ul>
Boundaries of expertise	<ul style="list-style-type: none"> <li>- Extending the boundaries of expertise in various directions: present moment, past, mid-term future, long-term future</li> </ul>	<ul style="list-style-type: none"> <li>- Blurry boundary around one's expertise and a constant need to extend one's expertise</li> <li>- Tension between a reactive mode of expert work and a proactive mode of expert work</li> <li>- "Detective work" as one means to extend one's expertise in a reactive manner</li> </ul>

**Table 12.** Parameters related to boundary dynamics and nature and findings from the case company

The features of a flexible expert formed around four important challenges: *learning, adapting, collaborating and completing*. The features supporting these challenges form a sort of a *stretch competence* or an *amoeba competence* which is an important part of expertise when everything is in a state of flux (cf. Döös et al., 2005). The features supporting these four challenges are: learning mindset, meta-learning skills, sketching the big picture, tolerating uncertainty, fatalism, humility, collaboration skills, networking skills, interpersonal skills, capability for self-direction, initiative, self-management skills, persistence, activeness, prioritization skills, risk taking capability and courage. The boundary dynamics referred to above are related to expertise.

### 8.7.3 SUMMARY OF FINDINGS

Above I have summarized some findings related to the nature and dynamics of boundaries in the case organisation. *Table 12* shows a set of parameters that can be used to describe the dynamics and nature of the boundaries at work. The table also gathers features related to the dynamics and nature of boundaries identified in the case company. The ultimate interpretations on the parameters that can describe the dynamics and nature of the boundaries are not completely aligned with each other and comparable (cf. Miles & Huberman, 1985, p. 227). They are different, as are the phenomena they are related to. Thus, the below parameters are tentative proposals on how the boundaries could be approached in contexts where they have become ever more important.

Overall it seems that boundaries are numerous, volatile and blurry. Both systematic and ad hoc links over the borders are in-built in the organisation to ensure the alignment and synchronization of the whole across the boundaries. People constantly negotiate between the individual work, hybrid mode and collaborative work. The type of meetings and knots to be convened, and whom to invite, is dynamically dependent on the situation. Techniques like sending on-line memos are used to cascade the information or generated knowledge from the meetings and knots forward over the boundaries. In order to do their work people need to plunge into “detective work” techniques to navigate within and over the boundaries in their work context. The boundaries around job roles often seemed to be rather blurry and the need to extend one’s boundaries of expertise in everyday work was great. On the other hand, there were many bounded features in the careers, especially within the major social system of R & D/engineering.

The starting point in this study was boundaries and boundarylessness, which I had adopted from studies proposing boundaryless organisations (cf. Ashkenas et al., 1995) or boundaryless careers (cf. Arthur & Rousseau, 1996ab, Arthur, 1994). Throughout the study I have discussed boundaryless organisations or boundaryless careers and the whole study was a venture into the concept of boundary from the perspective of individual employees in a case organisation. My aim was to investigate

the very concept of boundaries, whether they exist and if so, what are their nature and their dynamics. My aim was also to plunge into the job roles, careers and expert work as described by people working in the case organisation and to study whether any boundaryless features exist in these and if so, what are their nature and dynamics. In *Section 3.7* I defined *boundaryless work* in the following manner:

In this study boundaryless work is defined as the kind of work emerging in a context where efficient boundary work is enabled and enhanced through various tools and practices. It does not mean that in such a context the boundaries are non-existent. Boundarylessness or boundedness is a continuum of conditions and features in different organisations. The question concerns the extent to which people know how to navigate (articulate and engage with) and negotiate (redefine, reconstruct) the boundaries in a certain organisational context. As a consequence of all the changes and developments described so far in this study, people's job roles, careers and expert work overall have likewise been compelled to change. They have become more unbounded and amoeba-like... Boundaryless work refers to something that is more unbounded in a relative sense compared to work organisations in general. It refers to the kind of environment that requires and enables people to stretch and cross boundaries at least in their job roles and expertise... From individual employees' perspective, boundaryless work demands the willingness and adaptability to stretch regarding discretionary job roles, "boundaryless careers" and flexible expertise. Boundaryless work is also rewarding to employees in providing interesting and challenging work, opportunities and learning in a volatile environment often at the cutting edge of the business concerned. (see *Section 3.7*, pp. 75-76)

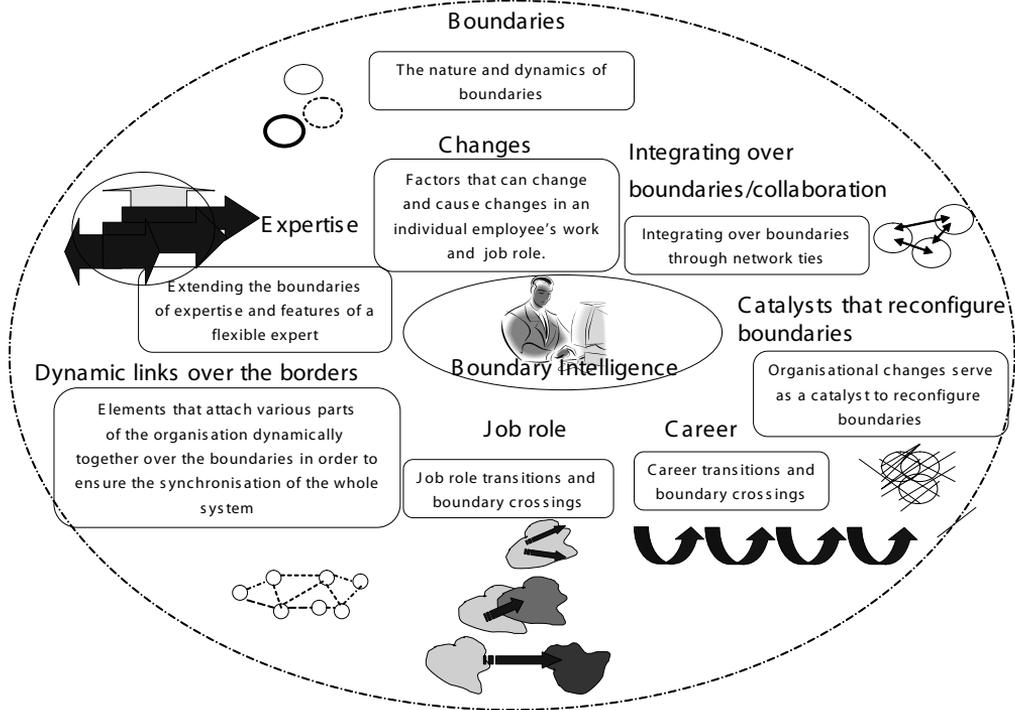
In most cases there are various drivers and consequences with changes in boundary dynamics. For example, efforts to clarify and simplify a certain boundary can cause that specific boundary becoming more rigid and more difficult to cross. One case example is the centralising of the external boundary crossing points towards customers and partners in the case organisation. This has caused a feeling that the customer and partner boundary had become more rigid from the employees' perspective in general. Secondly, reconfiguring organisational structural boundaries during organisational changes seemed to make horizontal boundaries more permeable but at the same time possibly contributing to vertical boundaries (hierarchies) becoming more rigid. It needs to be borne in mind that the findings are related to a specific moment of time in the organisation, they feature the perspective of a certain set of interviewees and there are probably multiple factors affecting to the reported boundary dynamics and how the interviewees perceived them. Boundaries are not simple and cannot be approached with a simplistic mindset. What can be evinced at best are tentative patterns in the nature and dynamics of boundaries. Thus, conclusions and generalisations require caution.

The quantity, quality, nature and dynamics of the boundaries vary over time in different organisations, contexts and from different individuals' perspectives. In my view the ultimate goal is not to reduce the boundaries and make them disappear

wherever possible, nor is the goal to make all boundaries as permeable as possible. The goal is rather to make boundaries permeable wherever needed in an intelligent manner. What is important is to *understand the importance and dynamics of boundaries and how to play with them in an intelligent manner*. There are cases where one needs to consider protecting a boundary around an organisational entity or a person. For example, modular teams can be considered as the key guardians of Nokia key process knowledge (cf. Gratton, 2005) and thus not to be dissolved at least too often. Several managers also thought it was one of their tasks to protect their specialists so that they can fully concentrate on their specialist area (and not mingle with various other areas and tasks around and readily available).

*Boundary intelligence* requires awareness of work-related boundaries. Pauleen & Yoong (2001), for example, have equally urged for this kind of awareness and skilful use of related tools. Understanding the nature and dynamics of boundaries and knowing how to play with them in an intelligent manner can help individual people to make their own work and others' work more sustainable in volatile environments. For instance, it is important to create intelligent career boundary crossing skills so that individual people can make their own careers sustainable. A part of intelligent boundary crossing skill set is the ability to evaluate career boundary crossings from the perspectives of driver/catalyst, nature learning wise, direction and experience. It is equally important to understand the boundaries related to the way people dynamically integrate over boundaries or extend their expertise and to learn to play with these elements in an intelligent way. Likewise, from the organisational perspective managers and HR practitioners need to understand the emergent dynamics and nature of boundaries so as to be able to develop related HRM and HRD practices further in an intelligent way.

*Figure 47* shows what areas surfaced when considering boundaries from individual R & D/ product development employees' perspective. This figure also shows the areas I recapped above in order to answer the research questions of this study. It equally shows the areas and boundaries people need to be knowledgeable of in order to be able to navigate and negotiate them in an intelligent manner.



**Figure 47.** Boundary intelligence: areas to be considered when focusing on boundaries from individual R & D/product development employees' perspective

#### 8.7.4 PRACTICAL PERSPECTIVE

In agile organisations featuring boundaryless type of work, people should develop their *boundary awareness* and their *boundary intelligence*. Individual employees need to understand the boundaries and their dynamics in their work, job roles and careers. Understanding these boundaries and learning to play with them in an intelligent way is crucial for people to make their own work and life more sustainable. Conversely, from an organisational perspective, the managers and HR practitioners need to understand the boundaries and their emergent dynamics to be able to develop the HRM and HRD practices further in an intelligent way. Even though the findings of this study related to the dynamics and nature of boundaries are tentative and fleeting, they might help employees and practitioners to consider their work and practices from the boundary perspective.

In light of the results and findings, there might be room for improvement in some areas in the practice of the case company. One is the *job and career related terminology* used in the case company. Expressions like job rotation, and their definitions inherited from earlier phases of work design can confuse people (cf. Dyer & Ericksen, 2005).

It would be useful to continue to coin terms and concepts that reflect the new era of work design. Three perspectives meshed in career conceptions and descriptions of the informants: firstly the traditional, hierarchical career pattern, secondly the company official career discourse (career self-reliance, learning and development) and thirdly the real life that raises numerous opportunities but also self-organising type of phenomena like “drift theory” or placing people based on “availability”. Some of the concepts generated by the findings in this study could possibly be useful in organisations, for example *evolutionary* and *radical boundary crossings*. Possibly more emphasis could be placed on *enhancing the concept of career self-reliance* that stresses the initiative in one’s career. This does not mean that managers should withdraw from career and development discussions with their people. The habit of a *manager acting as a mirroring interface to their people’s career considerations* was perceived positively and could be further enhanced. In an environment where managers change often, they can all provide a different view and ideas to their people.

There may also be room for steps to *make the official job role and career infrastructures more flexible* to mirror the needs and requirements of the everyday work context. For example, tying people to flexible pools of expertise combined with project based temporary assignments might be more flexible compared to fixed positions (that often change during the organisational changes.) This type of flexible structures might even reduce the need for changes in organisational structures (organisational changes). At the same time there is equally a need to pay attention to find the *balance between flexibility and stability* in order to make the workplace sustainable. Issues like *career expectation management* or *age management* could be on the agenda of development efforts in the case organisation. Further, there might be space for enhancing and possibly *institutionalising the horizontal feedback channels*. Along with the development of horizontal boundaries turning more permeable, the significance of horizontal and diagonal feedback has grown. Yet the in-built practices and tools in the organisation are built on vertical feedback channels. All these findings are based on the interview (and survey) data gathered mostly in 2003, so the situation in the case organisation may have changed since or some of these issues may have already been addressed.

## 9. RELIABILITY AND VALIDITY

This study is located at the multidisciplinary crossroads of adult education (workplace development and learning), organisational sciences, management studies and sociological perspectives. Its validity and reliability is considered in terms of criteria set for qualitative case studies. Within qualitative research there is no established definition or notion for the evaluation of reliability or validity (see e.g. Syrjälä et al., 1995, Merriam, 1989). Whether one wants to use the traditional terms of reliability and validity or the criteria proposed by Lincoln & Guba (1985): credibility, transferability, dependability and confirmability, the question remains the same: to what extent can the researcher trust the findings of a qualitative study? (Merriam, 1988, p. 166)<sup>1</sup> The evaluation of these concepts should be an integral part of the whole research process. The evaluation should be made against what was originally the starting point for the whole study; in this case a qualitative, explorative case study.

The first criterion, *credibility*, is about showing that the reconstructions of the realities of the research participants correspond to the original constructions. In light of qualitative research it is not possible to show the realities as such, only reconstructions of them. The second, *transferability*, concerns the generalisability of the research findings. The third criterion, *confirmability* is about ensuring the truthfulness and applicability of the research using various techniques. Research cannot capture reality but rather some angles and perspectives on reality; subjective perspective is inevitable. The fourth criterion, *dependability*, is about evaluating the context (external factors causing variation, the research itself and the phenomena under study). It is important to open up any *contextual factors* in order to improve the evaluation of the reliability and validity of the study. In a case study contextuality is the starting point of the whole approach.

1. Lincoln & Guba (1985) propose using *truth value* for internal validity, *transferability* for external validity and *consistency* for reliability. In traditional terms, internal validity deals with the question how one's findings match reality. External validity is concerned with the extent to which findings of one study can be applied to other situations. Reliability refers to the extent to which findings can be replicated. (Merriam, 1995, pp. 166-173)

Several procedures were conducted so as to ensure sufficient visibility of what credibility, transferability, dependability and confirmability are in this study. I have tried to describe my data, the research process and analysis so that a reader can evaluate how and in what terms it would be possible to transfer findings or parts of them from this study to other settings. The detailed description of the whole research process in *Chapter 6* is intended to provide a possibility to assess the process from the reader's own perspective and to consider possible cases for generalisation. I also endeavoured to explicate my ontological and epistemological standpoints in *Section 6.1* and my own perspectives and limitations in *Section 6.2*. This was done in order to enable the reader to evaluate and consider the reliability and trustworthiness of the study. (Lincoln & Guba, 1985, Tynjälä, 1991) This concerns the transparency of the research. The usability of the research results through generalising is thus partly left to the readers.

Different methods are used to gather information concerning the research phenomenon so as to *triangulate* or *cross-validate* the results. I have also attempted to assess the strengths and limitations of the each method during the research process (Marshall & Rossman, 1995, p. 81, 99). In this study I have gathered data via interviews, survey and observation, thus using both quantitative and qualitative methods. In case studies it is actually recommended to collect different types of data by different methods from different sources in order to produce a wider scope of coverage and a fuller picture of the phenomenon under study (Järvinen, 2004, p. 74). (I could even claim that there are attempts at theoretical triangulation in this study to illuminate different aspects of the phenomenon. (cf. Tynjälä, 1991, p. 393)) I have also tried to maintain a reflective approach to myself as a researcher in all phases of the study. As for the communicative validation, one colleague with a long history in the case company regularly read the study during the process, provided comments and discussed the research process and findings with me (Kvale, 1995). This is member checking (Lincoln & Guba, 1985) or getting feedback from the informants (Miles & Huberman, 1985). A couple of other colleagues in different phases of the process read the report and provided comments. This is peer examination (Tynjälä, 1991). The discussion within the research community was ensured by the seminar work, sharing and discussing the research process and the results with those conducting further studies in the same field. Further, three conference papers on this research have been produced. (see e.g. Miles & Huberman, 1985, pp. 230-243, Tynjälä, 1991, Järvinen, 2004, pp. 73-75)

Several *threats, question marks or weak points* have been identified with this research and were paid special attention during the whole research process. The first of these was related to myself as a *researcher*. Excessive identification with the case community possibly does not allow an objective analysis of the data. I may be biased in my preferences for selecting relevant issues from the research data based on my own experiences of working in the organisation. My own perspectives (employee, HR practitioner, researcher with experience of R & D boundary roles and background education in humanistic and educational studies) are a prevailing fact and certainly affected the

way the research was conducted. Usually it is beneficial if the researcher has experience of the everyday life of his/her research environment (Saarnivaara, 1996, p.9). On the other hand, he/she may have become so familiar with the features of the everyday life of the research participants that they may become invisible (Merriam 1989, p. 165). To avoid this it has been essential to have people working in the case company read the report and comment on how it depicts reality from their perspective. Another important thing was that there were two specific research leave periods when I was able to detach myself from the everyday reality in the case company. The main focus during the first of these was on gathering the survey data and conducting the *Set II* interviews. The focus in the second was on analysing the data and writing the report. Knowing the case company was useful when conducting the thematic interviews because it was easy to build the trust and because I mostly “knew” the language of the interviewees. On the other hand, I also at a couple of points, in the course of the conversational thematic interviews, became inspired to tell some of my own experiences related to something an interviewee had mentioned. (This was also mentioned by Kankaanpää (2003) in her summary of findings related to interview set II.)

The second question mark is related to the *research data*. Achieving a harmonious end-result from a large *research data corpus* containing heterogeneous material and combining qualitative and quantitative data proved challenging. Furthermore, I was not very economical with data gathering when there were no difficulties in accessing the research site. A great deal of data proved to be overlapping or redundant and a lot was left unused. The original aim was to gather research data up to saturation level. This was partly attempted by analysing the data in parallel whilst gathering it. The feeling, however, was that the saturation point was not reached at least in all areas. As this is an explorative study, even the research questions were different to start with. (They were more focused on the boundary crossings within multi-professional team work which I discarded soon.) One could also ask how it is possible to use interview transcripts conducted by several different people and from several different main topics. For me, the interviewees were in any case describing their work, even though this was done under various themes. For example, the theme of change and organisational changes emerged in all interview sets. Boundaries as such is a topic that people tell about without necessarily specifically analysing the topic by using the word “boundary” which is a rather abstract concept. It is also important to note that the data were gathered during a period of three years. The main corpus dates back to 2003, and it is true that things have changed since then. If we think of boundaryless work, it is probably now even more pervasive than it was at the time when this study was started. It can be assumed that for the most part the findings are still valid today, if not as such, maybe as transient concepts on which further study can build on. I still think that the results provide valuable input for the study of boundaryless contexts. As stated earlier by Ericksen and Dyer (2005), all attempts to describe self-organizing in real contexts are at this point “modest, tentative and ephemeral”.

The third area is related to the factors affecting possible *generalisation*. The business situation in the case organisation has matured and changed the overall attitudes in the organisation. At the time when the survey data were gathered and some of the interviews were conducted (sets II and III), there were business related redundancies in the company that lowered the level of motivation among employees. This may have had an effect on the interview data. Further, to what extent are the results valid for the whole company when most of the data was gathered from one of its business units (Networks)? The interviewees (except for three who had transferred from Networks to another business group) were from Networks. Can the results be generalised to describe the whole company? In any case the results are relevant for the employees in only one country, i.e. Finland and especially the city of Tampere, when the company operates in several countries globally. Whether interviewees from Tampere are overly emphasised is a valid question. Most of the interviewees seemed to be efficient workers, easygoing and sociable and seemed to enjoy learning and challenges; they also participated willingly in the interviews. This does not guarantee that absolutely all employees in the case company are such. (see also Kankaanpää, 2003) There probably were also more people who had taken radical career steps than in the overall population; some of the interviewees were picked purposefully because they were known to have made a radical boundary crossing in their career.

The fourth consideration is related to *ethics* and how to report possible negative findings (see e.g. Merriam, 1989, p. 179). In knowledge-based organisations the most important resources are the knowledgeable and competent people and the processes their work entails. If something negative is revealed in these, it has to be carefully considered whether or not it can be published. The same goes for whether to emphasise positive or negative findings in the analysis and in the final report. These issues are even more important in a company that has gone public. In this study the overall findings were positive. Still, both positive and negative findings were reported. In my view there is no perfect work setting or organisation. For ethical reasons I have also reported general patterns and not individuated stories, so that individual people would not be recognised.

## 10. DISCUSSION

In this final discussion I will first consider how the selected *theoretical approaches* fit the topic and object of study. I will then briefly discuss the *methodological questions* related to possible future research efforts related to boundaries. I will then discuss the future ways and solutions to *organise work* in contemporary and emerging agile “boundaryless” organisations. I will conclude by enumerating some paths for *future research* that this study opens up.

To start with I selected three *theoretical approaches* to study the boundaries and boundary crossings: the activity theoretical framework, self-organising (systems) and social capital. My original thinking was to introduce clarity and vigour via the activity theoretical framework, flexibility and freedom via the viewpoints related to self-organising and horizons related to collaboration (integrating over boundaries) via the viewpoints related to network ties and social capital. Bringing in these perspectives proved challenging from the very start due to the ontological differences. It was challenging to find a suitable approach to self-organising without committing to the biological views of autopoiesis and self-regulation (neutral adaptation of the system to survive and adapt to the environment). Thus, in addition to the activity theoretical framework I also used Luhmann’s idea of social systems and Holbrook’s idea of DOCAS (dynamic, open, complex, adaptive systems) to set the scene and to describe the organisation and some of the underlying structures. The idea of social systems was useful in the identification of the functions on the boundary of R &D/engineering social system. Still I did not wish to commit to understanding organisations and the structures within them as only adapting to the environment. In my view human beings are the brain behind the coordination and direction of intelligent, even self-organising, activity. Social systems and DOCAS as such do not take individuals into account and as structures they are rather bounded.

The strength of the activity theoretical framework is in the way it attempts to transcend the divide between individual and collective and to take into account

the culturally mediated and historical development of activity in certain contexts. Its roots are in the critical tradition that aims at revealing discrepancies through research, thereby improving the existing circumstances in certain contexts (activity systems). Even though my view is firstly hermeneutic phenomenological and I aim at understanding and interpreting, I see the value of using the results for developing the praxis. Another strength of the activity theoretical framework is in the way it covers elements and sub-processes related to any activity system (clarity and vigour). In this study, ultimately, it proved not possible to use the activity theoretical approach in its full scope: the elements of it were used to categorize some findings that emerged from the data (see more in section 6.4.1)

Boundaryless work as a phenomenon and an object of study in the first place is wide and extensive. If one is bold enough to tackle the phenomenon, it is difficult to pick only one theoretical framework. Moreover, as a practitioner I did not want to take a single starting point for this study, but to take several nodes of thought into consideration. These have also served as learning paths for me, even though I have possibly taken the learning path at the expense of harmony and straightforwardness of this study. Moreover, as a consequence of this, some of the multiple ingredients brought to picture may have been dealt with on a superficial level. This is one of the weaknesses of this study.

For future research efforts from a *methodological perspective*, it would perhaps be worth trying to ask more directly about the boundaries in interviews (and possibly in the survey method too). In this study my conception was that boundaries are such an abstract concept that it would be better not to use that term but to gather data on boundaries using concepts like “what enhances or hinders your work”. In interview set IV I endeavoured to use the concept “boundary”, with mixed results. One methodological option naturally is action research (work developmental research) which, however, is laborious and challenging in constantly changing environments. For future research efforts, if one wanted to study flexible knotworking, temporary knots and possibly boundaries of collaborative work, one possible method could be shadowing individual people in their work. As a method, it might be difficult to arrange but worth trying out.

None of the traditional *ways of organising work* (see Section 2.1) seems to provide solutions to the work contexts that the case organisation of this study features. The *intensity and sustainability factors in boundaryless work are different from the previous forms of organising*. Beer (2002) claims that creating work-life balance and the trade-offs in traditional assembly line work and new kinds of work are completely different but equally difficult in nature to solve. Moreover, in boundaryless work contexts the intensity factors, strain factors and stress are frequently *self-induced* (Brödner & Forslin, 2002, p. 19, Kira, 2002, p. 30).<sup>1</sup> New ways to describe work, new concepts and

1. One could for example conjecture that committed, dutiful and thorough persons assume an overload of tasks and assignments easily in an environment where it is unclear to whom a certain task belongs to and where improvising as a way of working is recurrent.

vocabulary are needed. Kautto-Koivula & Huhtaniemi (2006) express the view that in today's working life it is especially the educated white-collar workers who suffer from the quaternary economy where, however well one did the work, nothing seems to be enough. Siltala's (2004) view is even more radical and provocative in his book *The Short History of the Deterioration of Working Life*. His scenario is that the market economy in its extreme form has led to a situation where the labour market is split into two segments: the real winners who enjoy extremely high monetary rewards and the losers who include both white-collar and blue-collar categories. The white-collar workers have their own constantly changing "conveyor belt work" that requires extreme flexibility and adaptability.

In fact, it is often the concept of boundaries that is referred to when dealing with new kinds of work and new kinds of intensity factors. Docherty et al. (2002, pp. 8-11) point out that the imbalances of Tayloristic work are well known. They continue by asking: "*Why do people in modern, autonomous and versatile work find themselves equally imbalanced, just in a different way?*" Their speculative answer is partly related to the "vanishing boundaries" in the workplace.

One reason for the imbalance seems to be originating from the bureaucratic boundaries of work. Even though bureaucracy is consuming people by forcing them into tight rules and prohibitions, the situation without any boundaries around jobs and roles does not seem to work well either. In the modern work organizations, we find ourselves in the opposite situation to strict bureaucracies. In flexible, lateral organizations, where bureaucratic rules and structures are reduced, responsibilities and tasks become impossible to predefine. Autonomy means endless choices of where to go, what to do and whom to contact; the amount of possibilities in one's work is increasing, as are the things to care about. The need for personal judgements at work exposes employees more to social and performance demands... All in all, trying to form a unified picture of the problems mounting in modern jobs is difficult. What is the common denominator for all the imbalances discussed above? Is there such a common denominator? Why are the problems mounting? The immediate reasons for the imbalances seem to vary, but one pattern seems to bind them together. Namely, each potential source for imbalances is also a potential source for growth and well-being at work; the vanishing boundaries enable the versatile use of an individual's skills and give him or her a comprehensive view of the whole production/service processes, learning is the essence of healthy and meaningful adult life, and simultaneous existence of family and working spheres enriches one's life and self-image. (Docherty et al. (2002, pp. 8-11, underlinings mine))

New approaches and tools for *organising work* are needed. The "sustainable work system" proposed by Docherty et al. (2002) could be one option to organise work in the newest work contexts. The for-profit companies are ultimately seeking to maximize their profit. In knowledge intensive organisations there is a vital, even paradoxical, con-

nection between *intensity* and *sustainability*. “Sustainable work system” as a concept is an equally new one and not at all established. The two central concepts that Docherty et al. (2002) introduce are *intensive work systems* and *sustainable work systems*. By work intensity they refer to the “consumption of human resources – physical, cognitive, social and emotional – in work organizations.” By work sustainability they refer to a “vision for the future competitive organizations in which human resources are regenerated and allowed to grow.” (p. 3). The organisations that can make use of the benefits of boundaryless work practices, while at the same time carefully preserving the delicate but necessary balance between economic goals and human development, will thrive (Docherty et al., 2002). In developing the new approach to organising work in the most recent types of work, Dyer’s and Ericksen’s (2005) ideas on the human resources management model, built on the idea of self-organising systems could be helpful.

According to the results there are several areas that would *deserve further investigation and research*. One is the above-mentioned *sustainability* area: what kind of boundary related sustainability and intensity factors are there in agile organisations? For example, how can employees stretch and balance between individual and collaborative work and within the hybrid mode area? Is the hybrid mode of a new kind of intensity factor in work or is it actually a sustainability factor that brings efficiency to the organisation and variety to people’s work?

The second is related to the *dynamics of boundaries within a certain organisation over time*. How do the dynamics of boundary permeability and impermeability change and vary over time within the same company? What are the dynamics of the boundaries in relation to each other? What would be other means to reconfigure boundaries in addition to organisational changes? What is the nature of ad hoc links over the borders<sup>2</sup> and in what way are they related to the self-organising? What are the prerequisites for the ad hoc links over the borders to emerge and how could their occurrence be enabled and enhanced? How is the balancing of the permeability and impermeability of the boundaries done in the organisation? For example, in this case study it was proposed that the reconfigurations caused by organisational changes have possibly turned horizontal boundaries more permeable and at the same time vertical boundaries more impermeable.

The third is related on the one hand to the *friction between the flexibility and dynamism of the discretionary division of labour and job roles and on the other hand to the company overall structure of job profiles* (including grades and titles).<sup>3</sup> What would be the tools and concepts for more flexible and dynamic job related structures within a company (e.g. pools of people and even more floating job structures to support flexible project mode)? It would be interesting to investigate more in detail the authority

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2. *The ones identified in this study would be: role switching, duo working, looking at an issue from the company overall perspective (“putting the Nokia hat on”), familiarizing oneself with the process phases horizontally and strong shared identity. For more, see section 8.2.2.*

3. *The grade is always attached to a job profile. I have not dealt with those due to the sensitivity of the issue. I did not specifically ask about the grades in the interviews. Implicitly they are visible in the job profile, job description and title.*

boundary. What does it implicate that the authority based on line management role/relations is shifting towards the “*authority over content*”? How should this be taken into account in HRM practices? It would also be interesting to study at the grassroots level how people and managers negotiate and balance the active and passive elements related to how people move in the reconfigurable patchwork.<sup>4</sup>

Boundaries, their nature and dynamics in R & D/product development work ultimately proved a highly interesting and challenging, even ambitious, topic. The case company proved to be a good case to study the boundaries.<sup>5</sup> The global aspect and the high-technology systems being developed brought a multiplicity of boundaries into the picture. However, the nature and dynamics of boundaries proved challenging to capture due to the abstract and volatile nature of boundaries and speed of the changes in the case company. The findings and proposals related to them are fleeting and one needs to be careful with generalising them even to the case organisation. (For example, most of the interviewees were from Tampere, which delimits the way the results should be seen.) The tentative emerging patterns related to how people actually integrate over boundaries, how they perceive their own job roles, career boundary crossings and expert work are possibly the best outcome of this study. Likewise the proposed dynamics and nature of boundaries, how they are reconfigured and still kept synchronized through dynamic links over the borders may prove interesting. The value of this study possibly lies in its empirical grounding via the extensive corpus of data behind the findings.

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4. *Based on the findings of this study there are two perspectives to how people move within the reconfigurable structure of job roles. The first one features an active element. People shape their own job on the basis of their style, interest, competencies and skills and they start to gravitate to certain types of jobs. The second element is more passive from the individuals' perspective. This view manifests itself as “drift theory” or filling in jobs based on “availability”. In some cases people who are available drift to new emerging job roles. From a systemic perspective it is about self-organising to fill in gaps and reduce overlaps in the reconfigurable patchwork.*
  5. *It would be interesting to take a similar starting point and investigate boundaries, their nature and dynamics in the public sector, too.*

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## APPENDICES

### APPENDIX 1 LIST OF INTERVIEWEES

#### SET 1 INTERVIEWS

	<b>Job</b>	<b>Gender</b>	<b>Company Years</b>	<b>Time in current job</b>	<b>Note</b> <i>Set 1 interviews were conducted in spring 2003</i>
<b>1</b>	Project Manager	Female	2.5 years		Had recently transferred to a partner company at the time of the interviews.
<b>2</b>	Engineer	Female			Had recently transferred to a partner company at the time of the interviews.
<b>3</b>	Engineer	Male	7 years	6 months	
<b>4</b>	Manager	Male	8 years	3 years	
<b>5</b>	Project Manager	Male	26 years	2 years	
<b>6</b>	Project Manager	Male	14 years	3 years, just about to change	
<b>7</b>	Project Manager	Male	5 years	1 year	
<b>8</b>	Project Manager	Male	7 years	2 years	
<b>9</b>	Project Manager	Female	5 years	6 months	Had recently transferred to a partner company at the time of the interviews.
<b>10</b>	Project Manager	Male	1,5 years	6 months	Had recently transferred to a partner company at the time of the interviews.
<b>11</b>	Engineer	Male	5 years	1 year	
<b>12</b>	Project Manager	Male	8 years	2 years, just about to change	
<b>13</b>	Senior Manager	Male	9 years		

## SET 2 INTERVIEWS

	<b>Job</b>	<b>Gender</b>	<b>Company Years</b>	<b>No of different jobs</b>	<b>Time in current job</b>	<b>Note</b> <i>Set II</i> interviews were conducted in summer-autumn 2003
1	Manager	Male	5 years			
2	Senior Manager	Female	20 years	10-20	1 year	
3	Manager	Female	7.5 years			
4	Senior Manager	Female	7.5 years	5	1 year, just changing	
5	Engineer	Female	9 years	4	1 year	
6	Project Manager	Male	6 years	5	1 year	
7	Assistant	Female	5 years	1		
8	Engineer	Female	4 years	2	1 year	
9	Senior Manager	Female	9 years	4	1 year	
10	Project Manager	Male	5 years	3	1 year	
11	Engineer	Female	15 years	6	2 years	
12	Specialist	Male	10 years	5	3 years	
13	Manager	Male	9 years	9	1 year	
14	Engineer	Female	4 years	1		
15	Engineer	Female	5 years	3	1 year	
16	Engineer	Male	4.5 years			
17	Project Manager	Male	11 years	6	1 year	
18	Project Manager	Male	5 years	5	1 year	
19	Engineer	Male	4.5 years	2	2 years	
20	Engineer	Female	6 years	4	2 years	
21	Senior Manager	Male	12 years	7	1.5 years	
22	Specialist	Female	6 years	3		Had recently transferred to another organisation at the time of the interviews.
23	Specialist	Female	3 years	3		Had recently transferred to another organisation at the time of the interviews.
24	Senior Manager	Female	12 years	4-5	3 years	

### SET 3 INTERVIEWS

	<b>Job</b>	<b>Gender</b>	<b>Company Years</b>	<b>No of different jobs</b>	<b>Time in current job</b>	<b>Note Set III interviews were conducted in spring 2004</b>
<b>1</b>	Manager	Female				
<b>2</b>	Senior Manager	Male	11 years		3 weeks	
<b>3</b>	Project Manager	Female	12 years			
<b>4</b>	Manager	Female	8.5 years			
<b>5</b>	Senior Manager	Female				
<b>6</b>	Project Manager	Female	8 years			
<b>7</b>	Manager	Male	15 years			
<b>8</b>	Manager	Female	6 years			
<b>9</b>	Manager	Female	10 years			

## SET 4 INTERVIEWS

	Job	Gender	Company Years	No of different jobs	Time in current job	Note Set IV check-up in interviews were conducted in spring-autumn 2006
1	Engineer	Female	7 years			Set 2, N. 8 interviewee
2	Senior Manager	Female	12 years			Set 2, N. 9 interviewee
3	Project Manager	Male	8 years			Set 2, N. 10 interviewee
4	Project Manager	Female	14 years			Set 3, N. 3 interviewee
5	Senior Manager	Female				Set 3, N. 5 interviewee
6	Engineer	Female	12 years			Set 2, N 5 interviewee
7	Specialist	Female				New

Altogether 46 interviews were conducted during 2003-2004. Seven check-up/follow-up interviews were conducted in 2006 (6 persons had been already interviewed in the previous sets + one new subject). Thus, altogether 53 interviews were conducted, and there were 47 interviewees (25 female and 22 males). 16 interviewees were or had been in an R & D boundary role at the moment of the interviews. The interviewees were categorized according to their main job role type; 14 project managers, 11 engineers, 9 managers, 8 senior managers, 4 specialists and 1 assistant were interviewed.

## APPENDIX 2 THEMATIC INTERVIEW STRUCTURES

### SET I INTERVIEW STRUCTURE

#### **Background information**

What is your job title? What is your education? How long have you been working in this company? How long have you been doing the current tasks?

Could you describe your role in the organisation and in your current project? Are you involved in other projects at the same time when working in this project? How much time do you spend on the projects? How closely are you involved with collaboration projects? How much experience of distributed product development projects do you have?

#### **Distributed project work**

How many partner companies do you collaborate with in your current project? Where are these companies located?

NOKIA: Support for the partner: What kind of support practices do you try to provide to the partner? Do you have a resident engineer/liaison person in distributed projects? Why? How have you organised his/her work? What is his/her work description? What have been the benefits of this arrangement? How is answering suppliers' questions /problems arranged? How do you make sure that the supplier acquires enough product-related knowledge and information?

NOKIA: How do you monitor networked projects? What kind of information is collected? How do you use the information collected? Would you need to know more? What kind of information? Do you have any special monitoring on your partners? Do you have any tools to follow the progress in the project? What is most problematic in partner monitoring in globally distributed projects? Why? Do you inform project members about project progress? How?

How is the work divided into the network between you and your partners? Why is this division chosen? Is the development work divided into separate modules? How? Has the division caused any problems? What kind of problems? Have you used some process model in this project? What process model do you use?

PARTNER: What processes do you use? How often do you have milestones in this project? What have been the most critical milestones in distributed projects according to your experience? How many teams do you have in this project?

Do you have teams that include members from different companies? Why? Does that mean any special challenges? Do you have teams that include people representing different professions or functions in organisations? What is the benefit? Does this pose any special challenges?

Has there been a project kick-off meeting? Agenda? In which phase of the project was it arranged? Who participated? Was it useful? Disadvantages? Benefits? Why? What kind of networked product development projects / collaboration do you have? What kind of network structures do you usually have? How many companies? What kind of companies? What kind of roles do the companies in the network have?

### **The current work practices related to knowledge sharing**

Document management: How do you take care of document management in a networked project? Do you have any common document management system between the partner companies?

How do different companies access the documents? (How are the documents transferred between companies?)

How do you inform the project members (external/internal) about the changes in the documents or processes?

Do you have shared information storage? Who has access? Who is responsible? Do you have established procedures for information exchange?

### **Re-use of information and knowledge**

In your current project, do you re-use information/knowledge from the previous projects? If so: Why?

What kind of information/knowledge do you re-use? How does the re-use happen? If not: Why? Would you need some information from previous projects?

### **Communication and meetings**

What kind of communication is there between you and your partners during the project execution? (E.g. formal, informal, e-mail, face-to-face, document exchange...)

What kind of formal meetings do you use in this project between companies? Does the distributed/collaboration project require different meeting arrangements compared to normal project?

How often do you meet face-to-face? Do you think that is often enough? Who is participating? Which issues are discussed in face-to-face meetings? What kind of issues should be discussed in face-to-face meetings and not in remote ones? Besides meetings, which other issues need to be communicated between companies? Who communicates? How often?

How successful has the communication been between companies in this project? Regarding the amount of communication? Regarding the quality of communication? Is relevant information readily available and easily found? Are the important people available?

What are the most difficult problems in communication during a distributed project? Why? How could communication be improved in your opinion?

Contacts across company borders: Do you feel you have enough contacts and communication with those members in other companies, which are somehow important for your own working tasks? How have the contacts been created (kick-off / earlier projects)? If you feel you don't have enough contacts, can you name some barriers for these contacts?

### **Needs for knowledge sharing**

Do you need information and/or knowledge from others? How often/how much? What kind of information and knowledge you need from the colleagues? Do you need to inform the colleagues? In which situations? How often? How, from where and from whom do you receive the most important information and/or knowledge for your tasks and your work?

### **Knowledge creation**

Where is the knowledge created that is most relevant to you? In your opinion, what does it mean to create knowledge? How do you create knowledge in your work?

### **The effect of the work culture on knowledge sharing**

Ways of sharing knowledge in your company: How do you share knowledge? The values and practices: do they support knowledge sharing? Incentives?

Do you have any common practices with your partner? To what extent? Give an example. Differences in working practices between companies (or between departments) Have there been any problems/challenges in working due to the different working habits between companies? What kind of problems; examples? In what kind of projects are common practices needed most, in your opinion? Problems: What were the major problems related to work practices during the project? What were the causes of these problems? How problematic did you see: Geographical distances? Different work practices? Crossing company borders? Cultural differences?

### **”The knowledge border” between the organisations**

Team relationships: Teams and team borders? Where do you feel that you belong? Which team(s) have the most power to control the project in your opinion? Why?

### **Inter-company cooperation**

Do you prefer working in intra- or inter-company projects? Why? Do you get enough feedback across company borders? What kind of feedback do you need? Do you feel that your team’s (company’s) work was dependent on the work in other companies? How?

### **Knowledge sharing between organisations:**

Do people share knowledge fluently across company borders? Is knowledge sharing more difficult across the organisational border? Why? How can the situation be improved? How is your work dependent on the information or knowledge of the partner?

### **The role of information systems in knowledge sharing**

Do you use information systems to exchange information and knowledge? What systems do you use? Experiences on the usefulness of the information systems (positive/negative)? Do you have shared systems with the partners?

### **The barriers to knowledge sharing**

The experiences on the barriers to knowledge sharing. What kind of problems have you encountered? How have the problems been solved?

In your opinion, what are the obstacles for knowledge sharing? Between people? Between companies? Give some examples? Characterise?

### **The facilitators of knowledge sharing**

The experiences on the facilitators of knowledge sharing. In your opinion, what are the factors that facilitate knowledge sharing between people? Between companies? Give some examples? Characterise?

What kinds of helpful advice have you received from colleagues? How have you received this advice? What procedures are helpful in getting advice?

## **SET II INTERVIEW STRUCTURE**

### **Your work:**

#### **work practice, job role, education, competencies and career now and before**

What is your background education? How has your formal education benefited you in working life? Further education?

What kind of work have you done earlier either in this company or in some other organisation?

What kind of “career” have you had? How many job roles have you had in this company? What were the main constituents (tasks and responsibilities) of your previous job role/s?

Where do you belong? What is your main work-related reference group/s?

What kind of work are you currently doing? What are the main constituents (tasks and responsibilities) of your current job role? What do you actually do in your daily work? (Boundaries of job role)

What impedes or enhances you in your daily tasks? (What kind of “boundaries” are there in your daily work environment? What enhances working over boundaries? )

What possibly impedes or enhances people accomplishing their work in general in this company? (What kind of “boundaries” are there possibly in the case company’s work environment? What possibly enhances working over boundaries? )

### **Latest trends and changes in work environment**

How did you first feel when you started working in this company? Anything specific that struck you at that point?

How would you compare this organisation to other organisations that you have experience of?

How have work conditions changed during the last decade/couple of years from your perspective?

What has the increasing trend to collaborate virtually brought about?

Do you work with Nokia external collaborators (partners/subcontractors) and how would you describe the cooperation?

What do Nokia values mean in practice? What is Nokia corporate culture like?

### **Cooperation with colleagues**

What kind of work-related network have you got? How has it developed and how do you maintain it? How would you describe it? How flexible, changeable, stable is it? Informal/formal network? Can you draw it? What sorts of issues are dealt with in each node? Formal/informal issues?

Out of your work time, how much time do you use working collaboratively with others and how much time working on your own? Out of collaborative work, how much do you work remotely and how much face-to-face?

What is a typical day, week like? What does your job role actually include? Job description?

Team work? Line? Project? Communities?

How “teams” are usually built up and members selected?

How would you describe cooperation between people in this company?

How would you describe the modus operandi and climate in different organisational functions?

Management culture?

What issues enhance or impede you cooperating with other people? What enhances or impedes your sharing or gaining relevant knowledge? (What kind of boundaries might there be in your environment? What might enhance working over boundaries?)

What kind of issues might enhance or hinder cooperation or knowledge sharing between people in general in this company? (What kind of boundaries are there possibly in the case company? What possibly enhances working over boundaries?)

How does the tool environment support cooperation? What kind of improvements would be needed?

### **Cooperation between different functions/competencies/process phases in the organisation**

Please draw a chart of all interfaces that you cooperate with in work-related issues.

What enhances collaboration with others and what hinders collaboration with others from your perspective?

How would you describe the cooperation between different organisational functions?

How would you describe the cooperation between different competencies or professions?

Do people's backgrounds come up? How?

What does diversity mean in practice and how is it seen in everyday work life?

How do you take account of others having different backgrounds?

How do multifunctional/professional teams/groups work? Do you belong to any?

Problems, improvement items, examples?

### **Internal job transfers**

What is your opinion of internal job transfers and has it affected you? How?

How do the job descriptions and roles relate to people's competencies?

### **Work related expertise, knowledge and learning**

What competencies/expertise are needed in your work? What kind of competencies you do not have and require from someone else/some others? How have you developed your competencies/expertise?

From where do you get (new) work related information or knowledge relevant for your work?

What kind of information/knowledge is hard to find or get?

How do people learn in this company? Is there something that might hinder or inhibit people from learning?

What are the most important and useful features (skills, competencies, capabilities) when working in this organisation?

### **Rewarding**

What is rewarded?

What issues does rewarding support in this company?

### **Personal features and future**

What are your future plans? Are there any specific worries or great expectations?

### **Closing**

## SET III INTERVIEW STRUCTURE

### **Background information**

Background education, Years in the company, Current job profile and description, Years in the current job, Competencies needed in the current job (SLM: Number of subordinates and their location, the freedom and responsibilities of the subordinates, the role and tasks of the manager; the essential in the manager's role)

### **The company as a learning environment**

How do people learn in this company?

The organisational framework for learning (technologies, virtuality, global aspect)

Organisational tools to develop the competencies of the employees

The awareness and usage of the development methods available in the organisation

Applying learning from training in work practice? How and where is learning activity planned (elsewhere than in the IIP discussions)? How do people tell about their learning needs?

One's own work as a framework for learning. Challenges, variety. Autonomy, responsibilities. The clarity of objective setting. Understanding the big picture. Working on one's own or in collaboration. Learning on one's free time

### **Knowledge and learning**

The sources of new knowledge, Finding knowledge, How is knowledge shared (officially and unofficially), How is knowledge sharing enhanced?

What are the possible challenges in knowledge distribution?

What are the managerial means to influence knowledge sharing?

Learning in one's own work in interaction with others: learning new skills (how), solving work related problems, asking and getting advice and guidance, benefiting from others' knowledge, learning from others' work, colleagues as tutors and mentors

### **Learning and reflection**

Reflecting one's own learning, reflecting with others (in projects and teams...)

What is the attitude towards possible mistakes?

Assessing work

Getting feedback, learning from feedback (Solid line managers: How do you give feedback to your team members? How do you get feedback?)

### **Factors inhibiting and enhancing learning**

Factors enhancing learning, factors hindering learning

### **Support to learning**

Availability of support, Support from the organisation, Support from own manager, learning versus rewards

SLM: How does the organisation support solid line managers' work and learning?

On whose responsibility is the learning of individual employees?

What is the manager's role in the development of their people? How can a manager enhance the learning of his/her team members?

Any ideas to improve and enhance learning at workplace (organisation, managers, individuals)?

## SET IV INTERVIEW STRUCTURE

### **Career**

What have been the latest developments of your "career"? How did you feel about them?

How did you feel overall about the job transfers that have taken place during your career?

How were the job transfers initiated/by whom?

### **Expertise**

What features of an expert are the most emphasised in the case organisation's context?

### **Boundaries**

What have been the biggest boundaries in your work, job roles and career?

What kind of "boundaries" do you see in your work environment and how do you possibly overcome them?

## APPENDIX 3

### TEAMS, PEOPLE AND MODE OF OPERATION SURVEY

Support for cooperative work needs to change along with changes in the operational mode and work environment to enhance the overall efficiency of the company operations. Cooperative work refers to all tasks and assignments done together with colleagues whether they belong to your project team, line team or to other work related network, management meetings, steering groups, special interest groups, virtual networks etc. Also, cooperation between organizational functions, competencies and professional groups should be as seamless as possible. Through this survey we try to find out how people cooperate with their colleagues, and whether there are any bottlenecks and/or improvement items in the field. The results of this study will be analyzed by HR and CoDe functions and they will be beneficial for the company internally and also for research purposes.

**It takes 10 minutes to fill in the survey questionnaire. Please use this opportunity to give feedback on cooperative work and team work!**

#### GENERAL BACKGROUND QUESTIONS

Please give your name (optional) if you want to be sent the link to the survey results and participate in the raffle.

1. Gender

Male, Female

2. Age

20-30, 31-40, 41-50, Over 50

3. Which is your educational background? Select the option that best describes your basic education. Multiple choices are possible if you have studied several disciplines.

Engineering/Technology

Management

Computing Sciences

Natural Sciences

Economic Sciences

Humanities

Social Sciences

Other, please specify

4. For how long have you worked in Nokia?

Less than 1 year, 1-3 years, 3-8 years, 6-9 years, Over 9 years

### **GENERAL BACKGROUND QUESTIONS CONCERNING YOUR CURRENT WORK**

1. Please indicate what your current organization is

NMP/IBU, NMP Other, NBI, NHO/Nokia level, NET/ST, NET/PCCP/Helsinki HW, NET/PCCP/Tampere, NET/TM, NET/OS and PCCP NetAct, NET/PS Central Europe, NET/PILS, NET Other, NVO, NRC

2. What is your professional group? Please select the one that best describes your current position

Research, R&D System, R&D SW, R&D HW, R&D Integration and Verification/Validation, R&D Other (e.g. PCT or Customer Documentation etc.), Project Management, Product Marketing and Product Management, Marketing, Processes & Tools & Quality Development, Support (e.g. Assistance or HR/HRD etc.), Delivery Operations  
Other, please specify

3. For how long have you worked in your current professional group (see above)?

Less than 1 year, 1-3 years, 3-6 years, 6-9 years, Over 9 years

4. Do you currently work?

As a specialist, in line management, in business/program management, not applicable

5. Have you worked in other professional groups in this company or in some other company previously? Please tick the relevant ones.

Only in my current professional group, Research, R&D System, R&D SW, R&D HW, R&D Integration and Verification/Validation, R&D Other (e.g. PCT or Customer Documentation etc.), Project Management, Product Marketing and Product Management, Marketing, Processes & Tools & Quality Development, Support (e.g. Assistance or HR/HRD etc.), Delivery Operations  
Other, please specify

### **DURING THE PAST YEAR, HOW HAVE YOU COOPERATED WITH COLLEAGUES IN WORK-RELATED MATTERS**

1. If you belong to both line and project/program team, which is the one you MOSTLY identify yourself with?

Project/program team

Line team

2. Would it be MORE CRITICAL to have team building or team development to your project/program team or line team?

Project/program team

Line team

3. On top of regular line and/or project meetings, what kind of meetings do you have with your colleagues, partners, customers or other work-related networks? Please mark all types you have attended during the past year.

Line recreation (non-work related activities e.g. sports or sauna evenings etc.), line team building or development, project recreation (non-work related activities e.g. sports or sauna evenings etc.), project team building or development, other regular cross organizational meetings, other cross organizational recreation

4. How do you interact informally and formally with colleagues? Please mark the ones that you use regularly

Face-to-face meetings or workshops, Phone Conference (possibly with Virtual meeting system), Telephone call with one other person, Video Conference, Coffee room discussions (work related), Email, Virtual environments like discussion forums

Other please specify

5. What type of meetings are the MOST USEFUL for cooperation and interaction? Please mark MAX three options

Face-to-face meetings or workshops, Phone Conference (possibly with Virtual meeting system), Telephone call with one other person, Video Conference, Coffee room discussions (work related), Email, Virtual environments like discussion forums

Other please specify

6. What is your own location/site?

7. From how many locations/sites have you got colleagues with whom you are regularly cooperating with?

Australia, Austria, Brazil, Canada, China, Denmark, Finland Helsinki area, Finland Jyväskylä, Finland Oulu, Finland Salo, Finland Tampere, Finland – other locations, France, Germany,

Greece, Hungary, India, Ireland, Italy, Mexico, Netherlands, Peru, Philippines, Poland, Russia, Singapore, Sweden, United Kingdom, United States  
Other, please specify

8. Have you got contacts with Nokia external networks? Mark the relevant ones.

Customers, R&D partners or subcontractors, Other partners/subcontractors and vendors, Special interest networks e.g. discussion forums, University or research center or corresponding  
Other, please specify

9. How much time approximately do you spend in cooperating with others (meetings, discussions etc.) and how much do you work on your own? Mark approximate percentage.  
Cooperate with others: 0-100%

10. Out of cooperative work, how much percentually do you cooperate virtually (e.g. via phone conferences) and how much face-to-face? Mark approximate percentage.  
Cooperate virtually: 0-100%

11. Apart from your own professional group, what other professional groups do you regularly work with? Mark the relevant ones.

Only with my own professional group, Research, R&D System, R&D SW, R&D HW, R&D Integration and Verification/Validation, R&D Other (e.g. PCT or Customer Documentation etc.), Project Management, Product Marketing and Product Management, Marketing, Processes & Tools & Quality Development, Support (e.g. Assistance or HR/HRD etc.), Delivery Operations  
Other, please specify

12. Out of cooperative work (see question 9), how much time approximately do you spend with your own professional group and how much with other professional groups? Mark approximate percentage.

With your own professional group: 0-100%

### **PLEASE ANSWER BASED ON YOUR OWN EXPERIENCE**

1. Have you got any guidance/training on cooperation with others?

I have had briefing/training on team behavior or group work skills, I have had guidance/training on virtual/remote team work, I have read book/s or other material on the issue, I have NOT had any guidance/training on cooperation with others/team work  
Other, please specify

2. What are the most disturbing problems in the area of team/group work currently?
3. What kind of support would be needed for team/group work (e.g. training, technical support, team recreation or team building etc.)?
4. If you are part of both line and project/program team, what are the major challenges of matrix organization for the moment?
5. Please comment on the team stability and/or how teams are formed and members selected.
6. What are the major challenges of cooperation between people at different sites and virtual working mode?
7. How does the current tool environment enhance or hinder cooperation and interaction between people (virtual meeting systems, discussion forums etc.)?
8. Do you have any additional comments?

**Thank you! Press Save to transfer Your answers anonymously to the database. If you get a notification on missing fields, please use the back link in the notification text instead of Back button on the toolbar.**

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