

# **User Experience in Mobile Application Development: Developer and End-user Perceptions**

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The advancement in mobile technologies has driven growth in the smartphone market, marked by the launch of the iPhone in 2007. The subsequent adoption of *appstores*, marketplaces for mobile applications that run in such smartphones, has led to the popularization and simplification of development and commercialization of mobile applications, and hence to their wider availability. However, many of the applications in the market suffer from poor user experience (UX).

In this thesis I explore if developers perceive good UX as an important factor in the success of their application in *appstores*, and how it affects user ratings and feedback in the context of Nokia's *appstore*, Ovi Store.

The work I conducted describes the range of design and UX resources and services provided by different vendors to their third-party developers. I then assisted the case of an app developer who had their app's UX improved through a professional service, and utilized different methods to gather feedback on it.

The findings are that developers are willing to adapt their development process to include UX methods to improve their apps. Still, the UX of an application, especially of applications that utilize cloud services, extends the user interface and interaction issues of the application itself, and I point out that it relies heavily on external factors such as network quality and reliability of third-party services.

The discussion section brings forward how the measurement of the UX of applications should include concepts from Quality of Experience in its scope.

Key words and phrases:

User experience, mobile applications, app stores, application design, usability testing, UX evaluation

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## 1. Introduction

The mobile services and applications value chain has gone through many changes during the past two decades (1990–2010) due to the evolution of mobile devices and their capabilities. From the basic calling functionality and the introduction of *SMS* (Short Message Service) in 1993 to the high-end multimedia computer capabilities of *smartphones* in 2010, the speed of development has been incredibly fast. The adoption of mobile devices has skyrocketed, given their affordability and the possibility of being connected wherever one goes.

According to IDC's latest research (IDC, 2011), the worldwide mobile device market grew 17.9% in the fourth quarter of 2010 alone, with a total of 1.39 billion units sold during the whole year. The *smartphone* is the main driver of these changes. A smartphone is a handheld computer, equipped with a complete operating system (OS) and integrated with a mobile telephone. It usually provides a development platform to developers, and allows the user to install and run advanced applications.

These capabilities make smartphones highly popular, since they can serve many purposes and are becoming more accessible to the wider population due to lower prices and wider market availability. The advanced software capabilities of smartphones have played a critical role in the rapid transformation of the mobile industry, but that transformation only came to realization when users became aware of the full potential of smartphones. The catalyst of this transformation was the introduction, in 2007, of the iPhone.

Later that year, developers were introduced to the iOS Software Development Kit (SDK), and consumers to its application store companion, Apple's iPhone App Store. The SDK would enable the transformation of the iPhone into a platform. According to Cohick (2011), a platform is "*a product that can be extended by a user for the benefit of other users*", and this statement can be verified by the fact that the iPhone as a platform played a fundamental role in the shift of developer's attention to this new opportunity, as well as consumer education and awareness of the benefits of applications to ensure a viable ecosystem.

The major value proposition of iPhone is the availability of mobile applications, also referred to as *apps*. Mobile applications are software programs especially designed for mobile devices, taking into consideration context, different screen sizes, and user input. Apps are simpler than their desktop counterparts, and their development is becoming so easy it is reaching the masses through WYSIWYG (what you see is what you get) editors such as Google's App Inventor (Google, 2011), which can be utilized even by sixth grade students (Lohr, 2010). These apps range from very useful day-to-day tools such as shopping lists and maps to purely entertainment focused apps that feature virtual talking cats or emulate body sounds, such as one called "*iFart*". The idea is that apps could solve every day life's problems and situations, or be used simply to kill time.

On the seller (developer) side, Apple offered a complete end-to-end solution for bringing content and applications to market (Apple, 2011). Design guidelines and libraries, straightforward development and testing tools as well as marketplace and consumer awareness elements were available immediately when Apple's iPhone App Store opened its doors to developers, and are being iteratively upgraded and updated according to requests.

On the consumer side, the discovery and experience of apps was intuitive and enjoyable, which resulted in users downloading and eventually buying (consuming) applications from this common marketplace (the iPhone App Store). It is important to remember here that developers are also consumers, and when developers build their own products on a platform, they are in effect users of that platform. Businesses saw the potential of this centralized marketplace with all the media attention it attracted, and started building their own mobile applications as well, generating a virtuous circle for mobile applications.

With that, mobile applications and content became a strategic part of the mobile industry and the ecosystem surrounding it, as innovation flourished. This is evidenced by subsequent happenings such as the announcement of similar vertical solutions by other industry players – Nokia's Ovi Store and Google's Android Market being the most prominent ones. There are other platforms and storefronts in existence, but they fall outside the scope of this thesis.

The smartphone market started to grow rapidly from there. Strategy Analytics (2011) reports that 293 million smartphones were shipped during 2010, almost doubling from 151 million in 2008 and 175 million in 2009. This reflects directly in the mobile application market – according to a State of Mobile Applications study (NielsenWire, 2010), *“with smartphones expected to overtake feature phones in the U.S. by 2011, the popularity of mobile apps will only grow.”*

The open innovation environment where anyone can potentially become an application developer, however, has its negative side. Application stores’ stock numbers have crossed the magnitude of tens of thousands of apps in many marketplaces. Although the makers of many of these apps are professional companies such as big game studios, who are looking for healthy revenues, a much wider number of them are created by hobbyist developers – also referred to as garage developers – who build their apps for diverse reasons, such as peer recognition (Vision Mobile, 2010).

The ease of mobile application creation, especially by non-professional developers, has inundated the app stores with applications that are either badly designed, have a bad user experience, or both. The concept of user experience (UX) will be described later in Chapter 2, but in a summary by Don Norman (Anderson, 2000) it means everything from industrial design to graphics design, all the usability, and the whole experience of interacting with a product through its existence. The quality of the user experience on many of the available apps is inconsistent, attested by various reports on bad quality of applications generating unsatisfied users’ testimonials, either in personal blogs, professional review sites, or in the app store’ app review page. Most marketplaces enable their users to rate and review applications, making it possible for the marketplace community to better understand what products may have a better chance of providing a good user experience, and for developers to get feedback from their end-users.

At the time of writing (spring 2011), the world’s attention is on mobile applications and services. Relevant content and information, through apps or the mobile internet, should be easy to find and to use. Because of that, it is also critical to re-evaluate the way mobile applications are built, and find means to motivate the developers who are building these applications to take the user’s needs and expectations into consideration.

Considerable research has been done about the hurdles of mobile application development among multiple platform choices (Hammershøj, Sapuppo, & Tadayoni, 2010; Tarnacha & Maitland, 2006; Holzer & Ondrus, 2009) and the importance of good usability of mobile applications and websites (Bias & Mayhew, 2005; Chittaro, 2004; Harding, Storz, Davies, & Friday, 2009; Hussain et al., 2008; Kaikkonen, 2009). However, less attention has been paid to the benefits and cost-effectiveness of good usability brought by good User Experience Design (UXD) as an integral part of the mobile application development process.

According to the latest mobile developer study (Vision Mobile, 2010), developers of Symbian applications – Nokia’s smartphone operating system (OS) – do not perceive a good user interface (UI) as a top priority. The same is true for Windows Mobile developers. These findings raise a question on whether these developers are aware of the importance of User Experience Design in the creation of mobile applications. It would also be useful to understand developers’ assessment of the potential benefits and changes involved in taking user-centered design methods into consideration when designing their product.

In exploring these issues, my research approach is primarily action research (Kock, 2011). The decision to use the action research methodology is due to the fact that I am a member of the developer-facing team at Forum Nokia, enabling me to adjust the next steps of the research with enough speed according to the results gathered in a certain phase of the research.

Starting from 2009, Nokia has developed different initiatives to incentivize design and development using UX principles, initially through launching a complete Design and User Experience program<sup>1</sup> for the members of its *third-party developer* community. The definition of a third-party developer is an individual or company who develops mobile applications for a certain mobile operating system and / or platform, with the objective of distributing the mobile application product through its marketplace or similar channel. As a regional product marketing manager, I am responsible for promoting the program to developers and local teams.

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<sup>1</sup> <http://www.forum.nokia.com/Design/>

In the context of this thesis, third-party developers are developers building applications for Nokia devices and publishing their applications through Nokia's Ovi Store, utilizing either Symbian C++, Qt, or Java as an application programming language. The three programming languages are supported by Symbian OS, but Qt and Java are not limited to it. Qt is cross-platform and can be utilized in desktop as well as Maemo/Meego and Android operating systems, and Java is the main application framework for Nokia mid-range devices such as Series 40.

The main communication channel with this developer community is a support website called Forum Nokia. In it, third-party developers can find news, tutorials, code samples, tools, and collaborate with other developers through discussion boards and wikis. This thesis reports on the work done by the program to improve the UX of applications submitted to Nokia's Ovi Store, both through the website as well as through events.

The goal of the Nokia UX program is to educate these developers on the need for good design and user experience. For that, it provides tools necessary for developers to make applications that are attractive and competitive in the increasingly challenging mobile app market landscape, from design guidelines and prototyping tools to user experience evaluation services. I discuss the accessibility and effectiveness of this program and its services based on both qualitative and quantitative data collected from developers and Nokia websites in a time frame of 11 months.

In this thesis, I answer the following questions related to developers' processes and methods for product development: Are developers aware of the design and UX tools and resources available for the creation of their mobile applications? Are they aware of the importance of good user experience for their applications? Would an app developer change its own product process to include UX methods for future application development?

The contents of my thesis are the following. In Chapter 2, I go through the literature review, where I comment on the main relevant topics and explain their linkage to the initial research problem outlined above. I will also hypothesize how the findings may contribute to the topics being either addressed or studied in the current literature. I will then describe my research plan in detail. The initial



questions posed are broad, and need to be narrowed down during the research process – another reason to utilize action research.

For this research, I utilized quantitative and qualitative methods. The quantitative research involved web site metrics and tool downloads when facing developers, and application user ratings when facing consumers. The qualitative research identified different groups of third-party developers who have had contact with the Nokia UX program through events and consultations, and collected their assessment of these activities' usefulness. The in-depth case study goes into very specific qualitative data.

In Chapter 3, I describe what kinds of resources are available to all developers who want to start creating mobile applications, as well as what Nokia offers in its UX program through Forum Nokia web pages. I then present the findings from measuring the performance of such resources when compared to other resources on the Forum Nokia's web site.

In Chapter 4, I describe the interactive services provided by the UX program through events such as UX workshops and UX clinics. I then give a detailed view of the UX evaluation consultation program, where the process and criteria of the evaluations are described. After that, I present the results of measurements made to evaluate the effectiveness of the program, including developer feedback on the UX evaluations, clinics and workshops. Lastly, I present the findings from measurements in Nokia's Ovi store, where the performance of applications that have been through the UX evaluation is compared against other applications in the same category.

In Chapter 5, I will present the case of one developer, VISIARC, who has an application that could benefit from a better UX. The developer was taken through several steps, starting from the UX evaluation program, to gather professional and user feedback. The progress in the application's ratings and reviews was monitored and is reported in this work.

The findings of my research shed some light on developers' awareness regarding the importance of adoption of UXD in their mobile application development plan. On the other hand, the data collected in the case study also opens up some questions on the extent of the meaning of good user experience for

a mobile application, and how much the design itself can influence the perceived user experience of a mobile app.

In Chapter 6, the summary of the findings will be shared and compared to the current body of knowledge. Some new findings and issues raised during the work may serve as a complement to studies in Quality of Experience.

Finally, in Chapter 7 I summarize the work done in the thesis, starting from the motivation, target audience and goals, going through steps taken for the collection of the data, the findings this data provided, and make my final considerations and recommendation for future studies.

## 2. Literature review and related work on mobile applications

The literature review is a snapshot of the body of knowledge surrounding the mobile application lifecycle. For someone working for Nokia as a developer advisor, the understanding of the current mobile ecosystem is essential, as well as the state of current research in mobile usability and UX. The objective was to form a basis upon which the research is based and its results mapped against – and proposals for future work can be made.

### 2.1. The transformation of the mobile value chain

The mobile value chain is going through two major changes: the first one is the increased utilization of mobile data, which leads to a higher expectation from end-users on the quality of services. The other one is the migration of power, from the network providers to the users, who can now dictate the future of the different businesses in the value chain. This topic is important to my thesis as it describes how we got to where we are today, and how this transforms the businesses surrounding mobile devices. Also, since this thesis work covers the mobile application development process, it is important to document the current state of the sector with regards to implementation and fragmentation.

#### **From “Quality of Service” to “Quality of Content and Experience”**

The current literature on the topic of mobile VAS – Value Added Services such as SMS or Internet data connection for mobile devices – has *convergence* and all its implications as background. The term convergence in this context refers to technology convergence, where previously separate information technology channels such as voice, multimedia and Internet integrate and are made available in a single device such as a tablet or a mobile device. The evolution of these technologies requires enhancements in the capacity and power of devices utilized as terminals for such services, and also brings the need of a good user experience in the delivery and consumption of such novel multimedia content.

Mahmoud and Popowicz (2010) analyze the migration of the core value of mobile services from voice to data, motivated by mobile web access and mobile

applications download. This study validates the sharp increase of smartphone and mobile application usage seen nowadays and described in the Introduction. In a related study, Xia, Rost and Holmquist (2010) reflect on business models in the mobile VAS industry, based on the constant change of player roles and their interdependency in the mobile value chain. It is a valid point to surface, since the mobile VAS ecosystem is still growing and not stable yet, making many of the relationships not established or clear enough.

### **Mobile content**

Subramanya and Yi (2006) see the rise of the demand for mobile content (e.g., videos, music, games, news), brought by convergence, as a game changer. Mobile network operators have to invest more in data infrastructure and differentiate in the value added services they provide not to be just a mere data channel. Other players in the mobile ecosystem such as content aggregators and mobile services providers have to adapt to this new reality where both demand and competition are high. The evidence of higher investments of operators and aggregators can be seen in many initiatives announced in the latest years such as WAC (2011) – an applications consortium led by mobile operators – or Telefónica’s BlueVia (Telefónica, 2011), the operator’s effort to add value to mobile developers through its network applications, rather than just being a data channel.

In an introduction to a special issue in the Personal Ubiquitous Computing journal back in 2004 (Chittaro, 2004), the imminence of the massive adoption of mobile as a means by which users access internet content raised a concern on whether it would actually become reality, if the quality of the experience would not be good enough. Although the massive adoption did happen – with 1.3 billion people expected to have accessed mobile Internet worldwide in 2010 (Juniper Research, 2011) – the concern about quality of the experience remains valid.

### **Design – quality of experience**

In his Quality of Experience framework proposal, Mohseni (2010) singles out mobile content as an excellent example of the convergence of Information and Telecommunications technologies. He describes the transition of the mobile value chain and how *“the traditional and well-established concept of QoS (Quality of Service) has lost its importance, whereas content quality and end user perception*

*have become more significant... Although in many cases a better network QoS will result in better QoE (Quality of Experience), satisfying all QoS parameters will not always guarantee a satisfied user."* His main points are that services and applications cannot live in isolation as previously; and that the industry is migrating to a more consumer-oriented mentality. The result is that a good user experience is critical for the sustainable growth of mobile content value chains and ecosystem. The importance of these points is evident in the VISIARC case study, and will be described later on in the thesis.

Mosheni's (2010) point of view that Quality of Experience is rising in importance has supporters such as Golding (2008), who sees a mobile applications business as an experience business where the end user experience, not technology, rules. In his book, Golding defends that the quest for a seamless, connected and personalized end-user experience should influence even supplier selection for infrastructure and services. The quality of experience of location aware mobile services, for example, is directly influenced by the quality of network service. The quality of network service can shift one's perception of the usefulness of a mobile service if such mobile service is highly dependent on the network's speed and quality. (Häkkinen & Isomursu, 2005)

### **Development – fragmentation in implementation platforms**

The increasing number of available mobile development platforms has also increased *fragmentation*. This means that these platforms are not compatible with each other – sometimes a platform is not totally compatible even within itself – forcing mobile application developers to re-write their applications many times if they want to reach the widest range of devices.

Many studies have turned their attention to the issue of fragmentation. Hammershøj et al. (2010) present a comparative study of the different platforms in the market, their strengths and weaknesses. The study touches on business models, mobile OSs and application development platforms, specifically languages and their ease of implementation, with the objective of better informing newcomers about the current development choices. This is very useful as a high-level base for decision making in case a developer needs to choose between platforms. A similar, more recent study by Tarkoma and Lagerspetz (2011) covers

an even broader array of platforms and technologies, even touching non-conventional ones such as Kindle's and HP's WebOS.

Cohick (2011) talks about developer experience and warns platform owners of the commitment needed to third-party developers in order to keep a platform viable. Developers are what keeps a platform alive and are a special kind of user that deserves respect. This respect comes in the shape of transparency and two way communication; good documentation, extensive tutorials and enablement of peer education through collaborative tools such as wikis; tool chain quality; and good platform usability through good and well-documented application programming interfaces (APIs).

Going deeper into technical aspects, platform fragmentation is top of mind when developers think about the market they plan to address (Mahmoud & Popowicz, 2010). According to Vision mobile's research, developers will target – and re-write – applications for an average of 2.8 platforms (Vision Mobile, 2010). As of this writing, the top two platforms for which apps are being developed are Android and iPhone. Other platforms, such as Windows Mobile or Java ME are also subject of research and comparison, and in one study (Grönli, Hansen, & Ghinea, 2010), the conclusion made from the mobile development environments analyzed is that the tighter the integration with the original operating system, the better for the developer.

### **Distribution and monetization**

Entrepreneurs face challenges when creating content in the mobile space, such as fragmentation on devices, operating systems and networks; intermediation due to fragmentation by, e.g., cross platform application porting or certification required by network operators; and distribution integration challenges due to the industry's open model (Tarnacha & Maitland, 2006). Another study on trends in mobile application development talks about platform openness and marketplace models, and in the end advises developers to evaluate market size and accessibility as well as career opportunities and creative freedom when choosing a platform to develop for (Holzer & Ondrus, 2009).

A critical aspect on the value chain is distribution, monetization and renewal. While Mahmoud and Popowicz (2010) carefully work through better ways for

apps to be found and consumed by people and propose a framework based on the current state of the marketplace and channels available, Xia and colleagues (Xia et al., 2010) discuss the different business models different players are adopting. The overall understanding is that the current business and distribution models are not yet final, and more clarity is expected as the market matures.

One of the reports reviewed has extensive studies on the current state of app stores, what kind of business can be built now and in the future, as well as predictions on what the future of application stores will be (Khanna, 2009). Literature aimed at aspiring developers go specifically into what kind of business models and marketing activities can be implemented to achieve better performance (Wooldridge & Schneider, 2010). There is a warning, however, that *“No amount of marketing and publicity will help a poorly conceived app”*. Publications with core focus on web channels (Harden & Heyman, 2009) explore digital marketing tactics to improve performance of a product or a service on the market.

### **Marketing is not enough for success**

Marketing efforts to drive awareness do not guarantee success, however. The key factors affecting success are social networks, and the previously mentioned mobile internet adoption growth. Feijóo, Pascu, Misuraca and Lusoli (2009) discuss paradigm shifts in the mobile ecosystem brought by their adopters reaching critical mass. The premise is that the social internet is already in advanced migration phase to mobile devices, which are now a social hub.

In this social hub, the crowd sourcing of information from users and task-centric, context aware social information can help improve people's lives as they *“create, change and enhance content, as well as comment on, discuss and assess it”*. (Feijóo et al., 2009) This is especially true now that virtual marketplaces provide social shopping experiences – users can openly rate, recommend or criticize a certain product or service. This shift in ownership of consumer influence is powerful especially as it is generated by real life, contextual usage, and can provide a more accurate assessment of the usefulness of what is being offered.

And if users cannot use an application or gain pleasure from its use, there is no shortage of other applications in the market ready to show how the UX can be

done better. Consumers are aware of the importance of this, and are more than happy to share with other consumers their experience with a certain application. That, in its turn, affects the mid and long-term performance of a given application in the market. Consumers rely on ratings when choosing an application to download, and a recent study shows that 83% of users will download apps with a 4 (out of 5) star rating or more (King, 2009).

The concept of active consumers in the context of “Quality of Experience” (Mohseni, 2010), points out how content is not anymore consumed passively. This means that users can now give feedback to the content provider and developer, either to praise or to request improvements. A real-life example of this feedback channel is the ability users have to rate and review applications in app stores, and they are also able to reach out to the developer directly (Bacon, Chen, Parkes, & Rao, 2009). This method is used and proven in its principles by web-based companies that already use recommendation systems with great success. (Linden, Smith, & York, 2003)

### **Improving the consumer experience**

Concepts of “one integrated portal” and “one click purchase” where consumers have an end-to-end solution for registering, browsing and purchasing applications make a difference in the consumption levels. They help make the end user experience much better (Holzer & Ondrus, 2009). But from an end-to-end perspective – from the moment a developer has an idea for an application, through the prototyping and development and finally to its publication, monetization and consumer feedback for new iterations – Holzer and Ondrus (2009) do not mention good UX or need for good guidelines for app design. In my opinion these should be discussed, since UX needs to be consistently good – a poor app can ruin the whole experience, even if the discovery and consumption experience was pleasant.

## **2.2. UI design, mobile usability and user experience**

*“Your best guess is not good enough”* – Jakob Nielsen (Nielsen, 1993)

Computers rarely improve the efficiency of the information work they are supposed to do (Landauer, 1996). This usually happens because they are too hard to use and do too little that is sufficiently useful. Their many features, designed to



make them more marketable, merely increase cost and complexity. Landauer proposes that emerging techniques for user-centered development can turn the situation around, and this proposal is especially useful for mobile software development.

Already in 2006, the upcoming transition imposed by convergence was foreseen in an article on the importance of good UI design for simple yet pleasant mobile user experience (Subramanya & Yi, 2006). The article also pointed out the need of future studies on the UI design field for the consumption and experience of mobile content. The goal would be to ensure that users would experience consistency, ease of discovery, and seamless processing and transfer of content. Although the recommendations made were not only for mobile applications, they are perfectly valid still today – from new input methods to be taken into consideration, to improvements in UI design and development tools.

The UI or user interface of a mobile application is the mix of hardware (for example a touchscreen) and software (application screen) components so a user can achieve the desired goal intended with such application. Karat's definition of usability is *"the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use"* (Karat, 1997). Figure 2.1 shows the dimensions of usability according to the ISO 9241-11 standard, as suggested by Keinonen (2007) in his analysis of the various definitions for usability. Usability can be succinctly described as "how easy user interfaces are to use" (Nielsen, 1993).



Figure 2.1. One interpretation of the dimensions of usability, based on ISO 9241-11 (Keinonen, 2007).

When we refer to user experience (UX), however, the definition is not that straightforward. UX is related to a range of aspects from utility and ease of use to meaningful, pleasant experiences through the whole period where an individual is

in contact with a product, system, service or object. Figure 2.2 is a re-drawn version of Nilsson's (2010) model of the different dimensions of User Experience. User experience is, according to the scientific community, dynamic, context-dependent, and subjective (Law, Roto, Hassenzahl, Vermeeren, & Kort, 2009). The scope of a user's experience with a product can start as early as when he or she is subject to a commercial advertisement of such product, setting expectations on availability and usage.

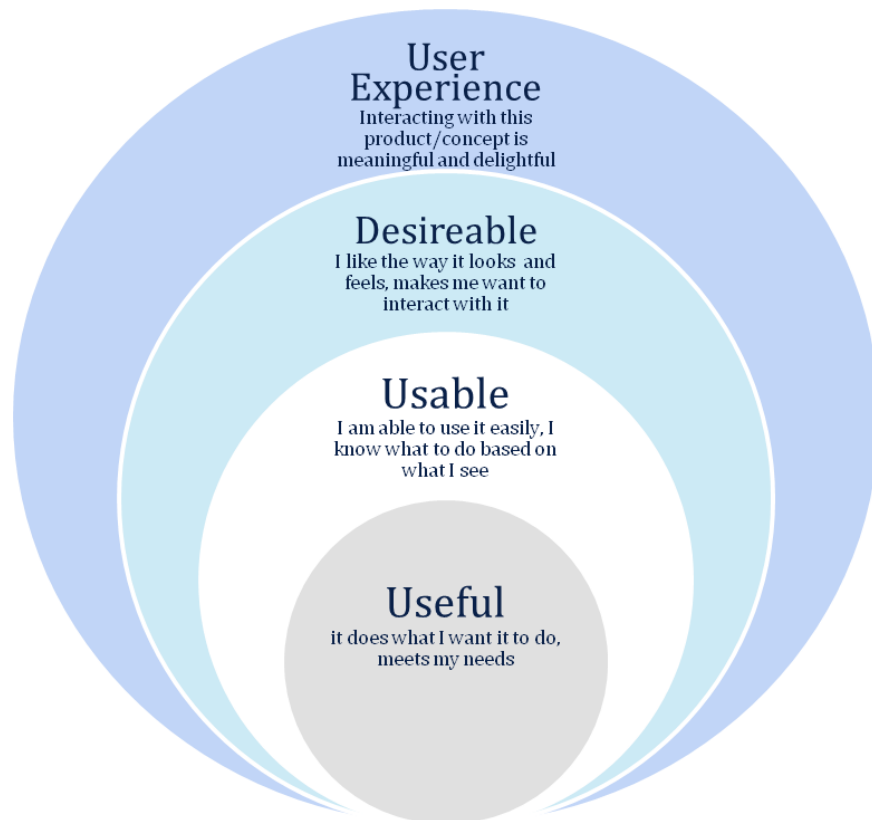


Figure 2.2. One definition of user experience, adapted from (Nilsson, 2010).

One of the approaches to achieve a good user experience is through user-centred design or UCD, introduced in 1986 (Norman & Draper, 1986). In UCD, human needs are put above other aspects such as technical specifications, and early user input, testing and feedback supports the creation of a product that achieves the intended goals in a way user adoption and learnability is optimal (Law et al., 2009). This is very important because not even the appeal of a brand is enough to keep users engaged when the UX of an application is not optimal. Brand – not necessarily only product - experience is expressed in Figure 2.2 by the outer layer, which encompasses the other ones.

Overall in Human-Computer Interaction (HCI) and mobile HCI papers, there is very little disagreement on the need of special attention to usability in mobile devices due to limitations in screen sizes, differences in screen resolution and existence of touch input capacity. The increasing availability of heavy mobile content, requiring broadband access, and users' expectations on how this experience will be delivered also contribute to the need of a good user experience. Cognitive overload is a major factor to consider, since mobile users are usually on the road with many distractions. A good example is the delivery and experience of mobile multimedia, where the choice is overwhelming and a bad user experience can make the usage very frustrating, if not impossible (Hussain et al., 2008).

In the other end of the spectrum, Dörflinger (2009) proposes a framework for mobile content and applications to the next billion users in the bottom of the pyramid – namely developing countries where money is scarce and mobile devices are the primary channel for internet access. The framework explores how usability will play an even more crucial role in the adoption of mobile technologies in emerging markets.

### **Usability testing and evaluation methods**

Authors in the scientific community are engaged in discussion around the validity and effectiveness of different approaches for creation and testing of mobile software. Sefelin, Tscheligi, and Giller (2003), for example, do a comparative study on paper vs. computer based prototyping in software design, pointing out that both tools have their own limitations according to what needs to be prototyped. When thinking of the diversity of screen sizes and screen ratios of mobile devices, the choice of the right tool is important; limitations have to be taken into consideration, because some members of the prototyping team such as less tech-savvy graphic designers – individuals drawing illustrations and other UI elements for applications – may not have enough skills to navigate through computer tools outside of their own domain.

Qualitative and quantitative methods can be used to measure mobile usability. Lesemann, Woletz, and Koerber (2007) present two specific case studies, where one can see how invaluable these are in general, and specifically how different methods can yield different results. This study takes usability testing as a

premise, though, and focuses solely on the kind of data that can be obtained through different methods.

### **Field testing vs. lab testing – the importance of context**

The effect of context in mobile usability is a big point of discussion when talking about measuring the user experience of a mobile application. Kaikkonen, Kekäläinen, Cankar, Kallio, and Kankainen (2005) argue that field testing is not a better solution over lab testing, as it is time consuming and the same UI design flaws can be found in both settings. Field testing would only be justifiable if one needs to understand a user's contextual behavior. On the other hand, Scott (2009) explains why lab testing – in a controlled environment – is in many cases almost useless, since that context is very different from real life, where, e.g., latency – the time it takes for the software to respond to the user's request – can make or break the user experience and make an application idea unfeasible.

A study by Nielsen et al. appropriately titled “it's worth the hassle,” supports real-life testing. In this study, field testing is regarded as essential, since it can surface usability problems that the lab testing simply cannot, as it deals with cognitive overload and interaction styles – elements inherent to being “on the move”. (Nielsen, Overgaard, Pedersen, Stage, & Stenild, 2006)

In a study on appropriating and assessing heuristics for mobile computers, Bertini, Gabrielli, and Kimani (2006) defend the need of taking context into consideration even for these kinds of evaluations – which are synergic to user testing with inexpensive costs – due to the opportunistic, unstable nature of mobile. Here the focus is on context, but the ultimate goal is to provide better usability for mobile applications.

### **Context inside mobile applications**

Davies (2007) did a study on how to improve mobile application usability based on context, in hopes of tackling the cognitive overload and surfacing interactions that are meaningful to a specific life situation. It was primarily on location, time, activity and identity, and was based on previous studies by Dey and Abowd (Abowd et al., 1999). Davies points out that contextual data, in the same way as

activities surrounding the usage of a mobile application, is especially useful for a designer when planning a new mobile application. The ultimate goal is to simplify tasks as much as possible, resulting in a better user experience.

Another group of researchers went beyond a proposal and actually did an empirical study on mobile usability where the implementation technology was added as a context element (Ryan & Gonsalves, 2005). What they discovered is that the UX of native applications, because they are tailored to the mobile use case, is much better than of their web based counterparts in terms of user satisfaction and feedback. These findings are supported by Nielsen (2010), who defends native applications on the basis that the more impoverished the device, the more the design must be optimized for the platform's exact abilities, instead of bowing to a cross-platform common denominator.

Teófilo, Martini, and Silva (2009) have a very similar objective than Davies: they propose customizable software for embedded devices, namely mobile phones. Its sole purpose is to shorten the time for a task to be completed, as intuitively as possible and according to the user's input and expectations on what he or she expects from each context. While there is a learning curve to it, once the user gets accustomed to the new navigation process the feedback is very positive. Following the same principle, Uther (2002) believes that attributes such as limiting user input, displaying only minimal and relevant information on the screen, and the use of context should be considered specifically from the perspective of mobile applications.

### **The importance of good UX**

When an individual is the sole designer, developer and tester of an application, it is very easy to overlook the basics of usability and deploy a sub-par application in a marketplace (Wooldridge & Schneider, 2010).

Jakob Nielsen, in his classic *Usability Engineering* starts out with some examples of how good usability can bring savings in all kinds of systems (Nielsen, 1993). At the same time, he points out that the direct savings are not obvious to the development organizations, especially before the product is launched. In a survey with companies on how much resources should be allocated to usability on a project, it can be seen that the smaller the project, the smaller the allocation – and this survey only covered projects that actually had usability engineering

efforts, not all of the companies' projects. It is argued that the amount of ideally allocated resources varies according to the nature of the project, but should be present nevertheless.

The importance of good mobile user experience (UX) is increasing as the user base of mobile devices and applications is constantly growing and shifting. Advanced mobile services are becoming popular with the general public, and UX is a key differentiator between competing mobile applications (Forum Nokia, 2011). This results in a rising level of interest by companies in understanding the required UX-related tasks and competencies that are needed for proper user research, interaction design, and graphic design. But how to get developers, usually engineers by formation, to take an interest in UX?

Pongapet (2010) shares his own experience as an engineer turned product designer and UX specialist by self-learning. He points out the importance of having both skills as a well-rounded professional, and describes relevant starter's reading. Then he goes through different kind of resources and motivational examples to demonstrate that it is possible, if not easy, to get acquainted with the world of design and UX through the right channels and tools, for which he also provides some links.

### **Usability as an integral part of development organizations**

A significant amount of work has been also dedicated to the overarching theme of integrating usability in companies and frameworks, so that usability and design become initial product drivers as opposed to add-on fixes or upgrades (Scott, 2009). Usability as a part of product development processes has been defended since the early HCI pioneers (Gould & Lewis, 1985), Jakob Nielsen being a strong defender of that practice in software development, most notably in web and, lately, mobile domains (Nielsen, 1993; 2010).

Linked to the topic of integrating usability in companies by adding it to the software development process, there are discussions about institutionalizing usability. The literature defending such practice intends to support decision making on how much time and money should be allocated to usability resources. The motivation behind it is that the usual resource allocation for user-centered design and usability is not enough.

Lund (2010) shares his experience in establishing a User Experience team in his own corporation, and points out that having the vision and focusing on the right projects in the beginning – by delivering results, being inspiring and motivating – can create a virtuous circle that helps build an user-centric culture. In their course description on institutionalizing Mobile User Experience, Herrmann and Tscheligi (2006) attempt to position user experience into the corporate culture, and the corporation itself. Management support is mentioned more than a few times in all literature related to integrating usability into businesses, since a change of culture inside an organization takes time and effort.

The interest in UX practices establishment, in the case of Nokia, is extended to its third-party developers through the UX program as described in this thesis. The intent is to make the knowledge available and motivate developers to utilize design tools aimed at achieving a good quality level of applications, regardless of who created such applications. Since the third-party developers are not employed by Nokia, earlier work relating to institutionalizing usability is not directly applicable – it is, however, a foundation to motivate these developers to consider integrating usability in their companies.

### **2.3. Research questions, methods and timeline**

After the literature review, it is clear that there is a wealth of information on the different aspects surrounding the development process of a mobile application. However, the reasons behind the adoption – or lack of adoption – of UXD as part of this process are not fully explored.

#### **Reinstating the research problem**

Going back to the study conducted by the research and analytics firm Vision Mobile, who interviewed over 400 developers with different backgrounds, one of the findings was that while iPhone and Flash developers were highly aware of the importance of a good UI and UX in their applications, the contrary was true for some other developers, especially the ones creating applications for the Symbian and Windows Mobile platforms (Vision Mobile, 2010). The reasons for these results may be at least twofold: lack of awareness of the benefits it brings, or about the existence of Design and UX learning materials and tools available to assist developers.

For those who are in the field of HCI, the fact that there still are developers who do not think a good UI and a good UX is particularly important can be quite surprising. This was the starting point for my research, with focus on the group of developers who develop for Nokia, utilizing the Symbian platform – pointed out in the Vision Mobile research as especially uninterested in good UI design. I stated these initial research questions:

- 1) Are developers aware of the tools and resources available for the creation of their mobile applications taking the user's experience into consideration?
- 2) Would an app developer change its own product process to include UX methods for future application development if they saw the benefits of such methods?
- 3) Do applications that go through UX evaluations perform better in app stores, measuring terms by ratings or comparison to peer apps?

It may also be difficult for developers who are new to the area of user experience design to immediately understand the logic behind it, because at times it sounds both very conceptual and vague ("applications should be emotionally compelling"), and at other time very detailed and specific, such as requirements of consistency in the placement of navigation buttons. Many times the terms "user experience" and "UI design" may sound superfluous to a technology-oriented developer.

The work conducted in this thesis aims at answering the questions and validating the assumptions above. However, due to the nature of the research methods, especially action research (described below), two other questions that were not raised by the original research plan have surfaced during the process:

- 4) Is user-centered design enough for good UX? What other factors affect the perception of an application's user experience, in the consumer's point of view?
- 5) To what extent the perceived bad user experience can really be addressed by the mobile developer?

### **Research methods and timeline of study phases**

The questions posed in my research give room to different research approaches. As a Nokia employee, it was possible for me to work independently as well with



two different teams in Nokia to get both quantitative and qualitative insights. I decided to explore both possibilities, and will describe the steps I took below.

## Overview

The research had two phases, and for each phase I utilized different methods. The timeline of the research phases and methods can be seen in Figure 2.3. In the first phase, I search for data on: a) Nokia developers' awareness and utilization of the Design and UX offering available to them, and b) Once the developer has been through an UX evaluation, do they find it useful and would be willing to utilize it again.

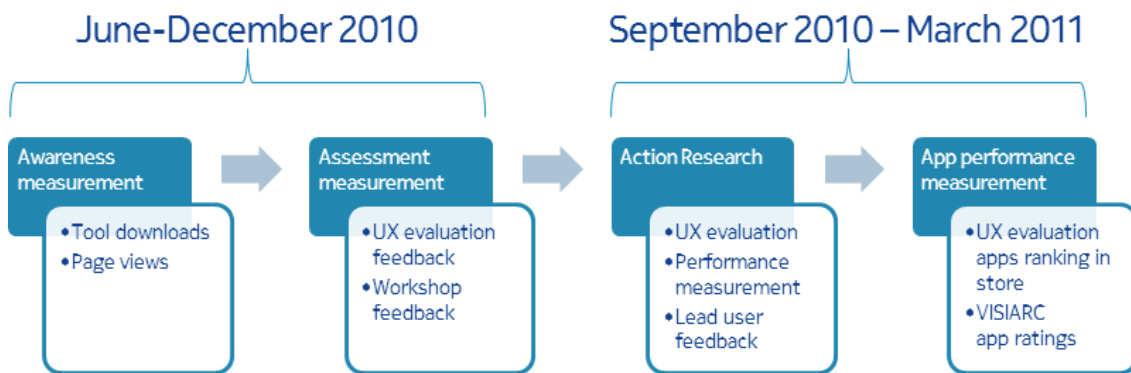


Figure 2.3. Research phases and timelines.

To identify and collect data in the first phase, I worked together with the UX team, who constantly runs developer-facing activities, from July to December 2010. The quantitative measurement was made through questionnaires that were formulated with the User Experience team – of which I am not a part, but do play a support role – and sent out to selected developers during this six month period. The selection criterion was that the developer had either participated in a UX workshop or in a UX evaluation.

The other data collection method was to follow the traffic on Forum Nokia's UX design pages during that July-December period, assessing the level of interest in different pages of the section and measuring the number of downloads of Flowella, the main design tool offered in the site.

When I started working on the second phase, from September 2010 until March 2011, I focused specifically on VISIARC's case, where a seemingly good application was getting mixed feedback, which required deeper investigation.

There, the questions and audience changed. I was now looking for user's perceptions of VISIARC's application; so I collected and analyzed feedback data related to their application from Ovi Store's review system and BetaLabs bug report and end-user review system. Both systems collected a significant number of reviews – around 800 – even though it represented only roughly 0.1% of the attempted downloads of the application during the tracking period.

### **Phase 1 data collection tools: Surveys**

#### **Survey to developers who participated in 1-day UX workshops.**

The objective was to evaluate the receptiveness to the idea of having a user-centric approach before and after a hands-on, full day UX workshop.

1. What do you think was the objective of the training?
2. Did it accomplish this goal?
3. Would you use the concepts presented in this workshop?
4. What did you like most?
5. Where would you have liked more information?
6. What was not useful to you & why?
7. Other comments?

The results collected from this survey showed that developers found the workshop very useful, that they were going to use the concepts learned in the workshop in their future projects, and that they had a better understanding of UX and its benefits after attending the class. In average, from 5 workshops with a capacity of 20 developers, half of the participants answered the survey.

#### **Post-UX Evaluation survey:**

To be selected to a UX evaluation, the developer had to be a member of Forum Nokia, have an application at least in early development phase, and have a contact person inside Nokia for follow up. After the User Experience evaluations, developers were sent a questionnaire to collect their assessment of the service, as well as the usefulness of the evaluation itself to their daily work.

1. How large is your current development team?
2. How do you currently take design and user experience into account during your development cycles?

3. Do you find our suggestions helpful?
4. Which of the suggestions are you planning to implement?
5. Do you have any technological or scheduling issues in implementing any of the suggestions?
6. Is there anything in the consultation that you didn't use/need/didn't understand?
7. Would you be willing to use this service again? Why or why not?
8. Would you recommend others use this service? If no, is there an alternate service that you might use?
9. May we contact you further if we have any followup questions regarding your evaluation?
10. On a scale of 1 to 5, 1= unacceptable and 5= excellent, how would you rate this consultation?

Specific questions were later added to evaluate if these developers think a good UI in their applications is important, whether they understand how UX and UCD are related to a good UI, and if not – once the linkage is clarified – do they still have the same opinion. Around 40% of all developers invited to the survey returned the questionnaire.

### **Phase 1 Log analysis**

While the surveys provide some qualitative data, they reach only a subset of developers. Therefore, it is useful to utilize additional measurements to evaluate how aware Nokia developers are of the resources and tools available for them. One way to measure this awareness is through Forum Nokia website visits. I measured the visits on design pages versus other similar resources on the site, and the number of times the design tools are downloaded.

As these transactions will be used as a measurement, it is necessary to explain the relevance of these resources and how they contribute to the results. For that, in Chapter 3 I describe and compare different kind of Design or User Experience resources that are offered by different vendors to developers worldwide. As not all platform vendors can be covered, I will focus on Apple, Google and Nokia. Then I will go deeper into some of Nokia's offerings such as the user experience evaluation consultation program.

### **Phase 2 – Action research with lead user feedback and consumer reviews**

In Chapter 5 of the thesis I'll add depth to the study through Action Research. In this activity, the research client is a small-sized developer, VISIARC. I selected VISIARC because even though they have a great product, I usually got mixed feedback about its user experience, making it an ideal candidate for a professional User Experience evaluation. Therefore I nominated them for a pilot UX evaluation offered by the UX program, VISIARC implemented the suggested changes, and shortly after that I nominated them for a promotional opportunity in Nokia's Ovi Store. User feedback through the store's rating system was collected and processed.

Because of the feedback from this first round of ratings, I understood that VISIARC could benefit from in-depth feedback – so I then nominated them to be featured in Nokia's Beta Labs (Nokia, 2011). Beta Labs is a lead-user community website, created by Nokia to share some of the concepts and pre-commercial products that it has been working on, in order to gather feedback on how they work in real life situations and how they can be improved. Initially for internal products, Beta Labs just extended this space in early January 2011 to a very limited number of third-party developers, subject to the existence of an internal sponsor – me – and evaluation by the program's stakeholders. Fortunately, VISIARC was accepted and was the first application to be featured in such a way.

After the collection and implementation of the users' feedback, I asked the developer in question to reflect on the benefits and challenges of the process he's been through – and answer the research question related to integrating UX in the application development process. Did they find that the UX evaluation brought benefits to the success of their application? Would they integrate UCD as part of their mobile application development process?

### **Research goal**

Based on the findings, the goal of Phase 1 is to have a recommendation made on where to place UCD and UX – represented by the UX program and associated tools – in the mobile application development process. The ultimate goal is to bring new argumentation to the program's current value proposition, backed up by evidence collected, and make recommendations on next steps.

The result of the both phases of my research should shed some light into developers' awareness, motivations and barriers to the adoption of UCD and UXD in their mobile application development plan. With that identified, we will know whether business benefits – in the shape of good reviews and performance against peers, as well as a decrease in the number of bug reports from such users – are enough to motivate developers.

The results and findings reached will be compared to the current body of knowledge, and issues raised during the work that may serve as a continuation of the discussion will be offered for further work.

### 3. Design resources and tools for mobile app developers

Mobile applications must be easy to use in order to be successful (Jarvenpaa, Lang, Takeda, & Tuunainen, 2003). For that to happen, design and usability guidelines specific for mobile use must be easily available, as the existing guidelines for desktop-based software development cannot be applied to the mobile context (Chae & Kim, 2003). What is, then, currently available for developers in terms of UI and UX guidelines? The main platform vendors do offer different levels of support for the implementation of good UX in applications.

#### 3.1. Overview

Apple is a pioneer and leader on this field, providing extensive assistance on UI and UX for its developers both in its website and in its tools. In the iOS Developer Center website<sup>2</sup>, a complete set of human interface guidelines is offered through a collection of articles and examples. Such guidelines are very important to guarantee that any application developed for the platform has a minimum set of attributes and consistency so that the iOS users will find it familiar, regardless of type of app.

The site also includes a getting started section, UI catalog, Design Strategies and case studies, among others (Apple, 2011). It is even suggested that developers start sketching with stencils, which offer the basic UI elements for both iPhone and iPad. Stencils are very useful because they assist paper prototyping in a realistic way, placing icons and other UI elements in the place and proportion they should have in the real application. Figure 3.1 shows an example of a typical iPhone stencil.



Figure 3.1. iPhone stencil kit. Source: Pelfusion Magazine (Zagidullina, 2010).

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<sup>2</sup> <http://developer.apple.com/devcenter/ios/index.action>

In regards to tools, Xcode – Apple’s developer toolkit – comes with a built-in interface builder that has an easy drag-and-drop interface as represented in Figure 3.2. The UI builder contains pre-made basic UI elements that can be connected to commands built either by the developer or through code samples included in the tool (Apple, 2010). These kinds of enablers ensure consistency and ease development, as beginners easily understand what the different UI elements should look like and how they should be placed in the application being built.

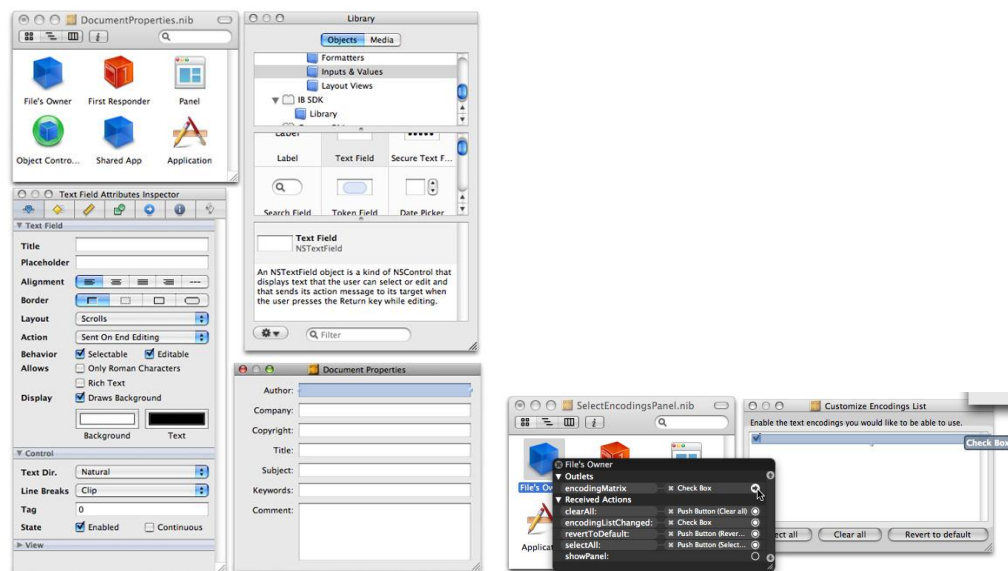


Fig 3.2 Apple’s UI Builder interface and connectors. Source: Apple Developer library (Apple, 2010).

Apple has the most famous UI and UX guidelines not only because of their quality, but also due to its strict policy on application quality. Apple’s commitment to deliver superior user experiences reflects on how it deals with applications submitted to its store. This is why developers who decide to create applications for Apple need to become acquainted with these guidelines since the very beginning – to avoid having to re-do their application.

A very practical example of how this culture is enforced is that in Apple’s App Store, around 60% of the applications submitted are rejected at least once, and the single biggest reason for that is that the app simply does not behave as it should. (Wooldridge & Schneider, 2010)

Google’s Android, on the other hand, does not offer the same kind of design support to developers – it does have guidelines on icons and widgets, but there is no specific UX section in its website dedicated to developers. The UI section of the site consists of technical specifications, and the guidelines provided are related to

tasks and activities – mostly meaning main use cases in application workflow such as activities in an e-mail client: view folders, view list of messages, view a message, compose a message, and set up an account<sup>3</sup>.

Google does not offer the same level of accessibility and tools as Apple does for standard UI building (Urquhart, 2009). Google relies on the community to build the tools, libraries and add-ons that are not part of Google's SDK. The UI builder tool is very basic, represented here in Figure 3.3. This UI builder is different from the App Inventor, which is a very simple visual browser-based tool. Fortunately for developers, there are many community-built UI tools and libraries available online and listed by different media such as specialized blogs (Andrew, 2010).

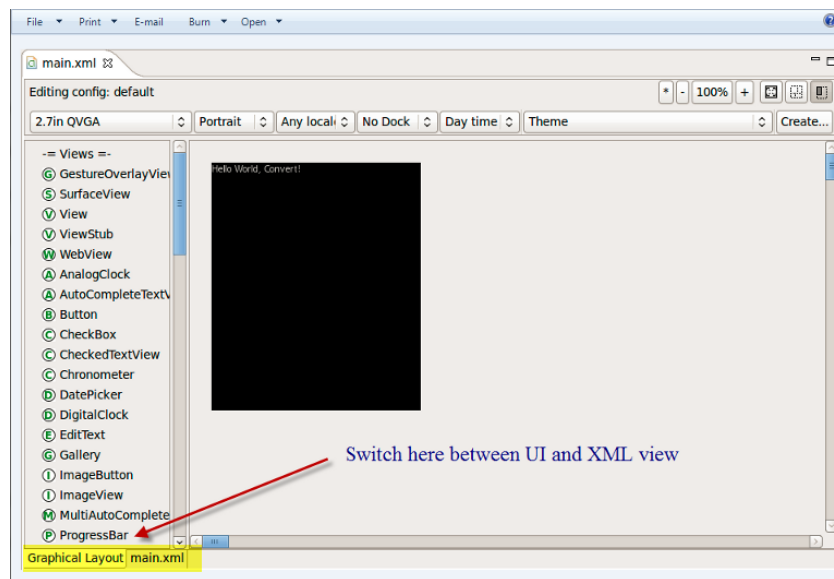


Figure 3.3. Android GUI builder (Vogel, 2011).

Other vendors that won't be covered in this thesis, such as Microsoft and RIM, provide UI guidelines for their developers with different methodological approaches.

### 3.2. Resources available to Nokia developers

Nokia understood that a similar level of service such as the one provided by Apple and described earlier in this chapter was needed, and has led efforts to provide a similar number of resources. In this case the approach would have to be less specific to a platform, since Nokia offers many.

The diagram pictured in Figure 3.4 gives an overview of what kind of resources and services are provided by Nokia to its third party developers. The

<sup>3</sup> [http://developer.android.com/guide/practices/ui\\_guidelines/index.html](http://developer.android.com/guide/practices/ui_guidelines/index.html)



resources are mostly provided via the Forum Nokia website, while the services are performed in events, with live interaction, or through virtual channels such as e-mail exchanges or teleconference.

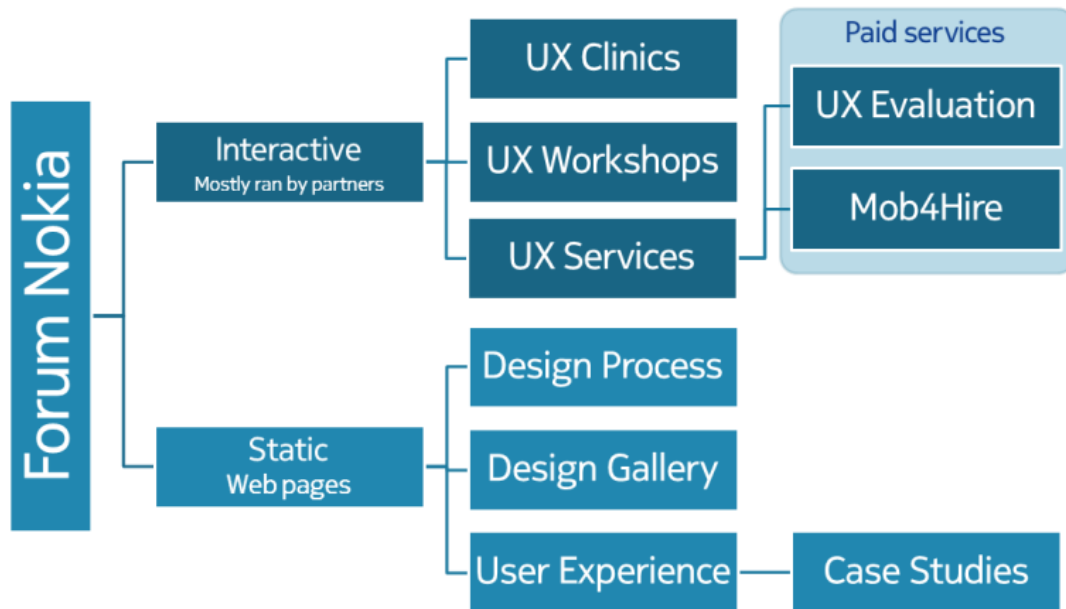


Figure 3.4. Nokia's User Experience program.

### Forum Nokia website – static resources

In early 2010, Nokia launched a new section in its developer portal solely dedicated to design and user experience<sup>4</sup>. The section is a repository of information built from Nokia's experiences in their own mobile application design, as well as experience collected in supporting third party developers in building their Nokia application. Due to the diversity of devices provided by Nokia, a significant amount of information related to good design practices for different mobile devices was collected and is now available in the website.

All the static resources offered through the Forum Nokia website are free of charge, and address beginner to intermediate design skill levels.

#### 3.2.1. Resources for the design process

The design process section, shown in Figure 3.5, provides a step-by-step process model in mobile design for developers, with the intent that the methods and practices described are utilized throughout the development cycle. This section was designed to be read in full. It starts from a very basic getting started guide that

<sup>4</sup> <http://www.forum.nokia.com/Design/>

describes reasoning behind the creation of a new project, its overlaps and possible motivations. It highlights top considerations when starting a new project, such as choosing the technology and understanding the constraints to see if a product is feasible. The reason why these steps are highlighted is to emphasize the importance of careful planning and UCD in the application development process, as much time can be lost in iterations that could be avoided if such planning would be in place.



Figure 3.5. Design process section (Forum Nokia, 2011).

The section then covers **design research** motivation, types and methods, including a guide on developing personas. Personas can be a very useful tool for developers when designing their apps, because they help define the target audience and main use cases, bringing focus to the project. It then covers **conceptual design**. Here, developers are introduced to practices such as brainstorming, sketching and scenario definition. Scenario definition is particularly useful to add context to the users of the application, building a story around product usage and helping define how the product should work. After going through this exercise, developers should have a clearer idea on whether the product is viable and well defined.

**Interaction design and prototyping** starts from basic elements such as consistency and responsiveness, and then moves from documentation, navigation maps, task-flow diagrams and wireframes to the reasons behind prototyping and its various methods. Here the objective is to make sure that enough attention is given to the basic principles of usability, making the application easy to interact with and understandable. A clear example is consistency in navigation – a user

should be able to always use the same key or button to perform an action such as going back to the previous stage of the application. A complete set of guidelines on consistency based on the platform conventions is available in Forum Nokia's design library, and an introductory example can be seen in Figure 3.6.

### Adherence to a consistent UI style

In the mobile world, the impact of UI style is far more concrete than in Web or desktop domains. Different mobile platforms, such as S60 and Series 40, define their own basic set of rules, for example, in terms of display area and content, keypad interaction and UI components that are available.

Consider an example from S60:



Figure: Example of S60 UI style

Figure 3.6. Introduction to consistency in the design library (Forum Nokia, 2011).

Another useful aspect of early prototyping is that it can surface interaction and information presentation challenges. One good example is when the application is used in different contexts such as with or without internet connection. This can help narrow down the possible interaction options with the application for determined contexts.

After considerations on **visual and information design**, namely by pointing out that clear, good looking applications work better, **tools and technologies** for increased productivity are described. These tools and libraries, such as mobile web templates, do not depend on platforms. Some, however, are specific to a technology such as Flash Lite or Web Runtime (WRT). A porting guide from platforms, mainly iPhone and Android, is also available. The purpose of making these libraries freely available is to increase developer productivity.

A strong reminder is presented on what kind of **design optimisation** is needed when dealing with different screen sizes and resolutions. With the variety

of devices available in the hands of users, it is a very important point to reflect, as the same application cannot be expected to have the same design and user experience in both a smartphone that has a big touchscreen and a basic mobile phone with a small screen and interaction through separate keys. Knowing how to design an application with different set of requirements in mind can help plan development for scale – that can result in reaching more users with the same design basis. One good example given is an article on the trade-offs of designing an application to be touch enabled versus being touch-optimized<sup>5</sup> – shortly, it describes what use cases and limitations to have in mind when designing an application that utilizes touch as the primary input.

The last sub-section on this guide gives an introduction on the importance of **quality assurance and evaluation**, pointing out that testing early and often is a practice that should be encouraged, with real users and real devices. It also provides a list of available methods for the testing and evaluation of applications, such as expert evaluation, single-user usability testing, group usability testing and focus groups, observation, and surveys. To support decision making, there is a comparison table on advantages and disadvantages of each approach. By knowing their options, developers can choose a solution that will adapt to their work reality and resource limitations.

Updated regularly, the **design gallery** shown in Figure 3.7 showcases selected third party applications from a different range of developers that display good design and UX, and links such applications to the related design documentation library. By exploring the showcased applications, developers can identify ideas for their applications and learn from best practices, as they can download the original applications to test its complete experience.

For example, the January 2011 showcase in Figure 3.7 includes the Financial Times mobile optimized website, highlighting its purpose, navigation and interaction scheme, as well as other aspects such as visual elements. On the other hand, it also showcases the Timberland full-blown Qt on Symbian app, that has rich design, utilizes GPS and camera functionality. It is fully customized in its design, while complying with platform style guidelines.

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<sup>5</sup> [http://www.developer.nokia.com/Resources/Library/Design\\_and\\_UX/designing-for-nokia-devices/interaction-design/designing-for-touch/touch-strategies/touch-enabled-vs-touch-optimised.html](http://www.developer.nokia.com/Resources/Library/Design_and_UX/designing-for-nokia-devices/interaction-design/designing-for-touch/touch-strategies/touch-enabled-vs-touch-optimised.html)

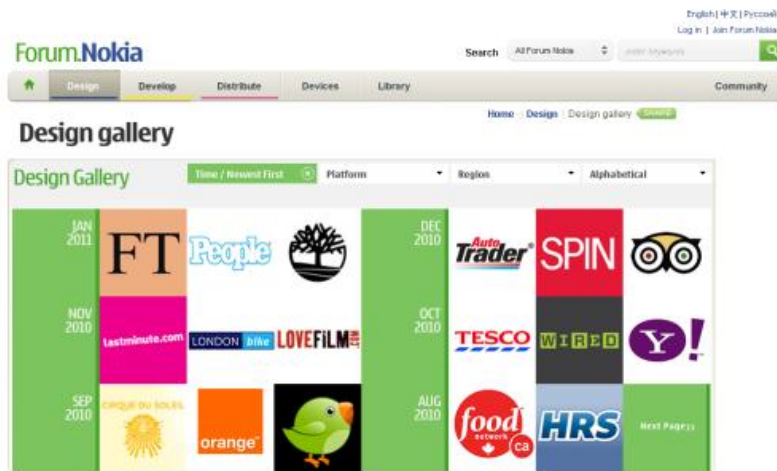


Figure 3.7. Design gallery highlighting the Financial Times and Timberland apps.

The **user experience self-help** section, shaped as an e-learning platform, was created to attract and motivate those new to the concept of UX. Its target group is mainly individual developers who cannot – or are not willing to – hire professional assistance. The idea is to lower the barrier of adoption to basic design principles. The “Introduction to UX” learning module shown in Figure 3.8 aims at educating developers on mobile heuristics using real-life examples and quizzes, making it the only interactive section of the static pages.



Fig 3.8 Introduction to UX self help modules.

The practical examples are useful for developers to associate the situations proposed to their own experiences, and provide a basis for decision making in future projects. One example of a real life situation where advice is given is user testing. Experience shows that the tests should be done with users who are similar to the application's typical users, and not colleagues in the development team who have a higher technical understanding and different expectations from mobile applications than the target audience. Also, there is a module (again) on consistency – showing examples of applications that were developed with a

customized UI without losing the behaviour expected by the Symbian platform guidelines. One example is the Skype application, which utilizes context menus in the way the platform was designed, adding graphical elements to the menu to make it more visual.



Fig 3.9. Examples of choices for good UI design matching with the real world.

Another best practice to be followed, presented in the tutorial, is about matching the experience to the real world. Figure 3.9 shows an extract of two examples. The picture to the left, although not mobile-specific, describes the paradigm shift needed for when one is designing certain UIs that can benefit from mimicking the real world, such as a car control. It is much more natural to a user to manipulate an already familiar object than to try to assign the same meaning to a new set of controls.

The image to the right, in its turn, is mobile-focused and shows the design of an application for users who are in a mobile context, and who need an extra level of information that should be useful and easily recognizable. The case in point is a solution for a subway map, where the application contains famous landmarks close to the relevant stations so the user will know where they are in real life. The navigation is made through a carousel style menu, where users can access tasks, views and settings. It is not intrusive yet easy to find and access through single taps. Predictive text assists in information input, and after a task is completed the application displays clearly what has been done. After the developer has been



through the examples, there is a short quiz to assess if the concepts were understood, as can be seen in Figure 3.10.

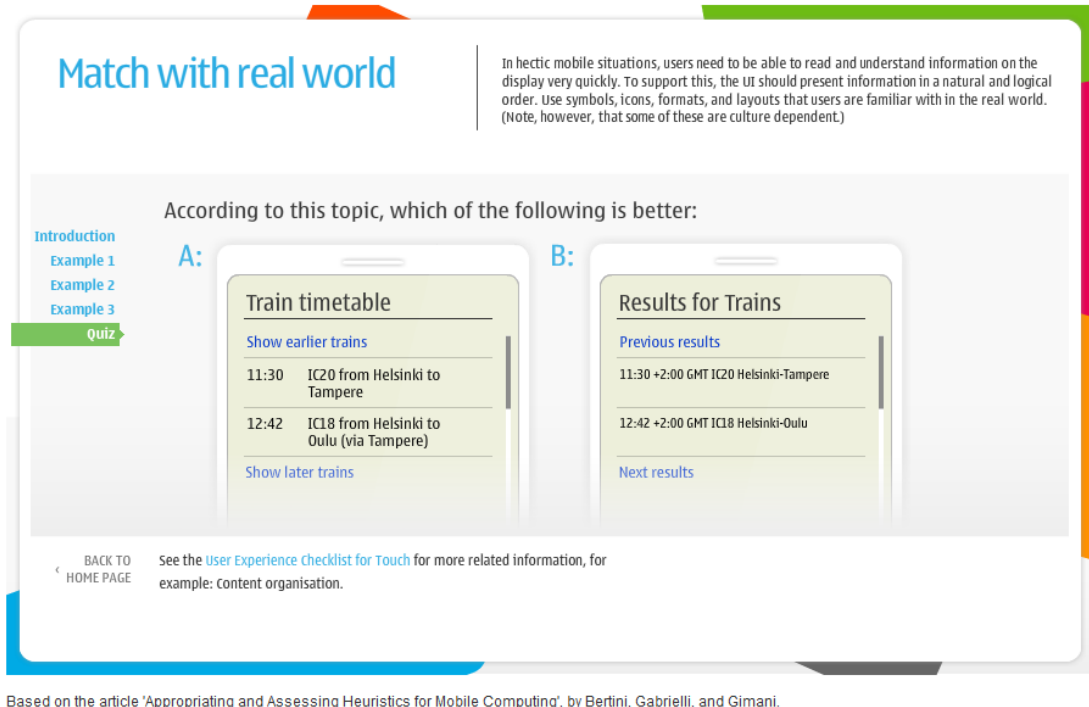


Fig 3.10. Quiz to assess student's understanding of the "match with real world" concept.

All the website sections described here point to the **design library** – a collection of different useful information and tools for developers. The library includes everything from concepting stencils and downloadable model applications with UI components that developers can customize for their own applications, to basic educational material in the area of user experience design. It also includes university level educational material on UX in various modules, as well as introductory online videos and e-learning materials.

### 3.2.2. Tools

In order to support developers in their design efforts and ease adoption of concepts presented in the design section, Nokia provides some tools in its static webpages, as described below.

#### Flowella

Prototyping an application should be one of the first steps a developer should take in order to plan ahead. To assist with prototyping, Nokia provides a free tool called Flowella<sup>6</sup>.

<sup>6</sup> <http://www.forum.nokia.com/info/sw.nokia.com/id/7557c13f-0b43-4805-85ce-8414bfbade57/Flowella.html>

Using Flowella, a developer can load images of an application's screens then define interaction areas and the flows triggered by these areas to other screens. These images can be anything from simple hand drawn sketches through to realistic screens created with the Symbian concepting and presentation stencils available in the design library.

The tool is presented in Figure 3.11. In this screen shot, the mock-up screens are on the right-hand side of the screen, and they can be dragged to the center panel to become part of the interaction flow. In the center panel, the picture demonstrates how a certain section of the image can be mapped and linked to another screen, so that the designer or user can navigate the prototype either through the tool or in a mobile device.

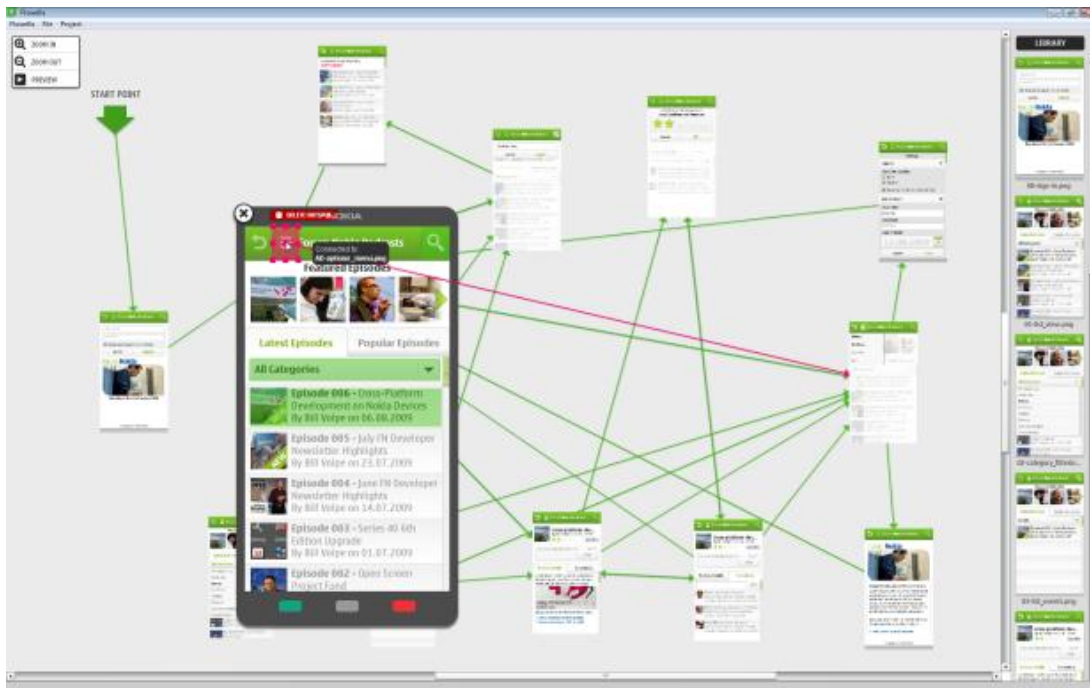


Figure 3.11. Building an interaction flow with Flowella. (Forum Nokia, 2011).

If the developer has a suitable device (one that supports Web Runtime widgets or Flash Lite), he or she can export the prototype to one of these application formats and run it on the phone. This is an excellent way to determine if the application provides with easy navigation and consistent behaviour, as well as an overall positive user experience. As the mock-up can be tested in a mobile device, certain use cases (or limitations) can potentially be surfaced, due to the addition of a mobile context. All of this can be achieved before a single line of code is written.



## **Mobile Web Templates**

Some developers, especially web developers that maintain websites with frequently updated content, want to use the mobile web as their channel instead of mobile applications. The reason for such choice is the possibility to reach more users without the added investment required by the creation of mobile apps to all platforms available. For those developers, the mobile web templates are a series of custom, tested mobile web styles and components optimized for high-end, mid-range, and low-end Nokia devices.

Creative developers can mix and match components as needed or use the full series of templates (small, medium, large screens) to completely customise their Web site or application, delivering a different site according to the screen resolution of the requesting device. This is useful for developers who do not want to create mobile websites from scratch, and don't want to spend a lot of time in the creation of specific versions of their mobile website to serve different kind of screen sizes. Mobile web templates save time and provide a better UX than the delivery of the regular website or an extremely simplified version of it.

### **3.3. Design section usage and tool downloads**

To assess the performance of the Design section in the Forum Nokia static website, I measured popularity in the form of number of visits, proportionally to the total number of site visitors. The period of time these visits were measured is from July 1<sup>st</sup> 2010 to December 31 2010.

The measurement scope excludes interactive Forum Nokia's community pages such as wiki and discussion boards. This differentiation is necessary because the usage patterns are different – the information and resources pages are static and usually visited only once, while community pages are collaborative and re-visited many times. For a clearer picture of what are the different areas of the site, its map can be found in Appendix 1.

The design resources are informational and as such are hosted in the static pages of the site. From all site visitors, the design resources pages get roughly 8% of the visits, from which the “mobile web templates” pages are the most sought after. This percentage is slightly below the number I had expected, but it is still a positive result, considering that this section is fairly recent comparing to the

remaining sections of Forum Nokia's website, and work is still being done to increase its visibility.

Another measurement taken was the amount of downloads requested from July 1 to December 31, 2010, of design tools, namely Flowella. Flowella downloads represented approximately 3% of the total downloads of the site, having been downloaded thousands of times during the tracking period. This means that a significant number of developers or designers have seen value in the tool and decided to try it on their mobile application projects. That is definitely a good result; as these Flowella downloads go beyond the passive behaviour of just reading through web pages. Detailed usage data of Flowella is not available, however.

#### 4. Interactive services available for Nokia developers

Many times, only one person (usually in the development team) is the only tester of an app. This makes it hard to assess its usability and user experience, since the individuals involved in the application's creation know it thoroughly and are not representative of the typical user. For developers who would like to have their application reviewed by UX experts, there are options available through Nokia's User Experience program.

The program is run by the design product marketing manager and a member of the technical services and consultancy team. They utilize partners such as Digia<sup>7</sup> and INdT<sup>8</sup> to scale the availability of the services, since the number of Nokia employees dedicated full-time to the program is very limited – only two people, as mentioned above. As mentioned in the introduction of this thesis, I am responsible for promoting the program to developers and local teams, who may utilize the services to the benefit of local developer partners. I also give input on the program and recommend developers for pilot activities. The structure of the teams and relationship between them can be seen in Figure 4.1.

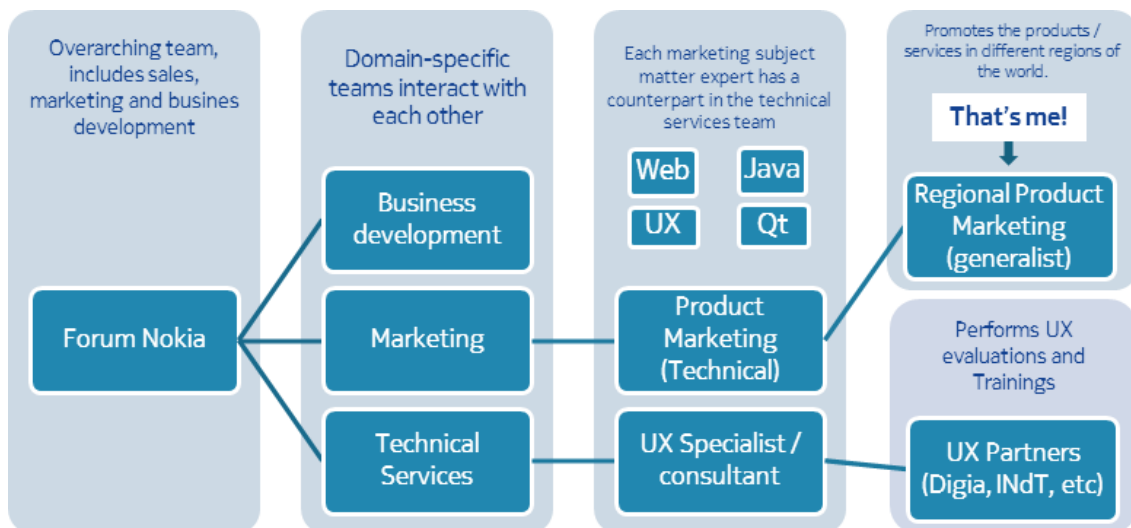


Figure 4.1. Forum Nokia team structure.

The services offered by the UX program apply a combination of heuristics and UI style guidance to third party applications, ensuring a higher level of quality for

<sup>7</sup> <http://www.digia.com/>

<sup>8</sup> <http://www.indt.org/>

applications developed for – but not limited to – Nokia devices. The program is cross platform and technology agnostic, and exists in paid, free, and event formats. Below are examples of activities ran by the program and a more extensive description of the UX evaluation, the main service covered in this thesis.

#### **4.1. UX Clinics and workshops**

The UX clinics and Workshops are an interactive and relaxed way to provide evaluation services, free of charge. These are targeted towards developers who are creating an application or already have an application that could benefit from improvements, and want to work intensively with UX specialists while they are coding.

Due to the nature of the interaction, these are best done face-to-face, in conjunction with other happenings such as code camps, hacking weekends or developer days. There, UX specialists work iteratively with developers on issues dealing with graphic design, interaction design, service flow, iconography, layouts and concepting, among others. While a workshop is conducted in a classroom with a group of 20 to 50 developers, the UX clinic session is conducted in an individual basis at a separate meeting room inside the event venue, and takes 30 minutes to one hour depending on the specialist's familiarity with the developer's application.

Typically, UX workshops are advertised as part of the event's program, and such events are advertised through communication to developers that are either a member of Forum Nokia or part of the wider community of developers. The UX clinic is also open for registration and advertised to all developers as part of the event, but usually half of the clinic slots are reserved for developers who are already known by the local team and are working on an application for Nokia devices.

Fifteen UX clinics and 5 UX workshops were conducted between July and December 2010 in different locations of North and South America, Europe, Middle East, Africa and Asia, and they continue to happen in parallel to major Nokia events.

#### **4.2. UX Evaluations and usability testing**

The user experience evaluations are consultations to ensure that applications gain expert feedback from mobile visual and interaction designers. Consultations are

especially valuable if the developer needs design help, but cannot afford to have an internal team within the developer organization dedicated to such tasks.

The evaluation is a charged service, executed by a specialized contractor company that provides an independent assessment of an application's user experience. The assessment is delivered as a PDF report that can be used to guide future development.

According to the UX team I work with, the UX Evaluation service proved to make the most difference in developers' applications performance, as it is shown in Section 4.4. For that reason, I will first describe how the service works in detail. The UX program ran a pilot program between March and June 2010.

### **User Experience evaluation pilots**

To properly showcase the benefits of the UX evaluation service, the user experience team decided that they would pilot the program and share the feedback as case studies<sup>9</sup>. For that, the program would select 10 developers to go through the evaluation and full UX consultation for free given that they could benefit from the evaluation and would implement the changes suggested.

Nominations came from across the world and developers were invited according to their suitability. I nominated VISIARC's Mobile Documents application to be evaluated (see the in-depth case study in Chapter 5). For those who accepted the challenge, the process for the evaluation is illustrated in Figure 4.2.

The UX evaluations started as follows: the application was sent to the vendor partner (Digia) testing team, where a designer with visual and interaction expertise reviewed the application submitted for around 8 hours. The designer wrote back suggestions for improvement, as for example flow changes and wireframes – sketches of pages and screens that focus on structure, organization, navigation, and interaction. All of these suggestions were based on standard usability evaluation guidelines, where the experts would identify UX issues, rate their severity, and offer alternatives for improvement.

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<sup>9</sup> [http://www.forum.nokia.com/Design/User\\_experience/Case\\_studies/](http://www.forum.nokia.com/Design/User_experience/Case_studies/)

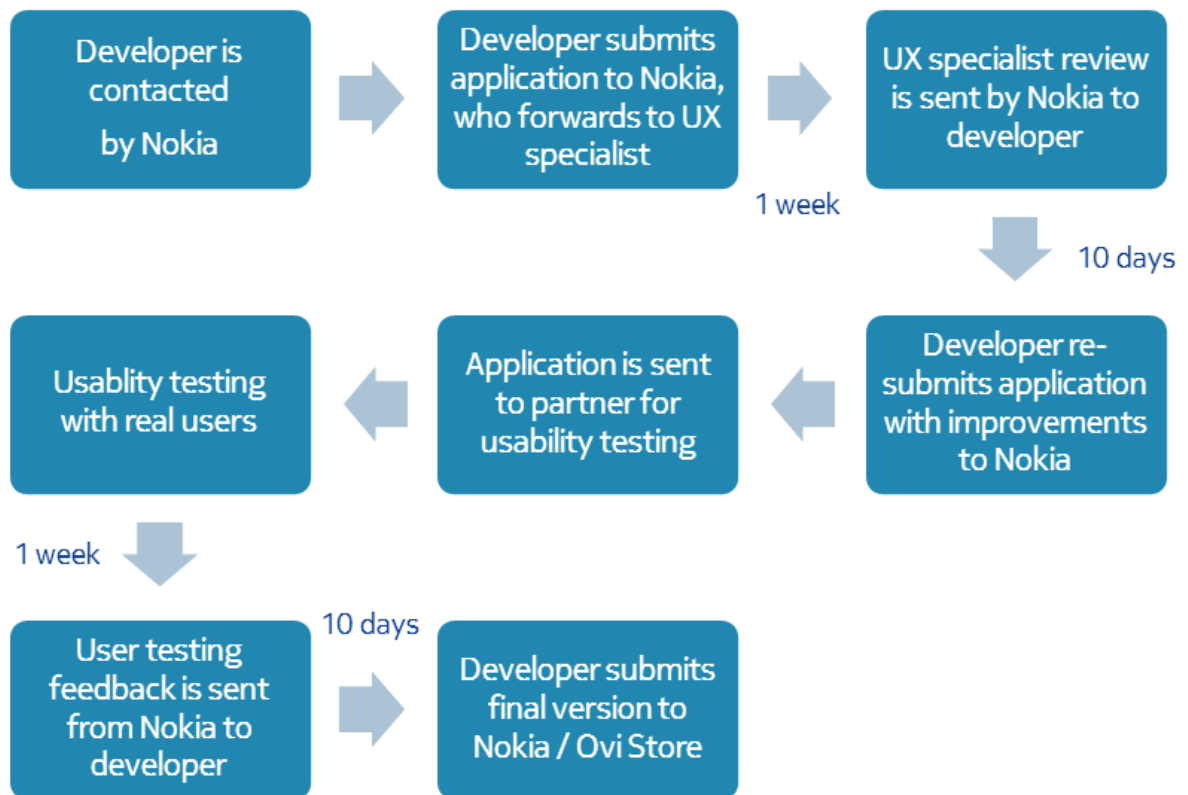


Figure 4.2. UX evaluation process.

One thing to notice is that the experts from Digia working with the evaluations are familiar not only with UI and UX guidelines in general, but specifically with the platform UI used by the developer. Also, they are familiar with the User Experience Model defined by Nokia through the guidelines and libraries available to its community through the static pages described in Chapter 3.

After the experts finished their initial report, it was then sent to the Nokia's User Experience team, who verified conformity with communication standards and performed a final quality check before sending the report back to the developer.

The document delivered to the developers was a multipage PDF document made in PowerPoint slide format, with the issues found and proposed solutions highlighted. There was a lot of care taken on the tone of communication, which should be encouraging and helpful, with summary and next steps. The report also opened a communication channel between Nokia and the developer to clarify any issues, encouraging contact if any of the suggestions or motivations behind them were not clear enough. Developers then had a few weeks' time to implement the changes suggested so they could go to the second phase of the service, user testing.

The second part of the pilot – usability testing – was different from the UX evaluations in the sense that the tests were done with everyday people who did not have any particular design expertise. Each developer who participated in the pilot had their application ran by one usability testing session, with three different users evaluating their applications in a usability test lab. The users in question were familiar with mobile applications and sometimes the platform (Symbian) UI, but not specifically with the developer's application.

In practice, the usability lab moderator administered a basic set of tasks specifically for that application, recording comments and feedback from the users (think aloud method) as they worked on the tasks assigned to them. The lab was equipped with cameras and screen recordings so all reactions and task completion attempts could be captured. After the tests, the report was then compiled by the UX expert, checked with Nokia, and then sent to the developer so they could make final changes based on the findings.

From the 10 developers who agreed to participate, 6 had the time and willingness to continue through all the phases. Developers who did not finish the process either had resources constraints to implement the updates required in time for the second round of testing, or had other problems that prevented them from continuing. One developer could not be contacted for the second evaluation step, for example.

These 6 remaining developers were asked several questions – in an interview format – regarding the process, and asked to submit “before” and “after” screenshots of their applications. These interviews were transcribed and the feedback was used to improve the quality of the interactive UX offering, as it identified gaps between what the report tried to convey and the developer's understanding of what it meant. The identified improvement was on language, and a professional copywriter was subsequently hired to review the reports. The interviews were also utilized as source material for individual case studies. These case studies were posted in the form of articles in the Forum Nokia website. All of the finalized applications were submitted to the Ovi Store<sup>10</sup>.

To ensure these applications would get a certain level of exposure after going through the evaluation, they were promoted in channels such as the Nokia

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<sup>10</sup> <http://store.ovi.com/>

“mydailyapp” blog<sup>11</sup>, where application reviews written by Nokia employees or guest reviewers are posted daily. These applications were promoted inside Nokia through intranet channels.

The six developers were debriefed by the design product marketing manager through interviews. All of them agreed the evaluations were useful, and that their products benefited from the feedback given by both the usability experts and the usability tests. They were considered equally useful by developers, however the insights provided by the usability testing with real users were considered more surprising. That can be understood if considered that these users are not UX specialists but rather ordinary people.

All of the developers said that they will take UCD and UX into consideration when refreshing their current product or when designing their next products. For some of them, the benefits of good UX in their applications were not clear in the beginning. At the end of the process, however, the benefits of good UX were much clearer to these developers, since they saw how users reacted better to their application and rated them positively.

### **User testing with Mob4Hire**

Another service offered by the User Experience program is user testing, through its partnership with Mob4Hire<sup>12</sup>. This user testing service allows for a global, large scale user testing for applications before they are released in the marketplace. In contrast to the User Experience Evaluation, which is conducted by experts spending intensive time with an application, the user testing is conducted by large numbers of everyday users who try out the application and report their impressions.

The idea of bringing Mob4Hire services to developers is to make beta testing accessible to a wider range of developers. Beta testing is popular and desirable, but not a very affordable service, generally speaking. Beta testing with Mob4Hire is a paid for service, but the partnership means that developers with Nokia apps get a discount in Mob4Hire services. The Vision Mobile survey surfaced the fact that small developers have very limited means to use such services (Vision Mobile,

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<sup>11</sup> <http://blog.ovi.com/dailyapp/global/>

<sup>12</sup> <http://www.mob4hire.com/>



2010); because of that finding, these services are considerably under-utilized, according to the Vision Mobile survey organizers.

#### **4.3. Findings gathered through feedback forms on interactive services UX clinics and workshops**

In the 20 interactive events executed in the second semester of 2010, we collected feedback from developers through a survey. The level of satisfaction by developers who participated was very high, with over 90% of the participants rating the usefulness of the initiative as “very useful” (5 in a scale from 1 to 5). The interesting finding, however, is that the majority of developers do not want to do the design work themselves, but rather work with someone who has design and UX expertise. Some of the statements from participating developers are transcribed here:

*“It’s so much better to work side by side (with the UX experts), there are so many new ideas that we come up with just by sitting next to each other and drawing concepts and fast iterations”* (Web developer, Dubai, October 2010)

*“There are so many different UI style guides and rules about UX; I just want to code and work with someone who knows about design”* (Java developer, UK, July 2010)

While these comments are anecdotal, the Design team has recently reported to me that these comments are consistent among the developers they work with, and further study is being made by the team on how to lower the adoption barriers even further by connecting developers to design specialists through a matchmaking service.

#### **UX evaluations findings – after the pilots**

After the UX evaluation program was successfully piloted, the evaluations were offered, free of charge, to a wider group of developers from Forum Nokia’s premium programs, Forum Nokia PRO and Launchpad. Membership of these programs is possible either by referral of a Forum Nokia business development manager, or by paying an annual fee of ~300 euros. The membership entitles developers for many benefits, including device loans and early access to tools and services, such as UX evaluations. These developers go through the exact same UX evaluation process (see Figure 4.2) as the pilot developers with their applications, albeit with different time scales.

Surveys are sent immediately after the evaluations, to measure the service usefulness and gauge developers' willingness to utilize the same UX evaluation again. The survey was sent to 150 developers between June and December 2010, and 35% of them replied. The answers were overall positive, and demonstrated that most of them will take UX in consideration in future projects. A sample of the answers that developers provided after these UX evaluations can be seen in Tables 1a and 1b.

Question	Developer A	Developer B	Developer C
<b>2. How do you currently take design and user experience into account during your development cycles?</b>	Usually before development starts, we perform an initial research phase followed by the design phase. During design phase UX team works closely with development team to ensure that the designed app is doable in specified timeframe and it goes along with hardware/software limitations. We also conduct user testing during and after development process.	We're very concern about it and tried to do our best based on seminar and things we learn by ourself. Lets say every time we got the chance to improve our design we will implement it.	We give high priority to design and user experience. We believe that ease of use is the most critical part of the application and it allows the user to use the application without any difficulty.
<b>3. Do you find our suggestions helpful?</b>	Most of them were helpful.	Of course.	Yes definitely
<b>5. Do you have any technological or scheduling issues in implementing any of the suggestions?</b>	Scheduling – yes.	We have a little scheduling issues since our project's deadline are very close, but it actually our fault, we believe that if we didn't submit our apps so late then we wouldn't have this problem.	Yes, first version of our application is under review by Nokia. So these changes have to be implemented only in our next version.

Table 1a. Developer's current working methodology and assessment of the evaluation.

The answers in Table 1a are a representative sample from a larger pool of over 45 answered questionnaires. The answers show that developers are already taking UX into consideration, even if not programmatically. Independent of that, they find that the suggestions proposed by the UX evaluation are useful, but scheduling seems to be a recurring restriction – a bigger issue than technical limitations.

<b>7. Would you be willing to use this service again? Why or why not?</b>	Currently we perform usability/ux testing using our UX team – we plan to stick with internal testing as we have more and more specialists in this area. So with tight deadlines we are opting for more flexible approach and on-site team.	Yes. Apparently your service is really helpful and frankly all of your suggestions are so detail that it could make us see our apps in a very different angle.	Yes. We were new to mobile application development. The UX consultation provided useful tips to improve the application.
<b>10. On a scale of 1 to 5, 1= unacceptable and 5= excellent, how would you rate this consultation?</b>	4. It was pretty good, if we take into account early drafts that you were basing evaluation on.	5	5

Table 1b. Developer's satisfaction with the service and willingness to use the service again.

Table 1b answers show that developers do like the evaluations, and are willing to utilize the service again if they don't have an internal team that can do it. One possible limitation to using an external company is the tight timeframe for the development of the suggestions. Answers in both tables show that the developers who have been involved with the UX evaluations are conscious and willing to take good UX into consideration. As there was no pre-evaluation questionnaire, it cannot be established that the developer did not have the same opinion before the evaluation.

#### 4.4. Application performance after UX evaluations

The Nokia UX program team did also track the performance of the applications from all the developers who have been to the UX evaluation and informed Nokia that they had submitted their applications to Nokia's Ovi Store. Altogether there were 22 applications in this sample, but I believe there were more applications published in the store that were not captured for this exercise.

The methodology for the measurement was the following: we got a list of all applications from Ovi Store, separated the applications by the category they are registered under, and within those categories we divided the application population in deciles, according to the number of downloads. A decile is any of the ten values that divide the sorted data into ten equal parts, so that each part represents 1/10 of the sample.

For instance, if we are evaluating the monthly performance of app 'X', we checked which decile the monthly downloads of app 'X' fall under. If the app's downloads are in the bottom 10% of the category's downloads, app 'X' belongs to the bottom-most decile, i.e. decile 1. If they are in the bottom 20% percent of downloads but above the bottom 10%, then it belongs to decile 2 – all the way until the top decile, that represents the top 10% of downloads in that category of applications.

After measuring downloads for two months for the sample of applications, the distribution of the applications in their deciles, according to the criteria above, is shown in Figure 4.3.

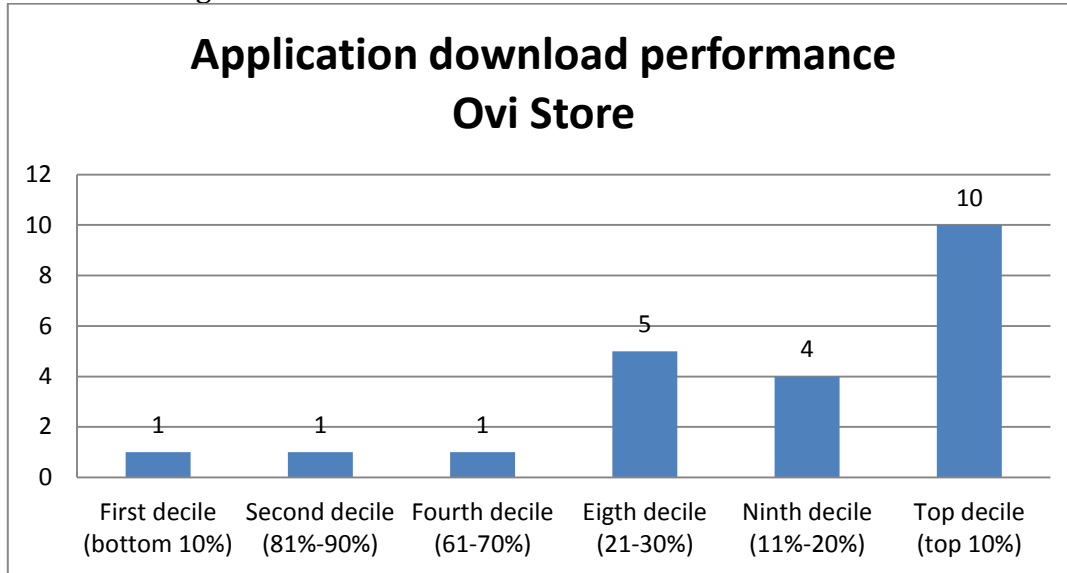


Figure 4.3 Application download performance in their category

According to the measurement over 40% of the apps that were evaluated and tracked figured in the top decile of Ovi Store for their category, meaning that they were amongst the top 10% most downloaded applications. Furthermore, 18% of these applications are ranking in the ninth decile, and 23% are ranking on the eight decile. That means that around 85% of the sample fell into the top three deciles of their category for the period tracked.

There is no way of knowing if there were other influencing factors in these numbers, such as marketing campaigns or other kind of incentives for users to download a certain application outside of the regular discovery process. Another limitation is that the results can be considered only partial, since the tracking period is too short. Consistent trends cannot be proven or affirmed by these results yet. The team intends to track this data over at least 6 months to be able to positively claim the correlation between UX improvement and Ovi Store performance. Another possible influencing factor is that the developers who went through the UX evaluations already had a good product and teams. The results are encouraging, however, and this initial performance analysis shows that the investment of time and effort in improving the application's UX made by these developers is most likely justified, as there is consumer interest.

## **5. In-Depth case study: VISIARC Mobile Documents**

Next, I will go deeper into one developer's – VISIARC – case study, where I nominated their application to go through different processes in order to improve its user experience and collect consumers' feedback for further improvement. Here, I'll gather the findings and learning from my side on the steps taken with their application, from the initial UX evaluation to the measurement of the application's ratings and reviews after various improvement development cycles. Finally, I will collect the developer's impression on the process he's been through, and ask him whether UCD and UX design is now a higher priority in his application development process.

### **5.1. Background**

VISIARC AB is a small software development house (around 8 people) based in Sweden. Its main product is an application called Mobile Documents, a push e-mail client in which, among many other features, the user can easily stream documents and handle attachments from different e-mail accounts. More information on the application is available at the developer's website (VISIARC, 2011).

Handling multiple e-mail accounts and cherry-picking attachments, however, comes with a certain level of complexity of the user experience, especially when we talk about bringing an inherently desktop experience to a mobile environment. The fact that the application is a client that connects to different third party e-mail services (such as Gmail and Outlook) adds another level of complexity.

All these complexities have to be simplified and made intuitive in a mobile context through the application's UX. This was my motivation to get them through the UX evaluation – to make sure users can easily learn this new way of handling information. VISIARC was also motivated to go through the UX evaluation as it would provide insights on how to make the application better free of charge, and they would get additional visibility through the case study that would be made after the UX evaluation. Figure 5.1 gives a description of the different steps in the process VISIARC's application went through.

## VISIARC process

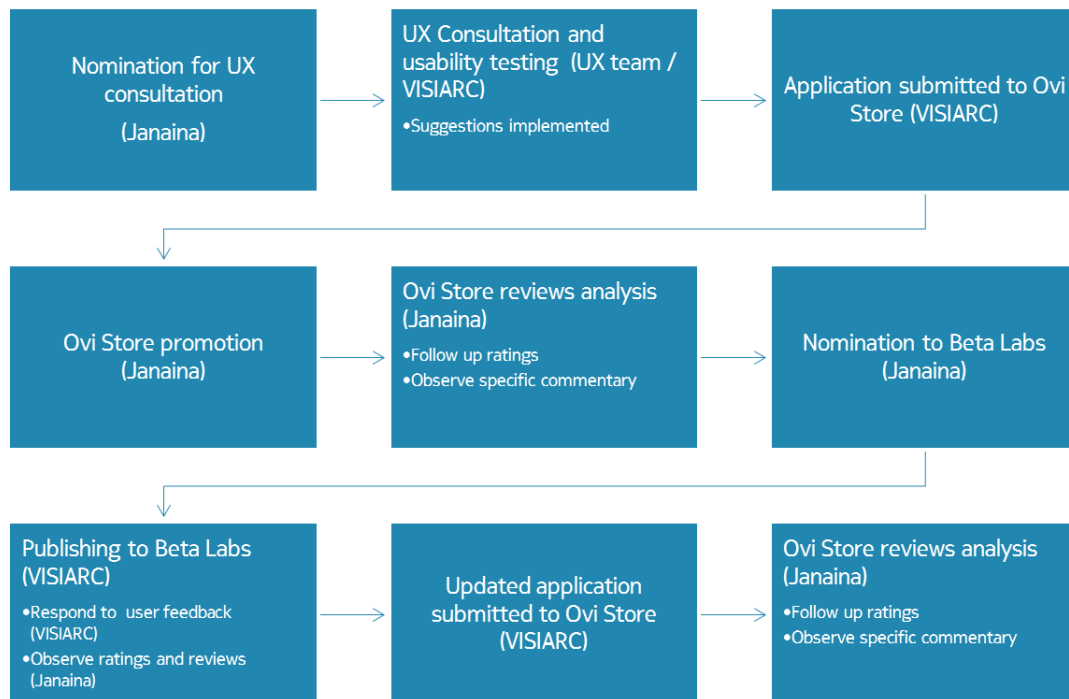


Figure 5.1. Complete process conducted with VISIARC.

### 5.2. User Experience evaluation for Mobile Documents

Mobile Documents was nominated by me to be a part of the User Experience evaluation pilot, where it followed the procedure described in 4.2. The application was sent to INdT's UX specialists who generated a thorough report, parts of which can be found in Appendix 2 and can also be seen in Figures 5.2 and 5.3.

The overall feedback from INdT's UX specialists was positive due to the innovative nature of the application, but there were adjustments to be made – from minor to major usability problems. The recommendations included larger component and icon sizes, making them more touch-friendly as well as improvement of access to the main application screen. Figure 5.2 shows an example of a problem identified by INdT – in this case, it is not easy to understand what happens when the user puts the e-mail subject field in focus. The icons that appear in the field (once it's activated) are not very clear at first glance, and trying to add multiple e-mails in the recipient field is not an easy task, either. The severity of the problem is marked in the top right of the page, and improvement ideas are suggested for a better usability.



Figure 5.2. Sample page of the UX evaluation report.

After receiving the initial feedback, the VISIARC team implemented many of the suggestions, such as shortening words for certain commands or adding highly used commands in the main screen of the application. The changes were made in less than two weeks. It was motivating to the developers that most of the changes were easy to make in such a short timeframe.

After the suggested changes were incorporated, the new version of the application was tested again, this time with real users in a lab setting. The users would try to complete tasks and the thinking out loud method was utilized to capture the user's impressions and comments.

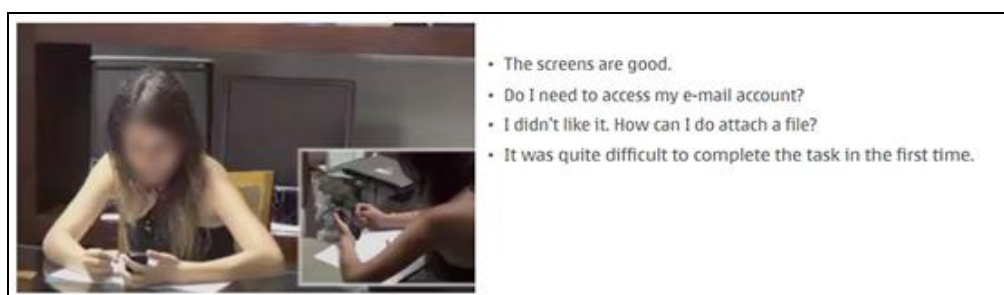


Figure 5.3. Sample usability test report page excerpt, with user's comments.

The most relevant comments were selected and transcribed in the INdT report, together with pictures of the users in that context, as can be seen in Figure 5.3. And again, while the findings were mostly positive, the test users did highlight a few key issues. One was the relatively large number of steps required to publish a document, which was a good example of limitations inherent to the platform.

According to the developer, it was impossible to do the publishing process in a different way utilizing Symbian, the platform Mobile Documents runs on. Fragmentation (see Chapter 2.2) also plays a role in the final design of the application, as it must support different screen sizes as well as touch and non-touch interactions.

### 5.3. Ovi Store promotion and ratings

Subsequently, it was necessary to get feedback from a wider array of users to assess the improvements on the application. After final adjustments suggested by the usability testing cycle, Mobile Documents was published to Ovi Store. To ensure the application would get enough downloads for a reasonable number of ratings and reviews; it was nominated for a “spotlight” – meaning that it would be promoted in the front page of Ovi Store, both in the desktop and mobile interfaces.

The spotlight triggered tens of thousands of downloads, and hundreds of reviews. During a defined period after the application was published in Ovi Store (June to November 2010), I collected and analyzed 326 user reviews. As there is no way to automate the collection of reviews and ratings, I navigated through all visible reviews, collected the ratings and reviews, and put them in an excel file. Unfortunately, the reviews were not as good or descriptive as expected, and the application was averaging 3 stars (out of 5). The rating breakdown can be seen in Figure 5.4.

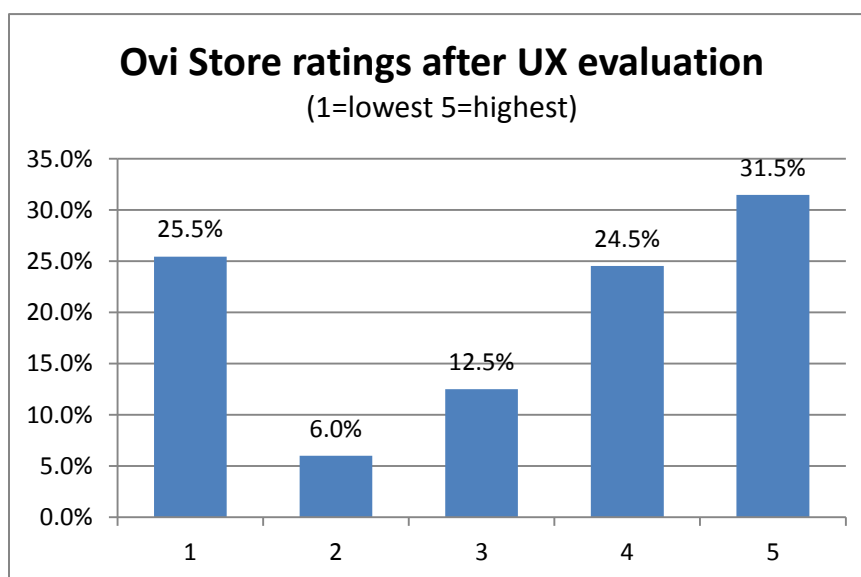


Figure 5.4. Breakdown of Ovi Store ratings – June to November 2010.



Three review samples – consisting of number of stars, user, device model, and comment, can be seen in Figure 5.5. In these samples, reviewers are complaining about installation issues or not giving any information that would help support the rating given.

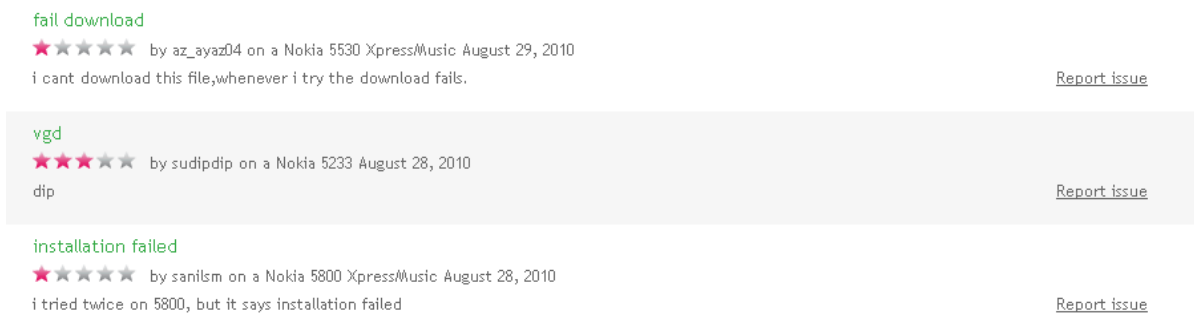


Figure 5.5. Sample of user's reviews and ratings.

I went through the reviews in detail, and I noticed another factor related to the wider context of user experience – a significant amount of the negative reviews were given because the user could not download and / or install the application at all – either because of Ovi Store errors or because of bad network service. The review type breakdown can be seen in Figure 5.6.

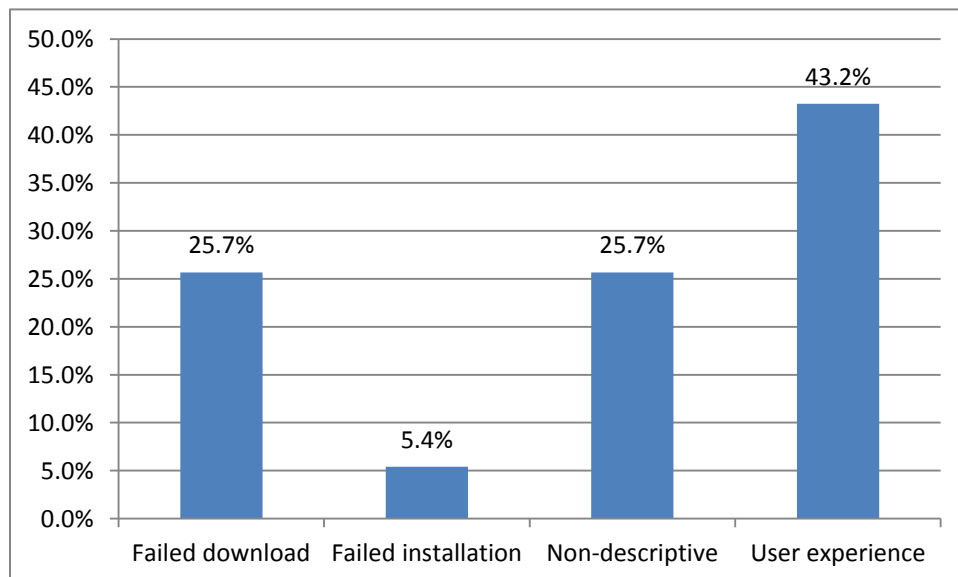


Figure 5.6. Breakdown of reasons for bad reviews – June to November 2010.

Another significant finding was that the feedback provided by the store users was often vague or non-descriptive, and did not shed much light on what needed improvement. There was also the fact that the UX evaluation had provided the

results of usability testing, but it did not include data on discovery and download experience which were causing nearly one third of the bad reviews. Also, it is worth noting that the tests in the lab were run in a controlled environment with a steady and fast network connection. Based on all this, it was clear that I would need more qualitative feedback to understand what other factors were influencing the application's ratings.

#### **5.4. Nokia Beta Labs – Lead User feedback**

I had the option of requesting the services of Mob4Hire to gather qualitative end-user feedback, but at that time (December 2010) a much more interesting opportunity presented itself – the possibility to be featured in Nokia Beta Labs.

The Beta Labs community provides with a good sample of the wider mobile consumer, with the added value that it attracts mainly *Lead Users*.

The term Lead User is utilized to describe early adopters that do understand technology and are willing to give complete feedback. They want to test the latest technology even if it is experimental, and are aware of the limitations and risks of utilizing non-commercial software. Lead Users are usually the most engaged users of a community, coming back at least once a day to share impressions and participate in discussions on the forum. As they have an advanced understanding of the technology they are playing with, they can report their findings more accurately. In this way, the applications tested can have their shortcomings more accurately identified and quickly be improved until they reach commercial stage. Beta Labs was going to feature a limited number of innovative third party applications and requested suggestions from the Forum Nokia team.

I decided to use this opportunity and referred VISIARC's Mobile Documents as a candidate for the trial. After a few selection steps, the application was featured in Beta Labs on the first week of January 2011, as can be seen in Figure 5.7. Once the application is featured, a feedback channel is opened in the shape of a discussion forum thread especially for the application. The procedure is the same for all applications featured in Beta Labs.



Figure 5.7. Mobile Documents featured in Beta Labs, January 2011.

This special thread has four categories – discussions, suggestions, bug reports and reviews. Each post in these categories can be replied to, and its usefulness assessed through a “like” or “dislike” button. In the case of the bug reports, users have the option of clicking the “I have this bug too” button – which makes it easier for the developer to measure the number of occurrences of a certain bug, as well as detailed information of the user’s device configuration and installed applications. That is very useful to help identify what is causing the bug. The “owner” of the application – in this case VISIARC – gets a notification via e-mail every time a new item is posted. The “bug report” forum section can be seen in Figure 5.8.





Type	Topic	Comments	Views	Created	Last post	Stats	Post info
	Gets stuck on "Checking user name" when trying to signup					28 Comments (1) Dev response	Created: 30-12-2010 14:22 by <a href="#">sigitask</a>
 11 people have this bug	N8, os version 011.012.286.01, browser version 7.2 When application opened I input my email address and press the button signup//Login The popup "Checking user name" appears and the ...	<a href="#">Read full post</a>	781 Views				Last post: 05-01-2011 16:11 by <a href="#">Anonymous642792</a>
	Cannot connect to my Gmail account					23 Comments (7) Dev responses	Created: 20-01-2011 01:24 by <a href="#">vojtechsafarik</a>
 10 people have this bug	Using a Nokia N8. After the succesful installation, as asked I entered my email address, username and password. The programme then starts connecting to my Gmail account, but wouldn't connect ...	<a href="#">Read full post</a>	707 Views				Last post: 18-05-2011 01:18 by <a href="#">jalsa777</a>

Figure 5.8. Bug report forum, top viewed topics, May 2011.

The response was much better than VISIARC expected – both in terms of increased awareness, and from the quality of the feedback provided by the beta testing community. According to the VISIARC developer, “*Fair and square we’ve been both*

*haussed and hammered*". They rapidly learnt that more than usability problems, there were many hidden bugs.

Sometimes these bugs were related to the installation of another application that would interfere with their application's performance. The problem was that, as their application was the one failing to work, it was the one that got the bad review from the user. Such issues serve to re-surface the fact that the user experience is something subjective, and directly linked with the emotions associated with task completion (in this case, inability of using the application).

The feedback data was collected automatically through the Beta Labs' discussion forum and bug tracking system, and sent periodically to VISIARC. It is worth noting that one of the conditions for participating in the beta program was to be active in responding to users, and the Beta Labs team requires a maximum response time of 4 days for any bug report, discussion or suggestion. Because of that, the developer learned a lot about the amount of time needed to collect, analyze, and react to user feedback.

After the application had been published in the Beta Labs system for three months, there were 159 bug report thread items in the forum. Furthermore, there were 101 open discussions threads regarding the application functionality and 83 posts suggesting features or improvements to the app. The feedback breakdown can be seen in Figure 5.9.

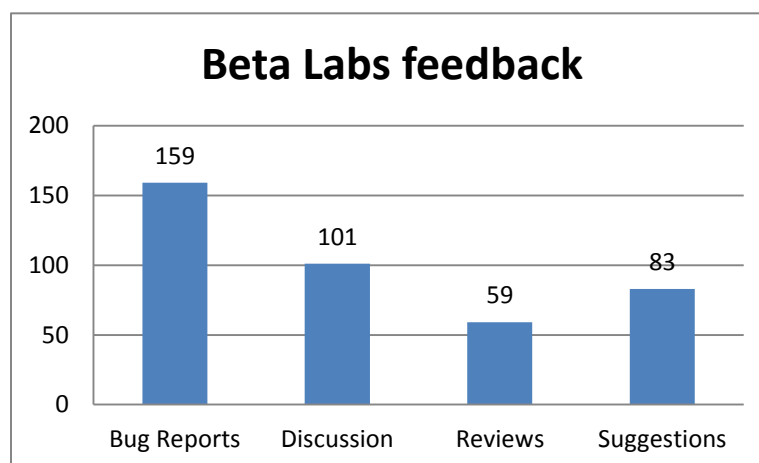


Figure 5.9. Types and occurrence of feedback, provided by the Beta Labs community.

The Beta Labs system also has reviews functionality, and by the end of the three-month period 59 people had reviewed and rated the application. The average

rating of the application by the Beta Labs users between January and March was of 3 stars (in a scale from 0 to 5) on the website, and 2.69 when I calculated the average manually. The rating breakdown can be seen in Figure 5.10.

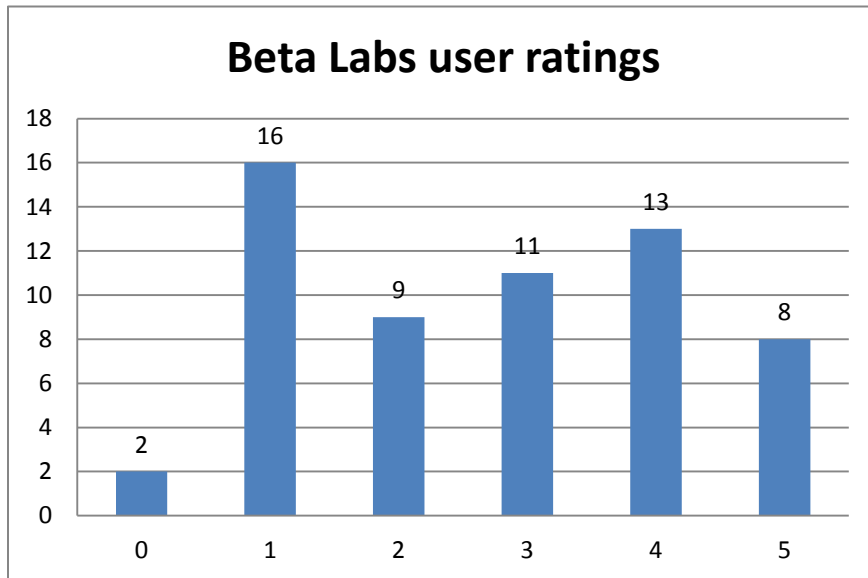


Figure 5.10. Beta Labs user's ratings on Mobile Documents.

The lower ratings were expected as the application versions available in the Beta Labs site were more experimental and the reviewers are more critical, being Lead Users.

All of the ratings demanded a review, and from the reviews I could see that some of them were placed wrongly there instead of bug reports section, despite explicit instructions provided by the site. These were not reviews per se, but rather complaints of some functionality that was not working. The complete review report, including complete user postings, can be found in Appendix 3.

After the activity peak caused by Nokia Beta Labs' public announcement of Mobile Document's availability in early January, the feedback from the developer was *"We've received a lot of useful feedback from the Beta Labs community, which has meant a lot of extra hard work, but work that in the end will make Mobile Documents much better."*

Once all the fixes were implemented in the application, it was re-submitted to the store in the middle of February. After that, ratings started to improve and now the application has a healthy 4-star average review rate.

Regarding the question related the importance of User Experience and user testing; VISIARC says the user experience evaluations and the Beta Labs experience were “very useful”. Without the fresh perspective offered by a third-party review, UX issues are “easy to overlook”.

### 5.5. Additional findings from the Beta Labs experience

I continued observing and collecting the ratings and reviews in Ovi Store from December 2010 until April 2011, and the new data sample had a total of 357 reviews. It is possible to see from the subsequent reviews that, when the user manages to install and configure the application, most of the times it gets a 5-star rating. Figure 5.11 shows a breakdown of the ratings. What can be observed is that the application is getting less 3-star and 4-star ratings when compared to the previous sample, and they are accumulating in the extreme ends of the possible range.

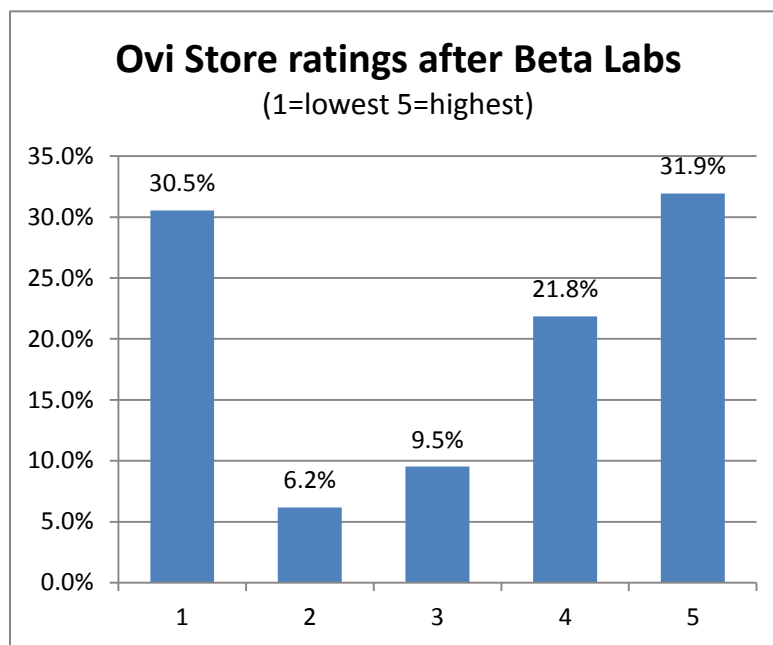


Figure 5.11. Ovi Store user ratings, Dec. 2010-April 2011.

This was a curious finding, so I analyzed all the negative reviews to identify whether there was a new trend, or if the reasons for a bad rating remained the same. The breakdown of the reasons behind negative feedback is presented in Figure 5.12. I found out that what has also happened is that the application got so successful that VISIARC had to limit the number of registered users so that their service could handle the heavy traffic in their servers. The problem is that

consumers are complaining about the wait via ratings and reviews. VISIARC must react fast to revert this trend, or it will lose the hard earned 4-stars.

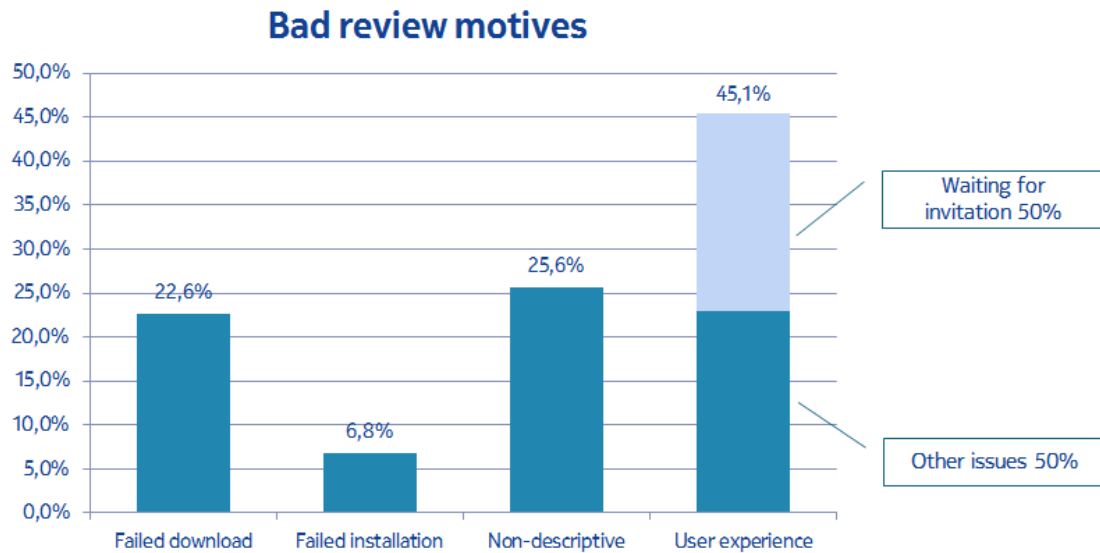


Figure 5.12. Reasons for bad ratings, Dec. 2010-April 2011

One interesting usability problem the VISIARC developer could not have found without the beta community testing is regarding *captchas* – an additional verification step to guarantee the request is coming from a human being and not a computer script. Some services such as Gmail add captchas randomly to IMAP (email protocol) connections, “*affecting adoption and review ratings, going down as more and more people fail to sign up successfully*” (Peter Lindgren, CEO VISIARC, January 2011).

A recurring topic on the feedback from Beta Labs is that the application is built to be connected all the time and relies heavily on cloud services. Sometimes the application “hangs” – stops working while waiting for the server to respond – and users have a bad experience. Unfortunately this is something that depends on the local internet access, mobile device connection settings, and other factors that cannot be controlled or monitored by the developer. Similarly, many of these bug reports are related to unpredictable environmental errors. An excerpt from the list of bug reports can be found in Appendix 3.

The findings from the Lead User testing show that there is a lot more that the application itself to be considered when evaluating user experience. Especially applications that rely on other services, such as cloud services, social networks

and cellular network infrastructure are subject to unpredictable variables. This represents an interesting field to be explored, as today the measurement of good User Experience in mobile applications is, many times, not so heavily linked to “always-on” connected services. As mentioned previously, much of the usability testing and evaluation occur in a controlled environment, and that is not the reality of users, that increasingly utilize applications to kill time when they are in diverse situations and contexts.

It is also worth noting something I learned from my own experience as a user and professional on the field, who needs to constantly download and experiment applications from all platforms for comparison and for keeping myself up-to-date on the best applications in the market. An increasing number of applications and games developed for mobile devices are adding a social element to it, so users can connect to their friends to share achievements, compare scores, and invite more friends to earn rewards, among other activities. This means that most of these applications depend on a third party service API (such as Facebook, for example) for authentication at the very least, and this can impact the user experience either positively or negatively, depending on the outcome. Some games store the entire user’s data in their servers, and playing a game “offline” is impossible.

As mobile devices become more and more dependent on information coming from mobile Internet, the definition of best practices in the design and evaluation of such applications can be useful.



## 6. Summary and discussion

### 6.1. Findings summary and recommendation

The work carried out in this thesis aimed to answer the following questions, described in Chapter 2.3. Recapitulating:

- 1) Are developers aware of the tools and resources available for the creation of their mobile applications taking the user's experience into consideration?
- 2) Would an app developer change its own product process to include UX methods for future application development if they saw the benefits of such methods?
- 3) Do applications that go through UX evaluations perform better in app stores, measuring terms by ratings or comparison to peer apps?
- 4) Is user-centered design enough for good UX? What other factors affect the perception of an application's user experience, in the consumer's point of view?
- 5) To what extent the perceived bad user experience can really be addressed by the mobile developer?

The first question was answered in most part by the static web pages' views and tool download numbers, described in Chapter 3.3. In summary, there is some level of awareness of the resources by Nokia developers, but the awareness could definitely be much higher, as the popularity of the section is still small compared to other static resources. The validity of the samples are discussed in Chapter 6.2.

Question 2 is answered through the UX evaluations and workshops surveys, and the findings show that even if developers are not initially aware of what UX means, they do see the value of an application with good user experience and are willing to take that into consideration when developing new applications. They find the user experience evaluations useful and understand the suggestions, implementing all of the changes requested when feasible.

As for feedback on the UX evaluations specifically, we found out that from the 45 developers that went through the evaluation process in 2010 and answered the feedback survey (out of the 150 total), 92% of them rated the usefulness of the evaluation as a 5 (in a scale from 1 to 5, with the latter being the best result

possible). There were no ratings below 4, and some developers even graded it as a 6, showing how useful they perceived the evaluations.

This means that even developers who are not initially very familiar with the concept of good user experience see the usefulness of considering it in their development efforts. Developers are usually concerned with code, and they are very grateful to get expert help when building the UI of their applications and designing user experience.

Question 3, discussed at length in Chapter 4.4, has a positive answer. Fortunately, when developers accept the help and improve the UX of their applications, they tend to rank well against their appstore category peers, proving that the adoption of such methods brings good results.

Questions 4 and 5 are partly answered with a “not always”, by VISIARC’s case study. VISIARC’s Mobile Documents application is highly dependent on third party services and network infrastructure, which has proven to be a risk to the reputation of the application. Even though they have implemented all changes suggested in the evaluations and have received very good feedback in a lab setting, when it was deployed to a wider range of users it started having problems.

Feedback from Ovi Store and Beta Labs users showed that the concept of user experience of an app, to the end user who is navigating an app store full of applications, can be only about being able to download it or not. And when the download is successful, many other factors outside of the developer’s control due to the connected nature of the application can heavily influence the user’s assessment and review of such application to their peers. I am not convinced that it would be possible to successfully open a bug report channel similar to Beta Labs to average consumer, but it is something that could be explored.

### **Recommendations**

With these findings in mind, my recommendation to Nokia is to increase the promotion of both the static and interactive UX offering, having it at the front of any developer outreach activities and being very forward about it. For the static content, digital marketing campaigns or even competitions between developers to have them utilize the resources in exchange of a reward could be a few ways a higher level of awareness could be achieved. A similar approach could be taken by

other vendors such as Google – in the case of Apple, their demanding model of app approval seems to be enough to keep the quality high.

The increase of interactive events and UX evaluations are more dependent on financial decisions, as they require investment in human resources. The findings of this thesis should help justify the investment, however, since it is clear that an interactive, individual approach is more effective to increase the quality of applications that are submitted to Ovi Store.

Lead User testing is also a great tool to identify hidden problems of applications or even just to “test the waters”. Unfortunately, the opportunity to be featured in Lead User communities such as Beta Labs is limited, but well known providers such as GetJar<sup>13</sup>, User Testing<sup>14</sup> and Mob4Hire provide similar services against a small fee.

The reason behind the recommendation is that there is still a gap between developers’ current perceptions of what UX really means to them and the ideal state, where a higher level of awareness and adoption exists.

An additional recommendation is regarding the marketing messages utilized by the Nokia team with developers, in order to convince them that investing in good UX is worth their time. These messages should bring as much data as possible on tangible benefits. One example is the finding described in Chapter 4.4, that clearly relates good UX with better application performance in the app store. Other data points can be related to user’s reviews and developers’ reports on support requests. Facts and numbers will compel developers to at least try the offering and methods having business benefits in mind, even if they don’t yet understand the concept of good UX in full.

### **Additional finding and recommendation**

The second phase of the research, however, was the one that yielded the most interesting finding. When analyzing the VISIARC study, the finding is that the user experience does not begin when the consumer opens the application, but rather much earlier in the process when the application is being downloaded. An unsuccessful download or installation can yield the application a bad rating. This

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<sup>13</sup> <http://www.getjar.com/>

<sup>14</sup> <http://www.usertesting.com/>

shows how the studies in Quality of Experience are important, and that the recommendations provided by such studies should be carefully considered by the different actors in the value chain. In this case it would range from the network provider and the Nokia servers up to the cloud services that VISIARC connects to such as Amazon and Gmail. Service providers can only gain by ensuring the best user experience possible to their users.

### **Effective methods for teaching developers about UX**

The evaluations collected for this study, as well as the results from developers after the interactions, show us that developers do want to understand the very basic principles of UX and UCD, but are not willing to go further into the topic or specialize on the UCD or UX disciplines.

Workshops were rated as useful, but we have seen confusion in developer's faces during some sessions as many of the concepts were new to them, signalling a high cognitive load. In this regard, the best approach has proven to be one of "learning by doing", having UX professionals work with the developers to design and implement changes. As there was no feedback form in the static offering – the design section – I cannot assess its usefulness. The only indication that developers read through the pages is the number of Flowella downloads, although the exact correlation cannot be determined.

Once the motivations behind the suggested changes are explained, the developer learns the principles behind them and starts applying the new paradigms on their own. This means, however, that a UX professional must always be at hand for guidance on design and quality assurance, which is not within the means of many small development companies.

### **Take-away messages to app developers, app stores, and researchers**

The key take away message to both app developers and app stores is that the power of application consumption and recommendation increasingly migrates to the hands of the end-users, making it necessary for the ones responsible for creating and delivering those applications to make the experience as pleasant as possible. This is not limited to the application in itself – it starts from the moment a consumer is prompted to download an application, or feels the need to do so.

The whole journey, from when a user learns about the existence of an app, by when he or she is downloading, installing and utilizing such an app for a final goal, is part of a consumer's UX with a certain application, brand, or device. When the experience is good, it has a positive effect on that application, and can determine the success of such application and, to a certain extent, the app store, device, or platform in which the user had the experience.

The last take away message can also be useful to researchers who try to figure out what testing setting would work best, lab testing or field testing, as discussed in the literature review. My findings lead me to believe that applications must be designed and tested making full use of the mobile context, and taking into consideration the short attention span of modern users - where the perception of delays in content delivery can translate into a very bad user experience.

## **6.2. Reliability and validity**

The methods utilized in this study were of varied types. I was fortunate enough to have a variety of channels and enablers at my disposal to collect information from the field. There were limitations in the data I could gather and utilize, however, since I worked through established programs that already had their own data collection methods and evaluation models.

The website metrics and user reviews on applications in Ovi Store (and VISIARC in both Ovi Store and Beta Labs) could be measured quantitatively. The reviews in Ovi Store and Beta Labs provided also qualitative insight through review comments where relevant. As all the data was manually collected and classified by one person, it add some reliability to the analysis.

The action research phase on the case study was highly qualitative as it covered one specific type of application in a universe of thousands.

Developer attendance in workshops and participation in UX evaluations presented in section 4.3 are measurable, concrete numbers. Assessment from developers was extracted with surveys from different contexts such as workshops, UX evaluations and UX clinics, also presented in Section 4.3. The survey research was mostly qualitative; with a quantitative element for satisfaction assessment. The sample is small, however. It can be attributed to either lack of time in developers' busy schedules or lack of motivation to answer the survey, as the

service was free and there is really no penalty for not answering. The real reasons for the low response rate remain unknown.

Even with the limitations, the different approaches still form a basis for triangulation (Wilson, 2006). Developer awareness could be measured by visits to the UX section relative to the rest of the static website and Flowella downloads relative to other tool downloads during a certain period of time, as presented in Section 3.3. There is no information on the profile of the visitors, however.

An absolute percentage of developers reached cannot be given either, as the number of page views does not tell about how much time a certain visitor spent on the different pages. Also, the number of tools downloads do not guarantee that the user installed or actually utilized the tools provided beyond an initial assessment phase.

Users' feedback could be measured through application ratings and reviews presented in Sections 5.3 and 5.4, where more detailed information on the reasons behind such assessments could be analyzed through user comments in both channels. This measurement covered both consumers with Ovi Store and Lead Users through BetaLabs, the latter being a subset of the former. This is also a good basis for triangulation, since the recurrence of certain feedback actually happened and was consistent across channels.

In this sense, the findings can be considered valid and reliable. But due to the nature of the sample of both developers and consumers – limited to the application ecosystem around Nokia – these findings may not have a high level of transferability. It would be necessary to repeat this study in other platforms such as Android or iPhone to verify consistency of results. The same applies to the case study, as the studied application represents a specific subset from a wider range of connected applications that can be similarly analyzed for consumer and lead user feedback.

### **6.3. Future research**

The VISIARC study shows that the choice of technology or application type heavily reflects on what needs to be taken into consideration to create a good application and manage expectations from users in terms of user experience. A standalone game may require the same amount of effort to implement changes from a UX

evaluation than a cloud service client, but the user's perception of the game will be much different as it does not have the interdependencies that applications such as mobile documents have.

As this finding was not the primary focus of this thesis, my proposal is that future work is carried on the field of Quality of Experience (Mohseni, 2010), adding the mobile UX dimension since such devices are being increasingly used for delivery of multimedia content. Current framework studies such as De Moor and team (De Moor et al., 2010) analyse the QoE subject very thoroughly but do not have mobile devices in their scope of work. It would be useful to understand the limitations of mobile devices as a delivery mechanism, and what design and implementation considerations have to be developed to achieve good QoE in this medium.

Work has been started in this field by De Moor's research team through analysis of QoE in the usage of YouTube on a mobile device (Ketyko et al., 2010). This research could potentially be extended to include other kind of data streaming, bringing clarity on what kind of framework for measurement and evaluation can be built around different types of connected mobile applications. Other mobile UX groups could potentially be interested in doing joint research to describe a bigger picture on mobile UX.

The main objective I propose is to define a broader scope of elements to take into consideration when defining what user experience means in the appstore domain. That should help guide developers on what kind of improvements can be made for this user experience to be pleasant and meaningful. Another possible topic for further investigation is how to improve the UX performance of connected applications. These applications are the ones that need a variable amount of time to handle connection requests and other type of communication, which may cause users to perceive the application as a bad one. It would be extremely useful for mobile developers to have a blueprint on how to design better applications based on this framework, as well as having ways to measure the end-user perception of such performance improvements.

## 7. Conclusion

This thesis was motivated by the increasing number of subpar quality mobile applications created by third-party developers and published in different app stores available in the market. The target group of my thesis was a subset of these third-party developers, namely the ones who are developing applications for Nokia devices, primarily targeting the Symbian platform, and are publishing their applications at Nokia's Ovi Store. This subset of developers was chosen because they were identified as especially uninterested in good UI design by a study, and also because my employer – Nokia – could benefit from knowing the reasons behind such apparent lack of interest.

The objective was to assess these developers' awareness of the importance of good UX in their applications, and explore what are the different factors that can influence them towards incorporating good practices in UX design. I also intended to find out whether the design tools and resources provided by Nokia are known to developers, and whether developers are utilizing these resources. Additionally, I collected feedback on the UX services provided by Nokia, from developers who utilized such services and were willing to share their impressions.

Different data collection methods were utilized to assess developer's awareness of the resources and tools available for their use. From web pages and online tutorials to live UX evaluations and clinics, the resources available have been utilized in different ways by developers to improve their applications. The awareness and utilization of static resources is still low, however.

The initiatives ran by the Nokia Design program, especially the UX evaluation program - that helps developers improve their applications - have been well received by developers. The third-party developers appreciate the help of professionals in their designing efforts, as they have little or no interest in doing it by themselves or spending time learning such skills. The performance results from applications that have been through the evaluation and are now in Ovi Store are encouraging.

The main contributions of this thesis were made in an in-depth case study. The study surfaced the various dimensions of a mobile consumer's user



experience, where different factors outside of the developer's control can impact the consumer's perspective of an application's user experience. Factors can be as simple as failure to download the application to complex interoperability issues with other applications running on the same platform. Some of the unpredictable factors cannot be fully addressed by the developer beyond what they can control, in this case the UI and description of their own application in the appstore. They can result in bad ratings for the application – which in turn reflects poorly on other consumers' perception of the application in the marketplace.

As a result, the contributions of this work to the current body of knowledge are related to the perception developers have about the usefulness of good UX in their applications and around the scope of Quality of Experience (QoE) for mobile applications. These should be further studied and defined in order to provide guidelines for future end-to-end content systems and applications design and development.

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## Appendix 1 – Forum Nokia Site Map

- **Home**
- **Design**
  - [Overview](#)
  - [Design process](#)
  - [Design gallery](#)
  - [Themes](#)
  - [Multimedia](#)
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- **Devices**
  - [Overview](#)
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## Appendix 2 –VISIARC UX Evaluation Report excerpts

### About this document

USER EXPERIENCE EVALUATION - INDY

- The purpose of this evaluation is to discover any possible problems the end users may have with the submitted application.
- The evaluation results are listed by view or functionality and then by criteria in question.
- The evaluation was done using mobile usability heuristics\*:
  - Visibility of system status and losability/findability of the mobile device
  - Match between system and the real world
  - Consistency and mapping
  - Good ergonomics and minimalist design
  - Ease of input, screen legibility and glanceability
  - Flexibility, efficiency of use, and personalization
  - Aesthetic, privacy, and social conventions
  - Realistic error management

\*Joanna Lumsden: Handbook of Research on User Interface Design and Evaluation for Mobile Technology. Edited by: Joanna Lumsden, National Research, Council of Canada, Canada , Released Feb2008. ISBN: 978-1-59904-871-0.

### Summary: Good usability in your application

USER EXPERIENCE EVALUATION  
Mobile Documents

- Mobile documents brings a impressive feature and its main purpose is straightforward. None of the issues were considered "usability catastrophies" most of them are "minor usability problems"
- Navigating within a document is fast and easy even over slow connections
- Excellent legibility of documents!
- Zooming and panning works smoothly
- The application is solid even when dealing with extremely large files over cellular networks

DEVELOPED BY THE INDY DESIGN TEAM

## Summary: What needs improvement

USER EXPERIENCE EVALUATION  
Mobile Documents

- Visualizing documents is Mobile Document's main feature thus improving the experience within the reading area should be the main priority and would make the experience even greater:
  - Increasing component size to make them finger touch interface friendly
  - Creating consistent spacing between touchable items
  - Distinguishing selectable text from raw text
  - Improving the toolbar on the rich view document screen with larger icons
  - Reducing the number of selections needed to go back to home screen
- Navigation within the Inbox is fairly simple but the other main features are potentially confusing. More consideration of how to label or organize those features would be of great benefit.
- Gesture support on the document viewer screen would increase the perception of quality
- Improve feedback to the user throughout the application: When is it downloading in the background? When is it synchronizing with the mail accounts?
- Create some help documentation to help users understand features such as My Archives, Clients and manuals

DEVELOPED BY THE INDT DESIGN TEAM

## Navigation

USER EXPERIENCE EVALUATION  
Mobile Documents

**CRITERIA:** Visibility of system status and losability/findability of the mobile device  
(FNUX-2.5.19) User is able to return to the main view (in game: Main menu), which is maximum two screens away.

**ISSUES:** (1) Most of the application is 3 or 4 screens away from the Main view

### SEVERITY

Cosmetic problem only 1  
Minor usability problem 2  
Major usability problem 3  
Usability catastrophe 4



### IMPROVEMENT IDEAS:

- Turn IMAP folders into a list item in the message list
- Attachment details and options should be inside the message reading view
- Leaving document navigation view should be easier ( 1 touch instead of 2 ) \*More info on the document viewer slide.

DEVELOPED BY THE INDT DESIGN TEAM

## Appendix 3 – VISIARC BetaLabs Feedback excerpt

Date	Title	Type	Body	username
15.2.2011	Exit Without Notifications menu on exit could explain functionality better.	bugreport	Steps to reproduce1. Shut down MD2. When prompted choose Exit without notifications Yes3. Return to home screen and try and access mail through the widget.ResultMail widget does not open MD when touched.Suggested FixThe reason why this confused me was I didnt understand what Notifications meant in this context. I would suggest rewording this to something likeClose MD and disable Desktop Widget Accessor Close MD completely and disable Home Screen access.	jaredmorgs
15.2.2011	Exit Without Notifications menu on exit could explain functionality better.	bugreport-comment	Using a N8 with PR 1.0 FW	jaredmorgs
23.4.2011	Much Ado About Nothing	discussion	Much Ado About NothingHasnt appeared that exciting as it was appearing from the Promos.Takes time in opening the mails very lousy doesnt open up the attachments.SANJOY MISSRA	sanjum.lko
14.2.2011	0.9.20 mangles N8 screen	bugreport	Nokia N8 PR1.1 V 013.016After installing 0.9.20 everything works correctly except the top part of the screen is mangled that is it stays on the MD app with the rest of the screen correct half of the clock the rest of the widgets.... Even exiting MD without notifications does not change anything	jcbagneris
14.2.2011	0.9.20 mangles N8 screen	bugreport-comment	Ok everything is back in order now after I used the menu button instead of the Hide button to come back to homescreen. I really dont know what happened I will tell you informed if it comes back.Sorry for the noise.	jcbagneris
14.2.2011	0.9.20 mangles N8 screen	bugreport-comment	For me the strange screen refresh behavior manifested by putting a black background over the top 1.5cm of the screen in portrait mode. In landscape mode the home screen looked a little strange but not as bad as portrait.When I first saw the issue I restarted the phone. I then tried using Hide again and the problem reoccurred.I then stormed over here to report the issue. Like jcbagneris says you must use the Menu HW button to return to the main screen from MOBILE DOCUMENTS. Once you do that for some reason you dont get the error WHILE YOUR PHONE REMAINS ON. When you restart you must repeat the process. I will be doing this every morning it seems because I turn my phone off overnight to conserve battery.	jaredmorgs
14.2.2011	0.9.20 mangles N8 screen	bugreport-comment	Hi GuysThis is indeed a bug. It comes from our fix for the Fring issue. Frings bug causes us to have to create a UI in the service thats not supposed to show I dont create a window for it but its needed otherwise the service would crash if Fring is installed.This is a temporary solution until Fring updates their Symbian clients.Sorry for the inconvenienceBest regardsHenrik Pettersson The Mobile Documents team	visiarc_henrik
14.2.2011	0.9.20 mangles N8 screen	bugreport-comment	Thanks for the response Henrik.Im not entirely sure changing your application in such a way that it introduces a bug because of another programs interface issues is the right way to go here but Im not a developer. Ill just keep on using my workaround until the issue is resolved.MD is still a great email client compared to the basic Symbian 3 Mail client.Cheersjaredmorgs	jaredmorgs
14.2.2011	0.9.20 mangles N8 screen	bugreport-comment	Thanks HenrikLets wait for Fring devs to fix the problem now.Regards	jcbagneris