Independent game development – Developers' reflections in postmortems

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Independent computer games have gained a lot of popularity in the past few years. Digital distribution methods and networks have made it possible for indie games to find more players, and get an easier access to markets, and get noticed by the consumers, than it was during the traditional brick and mortar shop based retail and console game dominant era. The increased popularity and number of indie games and developers has made indie games an interesting research area. Research of independent games has focused on very specific research topics; this study aims to gain a broader view of independent game development with the developers' perspectives.

The objective of this thesis is twofold. First we take a closer look at the indie games through academic literature: how independent games are being defined and described in academic game studies, we also describe and map out some of the other phenomena such as digital distribution and crowdfunding that have significantly aided in their entry to the game markets. Then we analyse indie game development postmortems using content analysis. What are the most common problems and success factors of indie game development in these postmortems? Are these success and failure factors similar to the defining features and aspects of indie game development outlined by academic literature?

Design & development process was the most common theme in the perceived reasons for success in the postmortems. The most common general reasons for success were technological issues, design process, art, connection and personnel. Production process & project management was the most common theme in the perceived reason for failure, while the most common general reasons for failures were technological issues, resource management, time issues, marketing and release. In general indie developers often succeed in arts and design, but business, process and project management causes problems in the development.

The postmortem analysis results were quite similar to other studies that have analysed postmortem wrongs and rights. The analysis showed that academic literature's defining features and aspects of independent games can be seen in the postmortem analysis results, but often they are not directly the reasons for failures or successes.

Key words and terms: independent game, postmortem, game development, content analysis

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1 INTRODUCTION

Video game industry seems to be the fastest growing mass media, that is also characterized by innovations and high dynamics (Marchand & Hennig-Thurau 2013). Independent computer games have gained a lot of popularity in the past few years and some indie games have broken into mainstream. Digital distribution methods and networks have made it possible for indie games to find more players, get an easier access to markets, and get noticed by the consumers, than it was during the traditional brick and mortar shop based retail and console game dominant era. Various sales concepts like Humble Bundle's *Humle Indie Bundle* have brought new valuable promotion for indie games. Game industry has had publisher dominant production, where the financier has had the ultimate power (Martin & Deuze 2009) and the industry is still centred around few major corporate publishers, even though nowadays there is a larger variety of publishers and developers. Game creation and development does not require as much work, skill and knowledge as it did before; the accessible and easy to use development softwares and new casual game types have brought more independent games to the market. This increased popularity and number of independent games makes them an interesting research topic.

Studies of independent games and independent game development have often tended to focus on very specific area or topic in independent games or their production. This thesis aims to gather a broad perspective of indie games and their development as they are seen in academic literature. Game development postmortems, in which the developers discuss what they think they did right in the production and what were their shortcomings, have been used to analyse game development before, however there has not been a study that has focused on indie game development specifically. This thesis aims to gain an indie developers perspective on their development process.

This thesis takes a closer look at how independent games are being defined and described in academic game research. It also describes and maps out some of the other phenomena such as digital distribution and crowdfunding that have significantly increased the number of indie productions and aided their in entry to the game markets. The second part is an empiric study of independent games' postmortems. In postmortems developers describe what they thought went right in their project and what they

perceive went wrong. In this study there are 53 independent game postmortems that have been published 2004-2014 in Gamasutra[1]/Game Developer Magazine. Postmortems are analysed by using content analysis in order to find out what kinds of problems and successes there are in indie development and the most common reason for success and failure in indie game development.

The main research questions are:

- What kinds of problems and success factors indie developers discuss in postmortems and what are the most common problems or success factors?

- Are the factors that are used to define and explain indie games in academic literature also visible in post mortems wrongs and rights that are written by the indie game developers

The International Game Journalist Association And Game Press' *The videogame style guide and reference manual* defines independent games as "Any game or company not affiliated with a major publisher." Financial issues also define independent games as "These games often have small budgets and/or are funded solely by the developer." (Orland, Thomas, Steinberg 2007: 37.)

In this paper indie games are addressed as a very broad, not fixed, concept. They are mainly viewed from the context of production; independent production of games outside the traditional big publisher-producer studios, whether it is by a single individual or a small company. Here *indie* can be seen as the opposite to mainstream game production with big budgets and big development teams.

[1] http://www.gamasutra.com

2 BACKGROUND

In this chapter we first take a brief look at independent games as part of game studies; what is their role in game studies, how they have been studied, and from what perspectives. Then we explore two separate sets of three different perspectives that can be used to examine and define the meaning of independence in game development.

2.1 Independent games as a part of game studies

Independent games are not a fixed entity, and there has been relatively little academic research done about them. Indie games are mentioned in other game studies but they have rarely been the main focus. Only in recent years have there been more studies that have focused on independent games. The topic still remains relative scarcely researched. This might partly be because independent games and independent game production is somewhat vague concept that has no strict definitions and is still quite a minor movement compared to the whole game industry. As indie games are becoming more popular and breaking into the public awareness, they are becoming a richer subject of academic research.

Canadian digital game studies magazine *Loading…* dedicated an entire special issue to indie game studies in 2013. Apart from this special issue, indie game studies have been quite infrequent and have focused on the game industry perspective; the production and political economy of indie games, for example the ongoing change of what is considered to be *indie*; the movement from production economics to genre and style, ideologies behind indie movement and what these changes mean to the indie developer community (Lipkin 2003). One of the most popular perspectives has been to compare indie game production to other cultural fields *indies*, for example comparing similarities and differences between indie game economics and aesthetics with indie films (Jahn-Sudman 2008). Jahn-Sudman explores whether indie games share the same distribution, funding and market chances, aesthetical alternatives and controversial, provocative topics that indie films do. Some other popular perspectives have been gender political issues (Harvey & Fisher 2013, Harvey & Shepherd 2016) and *indie* as form of arts and crafts (Westecott 2013, Parker 2013a, Oliver 2003).

In the article “Indie Game Studies Year Eleven” Felan Parker (2013b) briefly goes through some the studies done on independent games and discusses the challenges and opportunities related to the subject of indie games. According to Parker (2013b) there are four different main focuses in the study of independent game studies; theoretical, which aims to conceptualize indie games, historical research, political economy and socio-cultural context focuses.

2.2 Three perspectives of independence

Kemppainen (2009) states that there are three different perspectives in which independent game production and games can be examined from. These are: the production, the product and the producer. Games can be independent in all or only in some of these perspectives. The production viewpoint can be divided into three subcategories based on their financial independence: non-independent, semi-independent and independent. A non-independent game production basically means the big companies that such as Nintendo, Sony and their studios. Semi-independent productions do not have a permanent contract with a single publisher; often they do subcontracting work for bigger studios. Fully independent production is done completely without money from publishers. (Kemppainen 2009.)

By independent product viewpoint, Kemppainen (2009) refers to style and content. Indie game’s content often differs from mainstream in some aspects. Lack of resources is often compensated with their creative use; as graphics, animations are more toned down. Indie games’ retro style partly derives from lack of resources, but it is also a fashion phenomenon in the game industry. Independent style can also be new mechanics and the use of old ones in new ways or that game themes may derive from personal values. (Kemppainen 2009.)

With producer independence, Kemppainen (2009) refers to indie spirit and auther-theory, the freedom to do how oneself likes. While there is no set definition on indie spirit, according to Kemppainen (2009), it means doing things more freely and from personal premises. Indie spirit is often related with artistic independence, but while indie spirit can be related to visual content, Kemppainen (2009) stated that it can also be related to entrepreneurship and business thinking. This means that you stick to your principles whether they are artistic or other goals. Indie spirit is not only content that is

different from mainstream, but also related to the business side and innovational use of technology in game making.

Also, Garda & Grabarczyk (2016) state that there is a disjunction of three separate types of independence that can be used to define independent games; financial, creative and publisher independence. Financial independence refers to the relationship between the developer and the investor, creative independence to the relationship between developer and the intended audience and the publishing independence to the relationship between developer and the publisher. To be independent the game has to be independent at least in one these relationships. All of these are extrinsic properties so the term independent game refers to extrinsic property. (Garda & Grabarczyk 2016.)

Financial independence means that the developer is independent, funding its own game with no outside finance from any third party. Creative independence means that "the game is independent whenever the developers is the intended audience", making the game for himself, not to any other audience. This means that for example crowdfunded games are not independent neither financially nor creatively, as the intended audience is also the financier. Lastly in publishing independence means self-publishing, where the developer is also the publisher. (Garda & Grabarczyk 2016.)

While Kemppainen (2009) and Garda & Grabarczyk (2016) both have three separate types of independence that are quite similar in some aspects, they are not comparable with each other. Garda & Grabarczyk (2016) have very exclusive types of independence were as Kemppainen's (2009) independence type definitions are more inclusive and loose.

3 LITERATURE REVIEW

This literature review chapter aims to examine some of the literature related to indie games. The first part will focus on independent games, how they are defined in existing research and some of their key characteristics. The second part addresses some of the key changes in game industry that have allowed and facilitated the rise of indie games: digital distribution and crowdfunding. In the third part, we take a look at how postmortems are used to analyse game development and what kind of results these studies have had.

3.1 Independent games

This section will outline independent games through existing research and academic literature, what are their key features and defining factors according to this literature. First indie games are examined in general, focusing mainly on their definition. The rest of this section has been divided into three subsections, based on key aspects that arise from the literature: political-economic position opposite to the mainstream; aspects of style, creativity and aesthetics; and being part of a community, participatory culture and service orientation.

According to, Parker (2013b) there is no established definition for indie game, nor should there be. The concept of *indie* is ambivalent and varies in where and for what purpose it is used. The same is stated by many other researchers, for example Simon (2013), Guevara-Villalobos (2011), Lipkin (2013) and Rufino (2013). Grace (2011: 3) makes a valid notion that "the borders that define independent games are not rigid. They are like art, evolving and interpreted." Most of the research papers do not tend to define indie games as rigorously as the general gaming public and only make loose definitions. For example Kayali and Schuh (2001: 1) define independent games simply as "games created by mostly small publisher-independent teams". There is no consensus on what *indie* is in the indie development community. Being *indie* means different things to different developers as Guevara-Villalobos' (2015) study shows. He states that:

> "The identities of independent development are embedded within the economic and cultural structures that harness specific forms to understand and embody their sense of autonomy". (Guevara-Villalobos 2015:1)

Although independent games often have their own category in distribution platforms and gaming magazines, Simon (2013) points out that indie games are not a genre. Even though *indie* may be seen as a design style, it usually signifies the context of production: *Indie* often refers to the game development culture. On the other hand, *indie* is about the "authorship, creativity and authenticity" as well as "political, economic and cultural contexts of production". (Simon 2013.) As Grace (2011) contemplates:

> "It is then perhaps more accurate to define independent games as play experiences designed and implemented with a self-governed goal outside the status quo. Independence is a declaration of deviation. It acknowledges a standard, and attempts to ratify a space of its own." (Grace 2011:3)

Ruffino (2013:116) sees indie in game industry as a "justification of a series of changes in the production process of video game" which results in greater expression and freedom for the designers, alternative game forms and design leading to more varied games in the market. Indie development can, in a way, be seen as a cultural movement in the game industry.

Instead of explaining *indie* with "technological revolution allegedly oriented towards the democratization of the processes of game development" and developers self-expression without the industry restrictions, Ruffino (2013:106) suggests that indie development phenomenon should be seen from three perspectives that have affected the change in the industry and can explain the phenomenon. First of these perspectives is cultural, which includes political and socio-cultural changes. The second is economics and forming new business models and the third is technological factors. However, according to Ruffino (2013) the most important feature that the growth of independent games has brought is the collaboration and narratives of co-operation in game development. Seeking out different methods of commercialisation is also ingrained in being an independent developer as these developers are often critical to traditional retail models of game industry and digital distribution has made it possible to have financial success with small projects, but also given a chance to create and own the ip (Guevara-Villalobos 2015).

O'Donnell (2012b:21) points out that even though indie development is often seen as a nostalgic idea of small development teams, the reality is that developers have to "wear multiple hats in the process of production" whereas in bigger companies people have a very specific role. O'Donnell (2012b) also states, that the game industry is now more interdisciplinary rather than engineering based software industry, therefore it should be seen more as art production.

Garda & Grabarczyk (2016) claim that in games *indie* is not an abbreviation for independent game, but rather a casual set of properties they call "indie markers" that certain independent games have, that were produced in a specific time and place, in this case the mid 2000 in Northern America. According to Garda & Grabarczyk (2016), the most important of these contingent properties are digital distribution, experimental nature, small budget and low price, retro style, small size, small team, indie mindset, indie scene and lastly middleware.

3.1.1 Political-economic position opposite mainstream

The division between mainstream and independent games is not a clear line but rather a constantly evolving concept and there are several opinions of what can be considered *indie*. Parker (2013b) states that scholars should not try to make strict juxtapositioning between mainstream and indie game development, since neither are fixed concepts. However, some kind of division is needed, even if there are no set definitions and oppositions, just to understand what is meant in broad and general nature when discussing indie and mainstream in the game industry.

Mainstream often means corporate and capital nature, and those values are the focus point of the development that is done with large development teams, with large budgets by large publishing companies. While indie games are often viewed as artistic and creative, mainstream games can be seen focusing on gaining profit and gaining popularity. (Lipkin 2013.)

Similar to the film industry, mainstream games can be seen imitating other successful games and in many cases can focus on visual and graphical aspects and have almost standardized narratives. They can also have franchise and license titles and recurring genre games (Jahn-Sudmann 2008). Most revenue in the game industry is gained from these big budget games, franchises or licensed products, which are both financially im-

possible for indie producers. This however has led to a certain lack of supply of new games as studios have sought hits and favored proven game types and franchises. This is where independent production is filling a market void. (Martin & Deuze 2009). The amount of games that actually make revenue is very limited, top twenty games make 80% of the total the game industry revenue and the remaining 20% is created by the next 100 games (Fullerton 2008: 423, as cited in Whitson 2013).

Martin and Deuze (2009) point out that many larger publishers are outsourcing parts of their game production to smaller second and third party studios; these studios are in fact *indies*, in the sense that they run their business beyond corporate systems. Outsourcing large title work to smaller companies allows more independent production. Independent production is in no way homogenous, there are various kinds of organizational structures. (Martin & Deuze 2009.)

The general game industry has been hierarchical and workers have very specific roles and areas of expertise. Indie game authors are often professionals that have worked in the game industry and have desired more control and artistic and creative freedom over their work, or amateurs that have no previous experience in the game industry. (Martin & Deuze 2009.) When crunch time increases and creative autonomy decreases, developers burn out and seek alternative employment (Whitson 2013).

Egenfeldt-Nielsen, Smith and Tosca suggest that independent game productions are a counter-trend to the growing budget of AAA-games, large-scale commercial games, that sometimes are seen "as a potential threat to creativity and innovation in the industry". (Egenfeldt-Nielsen, Smith, Tosca 2016 : 15-16.) However, Wright's (2015: 38-39) study suggests that the creative control and freedom of independent development is often contrasted with the need to make a game that meest market demands.

Despite many definitions, one thing that is commonly agreed upon is that indie games are created outside creative or significant financial control of other parties, such as corporate developers, publishers and distributors. In some idealized notion, there should not be commercial sponsorship or market orientation influencing indie development. (Martin & Deuze 2009.) This is similar to the concept of financial independence that Garda & Grabarczyk (2006) propose, that there should be no third party money involved in order for the game to be financially independent. However, this strict division

would shrink out most of the games that are considered independent. Yet, definitions like these are not uncommon.

Traditionally, publishers own most of the intellectual property rights of the game, which also creates most of the value of the game product. Usually, games are not considered independent if the property rights are owned by a third party sponsor. In many cases, independent production is bought out by the publisher in order to control the distribution or expand the product. (Martin & Deuze 2009). Now that production tools are becoming more commoditized, game audiences are able to create their own games. However, these tools are financially important to their owners and the owners still regulate what they can be used for. (Martin & Deuze 2009.)

Indies are not operating outside the game industry, as many of these presented relationships point out. Even though indie development differs from mainstream game production, it is still tied to the industry as whole and in many ways is dependent on mainstream game industry.

3.1.2 Aspects of style, creativity and aesthetics

According to Jahn-Sudmann (2008), even non-commercial, aesthetical and artistic games do not have set expressions that would oppose traditional aesthetics or logic, since aesthetic conventions of games are not established. Game aesthetics are meant to be accessible, so it is not necessarily relevant for indie games to be visually or aesthetically different from popular games. In the game markets, the authenticity of *indies* is constantly being judged against the general state of the game market (Martin & Deuze 2009).

While some indie games have distinct product characteristics that make them alternative games, Jahn-Sudmann (2008) sees indie games largely as casual games, which have minimalistic graphics and are easy and intuitively operable, due to the financial and the market limitations of the indie companies. He states that indie games are often played online, within browser, or are downloaded digitally. Similar to this, Lipkin (2013) also notes that lots of indie games are nostalgic and retro style, using similar game mechanics to earlier games. Indie creators are reminiscing their own youth and childhood, and according to Lipkin (2013) this is an implication that they are dissatisfied with the current game design approaches. The same is stated by Guillard et al. (2013). They see that

there are niches that are not supplied by the major game publishing industry, and most of these niches have nostalgia factors in them.

Some researches include games with purpose, and those games that break the traditional game patterns as indie games. Serious games, persuasive games and alternative games that can be inspected as a form of independent games have similar characteristics where the game actions are not only made for gaming purposes, but appear with functions that have other agendas (Jahns-Sudmann 2008).

Juul (2014) analyzed winning works of the Independent Game Festival from years 2001-2013 to identify 'Independent Style'. He defines this style as "a representation of a representation. It uses contemporary technology to emulate low-tech and usually "cheap" graphical materials and visual styles, signaling that a game with this style is more immediate, authentic and honest than are big-budget titles with high-end 3-dimensional graphics." (Juul 2014:4.) According to Juul (2014) 'Independent Style' can promote small budget games, because they now have a category they can belong to, though he remarks that 'Independent Style' is not equivalent of independent games, but more of a collection of features that have been well represented among indie games and can be used in big production as well. It is "a style deliberately designed to signal a particular small-team ethos"(Juul 2014:13). Kayali and Schuh (2011) studied the role of level design and its evolution over time in creating what they call "contemporary retro games" which they strongly associate with *indies*.

Indie is partly defined by the subcultures that support it, its game aesthetics and mechanics and working conditions. Creators aim for artistic freedom and a desire to work with their own timetables, production and distribution structures that differ from the industry mainstream. (Lipkin 2013.) Fisher and Harvey (2013) note that *indie* can be referenced as working outside major studios, but more comprehensively, it can be seen as a resistance to mainstream; alternative to dominant practices, especially in artistic and design decisions. Conditions of creation are the major reason for the specific style that is often associated with indie games. Often this means selecting an aesthetic that is cheaper to create; therefore, nostalgic style is partly due to economic limitations, but also rejecting the current dominant style of games. (Lipkin 2013.) Indie games can be created on a smaller scale than average game studio because they often have less and clearer design and aesthetic aims (O'Donnell 2012a: 105). Technological improvements

have made certain types of production less expensive and easier to make (Guillaud et al. 2013) allowing them to become more popular amongst the indie developers.

Social and mobile game development has been seen to have flattened corporate hierarchy structure, enabling smaller and more agile teams. They also offer lower barriers to markets and higher royalties, which has made the casual and mobile industry more appealing to the developers compared to the console game industry. There is now intense competition in social and mobile game markets that makes market entries harder as the number of games increases in these markets. (Whitson 2013.)

3.1.3 Part of a community, participatory culture and service orientation

One major factor in making independent development more prominent is the community behind and around the indie development and the fans surrounding it. There are publications specializing in indie games. Many game magazines and other online game publishers have separate sections dedicated to indie games. There are several festivals, various events, developers' conferences and game jams that revolve around indie development and production.

Guevara-Villalobos (2011) sees indie games as forming "communities of production". Community networks and community events are formed to counteract social problems of individual and small team work, and to create common ethos among indie developers. Communities, related to indie game development, offer infrastructure for handling collective challenges, gaining knowledge, learning from each other and for peer support. (Guevara-Villalobos 2011.) Guevara-Villalobos (2014:730-731) states that social worlds that are related to independent production, especially artisanal and local networks, can help independent developers with technical, creative and motivational aspects of the production. Wright's study of self-employed game developers (2015) also shows that the independent developers actively seek out networking opportunities, share their experiences and have strong occupational community.

Social networks within indie distribution channels have offered forums for developers, players and critics to form communities that promote and stimulate indie game development. Indie games also allow their audience to engage in cultural identity. They create interactive relationships between the industry, developers, and audiences. Even

though independent development mostly occurs in small scale markets, they also affect the greater game industry and community (Martin & Deuze 2009).

Parker (2013a) also notes that indie development consists of social structures that emphasize community. Various community activities formalize the community and provide support and resources to games that exist outside commercial development. Besides easier access to development tools and distribution, the community is what has allowed different game forms and sub-genres to rise from indie development. (Parker 2013a.)

Another change in game industry that is directly related to digital distribution, and is changing the value chains of game industry, is considering games as services and part of the current trend of participatory development, where consumers are involved in the development processes. Lowthorpe et al. (2013) state that these recent changes; viewing games as services rather than products, and also popularization of free-to-play business models force indie developers to rethink their processes. Focus is not on the physical product, but in the customer experience and co-creation of the developer and the customer. The value is customers using the service, not in the actual product. Indie developers need to expand and alter their game design methods as well as take on new development processes in order to make gaming services that are able to make revenue in different ways than before when game were seen as just products. Customers are becoming more and more co-creators of their own play experiences. (Lowthorpe et al. 2013.) This co-creation concept seems particularly suited for indie development, since it has very tight roots in hobbyist game making and modding cultures.

Jöckel, Will & Schwarzer's (2008) study showed that including user-generated content and addressing players as "prosumers" (that have both roles as the producer of user-created content and as the consumer of the game content) created more value in the service oriented digital distribution platforms. These "prosumers" may even turn into professional indie developers. A more service oriented digital distribution platforms attracts both professional game developers as well as consumer created content. (Jöckel & al. 2008.)

3.2 The roles of digital distribution and crowdfunding

The most important technical improvement, or a change, that has affected the rise of independent game development is digital distribution. Digital distribution means that the digital product is delivered online in digital format from an online service, as opposed to traditional distribution where the game is stored on a physical disc, which is often bought in a retail store (Jöckel et al. 2008). Another significant factor is the new way of getting financial support in the form of crowdfunding. Crowdfunding means that anyone can present his idea of a project or a product, and common people who are interested in it and willing to support it, can invest money in that project often with the promise of getting the product early or with discount (Guillaud, Hänninen, Mariot & Perret 2013). In this part these two phenomena and their effects to indie development will be discussed in more detail. Section 3.2.1 will focus on crowdfunding and how it has changed the game industry and what kinds of elements affect proposed projects' crowdfunding success. Section 3.2.2 examines the role of digital distribution in games industry and indie games, and points out some other important issues that arise with digital distribution.

3.2.1 Crowdfunding

In recent years crowdfunding has gained significant momentum in supporting projects in various fields, including game productions, which may have had a hard time finding finance through traditional channels. With these improved services for attracting and gathering crowdfunding like Kickstarter, the indie game industry has found an alternative method to find funding for their projects.

Guillaud et al. (2013) argue that crowdfunding has affected the game industry significantly, especially indie development. It has shifted the focus to PC games, because they are cheaper to create and have wider audiences than console games, and this might eventually even affect console sales. Now the customers are a part of the production and have their say in what they want to play and pay for in advance. Crowdfunding also affects popularity of game genres as the publishers are not the only ones determining what gets published anymore. There already is a standardized type of crowdfunding for games. It is closely related to pre-order model, where customer pays the game in advance and receives various merchandise at discount price. (Guillaud et al. 2013.)

It seems that game industry has neglected to satisfy demand in certain genres and game styles. Crowdfunding has attracted lot of RPG genre games and games that are legacy projects, sequels to old games which the industry has stopped supporting even though there is demand for them. Nostalgia is a significant factor for many crowdfunded projects as many of these projects are similar to older games. Industry might have deemed them too risky of an investment or the profit prospects haven't been high enough. As game productions have grown larger and more expensive, publishers are not willing to take risks with the games they produce. (Guillaud et al. 2013.)

The success of attracting crowdfunding has several influencing factors, but the most important of them are the legacy of the project, legitimacy of the developers and the way the project it presented. RPGs are the one genre that has had the most successful crowdfunding projects. Adventure genre had the second most successes. Legitimacy of the developers who run the project is affected by whether they are know from the industry, whether they have a reputation. Legacy is how the project is situated between previous games, explaining the game idea through existing games. Well-presented project page that has concept art, videos, graphics, explanation of gameplay and other material is crucial for attracting attention. If the creators aren't legitimated by their previous work, well presented and strong pitch with accompanied good quality project page can legitimize the project enough to attract crowdfunding. Projects legacy and reputation are key factors affecting crowdfunding success. (Guillaud et al. 2013.)

Planells (2015) states that crowdfunding is enabling prosumers to be actively participating in decision-making and productive structures. While previously publishers control the access to the gaming platforms and thus control the contents and finance the development. This affects the creativity of the developers as well as their participation to the value chain negatively as games are homogenous and don't take much risks. According to Planells (2015) prosumer-investor has a three statues: a consumer, producer and investor. Prosumer-investor aims to enjoys the the product, the outcome, expects to contribute in determining the content by financial participation and expect return of investment with the success of the project. The role of the player is highlighted in crowdfunding as it connects the creators and players and thus empowers consumers. (Planells 2005.)

3.2.2 Digital distribution

In the past decades game industry has evolved to be highly hierarchically structured and controlled by few large corporations, markets are hit game driven and the game industry is co-operating with other entertainment and cultural industries. (Johns 2006 as cited in Martin & Deuze 2009.) Digital distribution and new platforms are changing the industry structure to global, networked and constantly evolving market that needs a diversity of adaptive production methods. Entry risks are considered lower in a more diverse market and bubbling under it is an artist driven independent production. (Martin & Deuze 2009.)

Technological improvements in networks and digital distribution are allowing new game content and market entries to game markets. Digital distribution has shaped the structure and identity of independent games. Digitally distributed contents have previously needed to have been small in file size because of network speed restrictions. This has guided or even forced indie games to focus more on gameplay than visually realistic graphics and audio. (Martin & Deuze, 2009.)

Indie scene can be seen as an objection to the status-quo of game industries control of production and distribution (Lipkin 2013). Technological innovations in delivery of games (digital distribution) as well as new game platforms of mobile devices like smartphones and tablets can be seen as disruptive innovation regarding game industry, where new technologies offer "a capability to a niche of consumers in the value chain." As this “capability” advances, it gains a better position in the value chain, thus threatening market leaders. Downloadable games and the disruption of traditional delivery channels, in other words digital distribution, have affected the entire game industry economics. Traditionally the industry economics was divided in three separate parts; developer, publisher and technologists. (Lowthorpe et al. 2013.) Digital distribution has changed the whole game industry value creation. Traditional game value chain has consisted of development, publishing, manufacturing, distribution and retail. With digital distribution and participatory media culture new value chain for digital games consists of software, content, value-added services, servers, net services and prosumer/consumer. (Jöckel et al. 2008.)

Digital distribution has been and is an essential factor for indie games. Game developers have the possibility to keep more of the profit margins for themselves and thus can keep

lower prices on their products, allowing various kinds of non-traditional games to be published, for example shorter games and more experimental forms of games. Gradual game development can be done by small additions. Also industry controls and limitations regarding more traditional distribution are now not playing a role in game development. (Lipkin 2013.)

Digital distribution platforms and social media services that support game contents can be seen to have democratized game market and radically made it easier to get games into the market. However, game market is the most competitive software market and it is saturated with products. Digital distribution and social network services have also popularized new business models for games, mostly freemium and free-to-play. Rapid increase of these models is a major disruption in the independent game development scene. (Lowthorpe et al. 2013.) According to Lowthorpe et al. (2013) this may be a disadvantage to indie developers as customers might favor larger and better established developers. However, indie developers value creative freedom, with content as well as in choosing business models, that is gained by self-publishing (Lowthorpe et al. 2013).

Many digital distribution channels are still controlled by the same publishing companies that have controlled the game market as a whole, for example closed console digital distribution channels' online game store services. In addition many of the game engines have been controlled by large corporations having substantial licensing fees that have taken their use for indie developers out of the equation. (Martin & Deuze 2009.)

Martin & Deuze (2009) state that even though digital distribution allows games to enter market more easily, it makes it harder to gain revenue as consumers must be won over in the highly competed market. Indie developers can sell their products easier if they address their audiences' needs and interest, co-create with audience. Also Jöckel et al. (2008) include user-created content to independent game production via digital distribution: Where small company can benefit from user created content by creating their own content, then adding user created content to their product and distributing it back to market via digital distribution platform. According to O'Donnell (2012) indie developers are able gain more revenue to themselves and thus fund new games because of digital distribution.

3.3 Using postmortems to analyse game development

According to Collins Dictionary[2] one definition of postmortem means analysis that is done after a completed event. In gaming it refers to game developers own analysis and reflections of what went right and wrong during the game development cycle, what they would have done differently (Sheffield 2009). According to Game Developer Magazine[3] "A postmortem is a look at a recently finished game, written by its leads" where "you talk about the game and team's initial goals, and explain what went right and wrong during the development and roll out of the game." Most commonly postmortems are a description on what went wrong and what went right, but it also may be a short summary or description of the game development process. Grossmann (2003) describes postmortems: "They follow projects from start to finish, talking about mistakes as well as good decisions, giving candid accounts, rather than just trying to abstract general guidelines".

Postmortems are most commonly used as research material in studies related to game development process and game design research. There are multiple studies that compare game development to traditional software engineering industry using postmortems as research material such as Lewis & Whitehead (2011). Many studies, for example Petrillo, Pimenta, Trindade & Dietrich (2008), O'Donnell (2012b) and Lewis & Whitehead (2011), state that the main difference between traditional software development and game development is the requirement of the product being fun, the creativity that is present in game development and heterogeneous production teams of artists and programmers.

During the writing of this theses Washburn, Sathiyanarayanan, Nagappan, Zimmermann, and Bird (2016) published a study that analysed 155 game postmortems published in Gamasutra.com between the 1998-2014 to identify positive and negative characteristics of game development process in order to form best practices and identify common pitfalls and to provide recommendation for developers. This study gathered

[2] http://www.collinsdictionary.com/dictionary/english/postmortem (cited 7.11.2016)
[3] http://v2.gdmag.com/contribute/ (cited 5.2.2017)

post mortems from all over the website including blogs and conference presentations and included productions of all sizes from major studio developers to small independent project. In their analysis they had altogether 22 categories that they divided into five main categories: product, development, resources, customer facing and other, and their subcategories. They found out that the most common factors that went right, were game design, development process, team and art. The most common factors that went wrong were obstacles, schedule, development process and game design.

According to Petrillo, Pimenta, Trindade & Dietrich (2008) postmortems and the knowledge base they create can be useful for project planning and sharing knowledge as they can be used by anyone and they have real development experiences and examples. Petrillo, Pimenta, Trindade & Dietrich (2008) studied what are actual problems in game development. In their study they analysed 20 postmortems and compared those findings to software industry's common problems and game development problems that are cited in game development literature. They found out that common software industry problems are also found in game industry. Especially the scope and optimism issues are highlighted in both. The main difference is that game development is multidisciplinary with artist and engineers and the explanation of the requirements is more complex, where traditional requirement engineering techniques don't meet the creative process of game's development. (Petrillo et al. 2008.) Similar to the Washburn & al. (2016) study the most common problems in Petrillo et al. (2008) postmortem analysis were feature creep, and unreal or too ambitious scope issues. Other problems were cutting features, design problems and delays or too optimistic schedules. While crunch time was a major issue in game development literature it was not so common problem in postmortems.

Callele, Neufeld & Schneider (2005) studied 50 Game Developer postmortems that were published 1999-2005, in order to identify factors that either lead to failure or success in game development. They used five categories: preproduction, internal, external, technology and schedule. Internal issues, such as project management and personnel, were by far the most common. They concluded that project management issues were the main contributor to both success and failures. The weakest point of the game development process was the transition from preproduction to production as most failures happened during this transition phase and a formal process during this transition would increase the reliability of this process. (Callele & al. 2005.)

Tschang (2005) went through 65 Game Developer postmortems in order to analyse the development process of video games focusing on product development. He studied how the interactive nature of the product affects the development and how game development processes differs from more conventional product development processes. According to Tschang video games consist of three main components: the programming code, the videogame design and the content. He developed categories that contain key elements of games and features of game development process: design, product development, project management, technology, external relations and content. (Tschang 2005.) In his study the most common pitfalls were project management, process and design. The most common positive aspects were technology, design and project management. He also concluded that gameplay, engines, tools, team related issues and concurrency are the most often cited issues altogether (in both wrongs and rights) and thus are the core issues with the game development process. (Tschang 2005.) Tschang (2007) also analysed 76 postmortems as secondary information in a study that analysed what forces influences creativity in game industry.

In these postmortem studies project management seems to be "the double edged sword": it is simultaneously common as a reason for failure as well as reason for success. Also, game design was mentioned simultaneously as a project wrong as well as project right. Besides project management, personnel, development, game design and art seem to be factors that have gone right according to these studies. While factors that have gone wrong are project management, feature creep, unrealistic scope, schedule, various obstacles, development process and the game design.

4 RESEARCH MATERIAL AND METHODS

In this chapter we address the research material and research methods used in this study. In the first part the research material is introduced and the reasons behind its selection are laid out. The second part explains how the data was gathered and its limitations. The research methods are described in the third part of this chapter. Lastly, the method for analysing of the research material is explained.

4.1 Research material

Game postmortems can be viewed as valuable research material: as they are written by the developers, they reflect their opinions. They can be seen as the learning diary of the developer that is written after the work is done. They bring out the voice of the developers. Postmortems are developers own reflections on their now finished work. Dingsøyr (2005) describes postmortems as "a collective learning activity". Similar research material could be gathered by interviewing developers or asking them to analyze their work and write down their views about it. Postmortems are commonly written by the members of the development team together or by a single or a couple of the development team members and their role in the development process vary; naturally this may affect what is discussed in the post mortem and from what point-of-view.

Independent game development is not a homogenous process and there are many different kinds of indie developers with a variety of external situations. Indie game developer may be a single person, a small team or a studio. Some of them may have external funding from various sources, such as crowdfunding, the game might be commissioned, they may do outsourced work for a bigger studio, some are doing the development on their own expense, whether otherwise employed or not, or in their spare time. Because indie game development circumstances vary greatly, it may not be possible to draw unified conclusions what causes problems or success in the development process, but most common problems and success factors can be found.

4.2 Selection of the postmortems

In this study there are 53 indie game postmortems, that have been published between the years 2004 and 2014 in game development website[4] Gamasutra.com[5] and it's earlier print publication *Game Developer magazine*, that appear in Gamasutra's feature-section for postmortems[6]. The full list of postmortems is presented in appendix 1. There are more postmortems in various sections of the website such as developer blogs and news, but these were excluded from this study. In Gamasutra most of the postmortems follow a particular form, and that is why Gamasutra was chosen as the collection point of postmortems for this theses. Gamasutra and its predecessor and sister publication Game Developers Magazines guidelines[7] state that a postmortem should have an introduction, five rights, five wrongs, and a conclusion. The rights should be five things that went right in the development process, and the wrongs five things that could have been done better. These points should be titled and discussed with concrete examples. Postmortem should also include some game art and separate databox that has details about the development.

Postmortems that were written by the editorial staff based on interview or a speech done in conference or in another event were excluded, as well as postmortems that were written by students or voluntary teams, not the actual game developer. To separate indie game postmortems from other postmortems, the selected postmortems were either tagged as *indie* or it stated in the postmortem itself that they were *indie*. In unclear cases the game was also cross-referenced to Pixelprospector.com[8] list of indie game postmortems, Wikipedia and Steam to confirm that the game is generally cast as an indie game in the eyes of the large public.

Some of the postmortems were excluded due to deviations in their form or topic. For example, postmortems that did not list the rights and wrongs, but were more of a narra-

[4] https://en.wikipedia.org/wiki/Gamasutra (cited 4.4.2017)
[5] http://www.gamasutra.com (cited 4.4.2017)
[6] http://www.gamasutra.com/features/postmortem/ (cited 4.4.2017)
[7] http://v2.gdmag.com/contribute/ (cited 4.4.2017)
[8] http://www.pixelprospector.com/the-big-list-of-postmortems/ (cited 4.4.2017)

tive into the development, were cut out, as well as postmortems focusing on a single separate topic, such as creating an AI, managing kickstarter campaign or map editor creation, rather than the whole game development process. Some of the indie postmortems were also cut out because they discussed too many rights and wrongs. For example, a game with nine right or wrong points would deviate the results by giving a single game too much influence over the overall results. As the large majority of the postmortems have five rights and wrongs, only postmortems with five plus or minus one rights and wrongs were chosen.

The analysis is based on the year of the postmortem publication, not the year of the game publication. In most cases the games release year is either the same as the postmortems publication year or the game might have been published the year prior to the postmortem. This is due to the fact that the games publication year might not be included in the postmortem. In the table below the number of postmortem that are published between 2004-2014 are shown by the year of the publication. As can be expected the earlier years generally have less postmortems published than the later years of this research period of eleven years.

Table 1. The number of indie postmortems published by year, 2004-2014

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
No.	3	2	5	2	2	8	6	6	10	7	2

4.3 **Research methods**

In this study content analysis is used as a qualitative research method, in order to achieve a constrict description of the perceived successes and failures in indie game development. The two main uses of content analysis are quantitative and qualitative approach (Graneheim & Lundman 2004). Quantitative content analysis is more commonly used to test hypotheses and its coding frames are concept driven, whereas in qualitative content analysis the coding frame is data-driven. In qualitative research content analysis is used as a data analysis method, while in quantitative tradition, it is more of a data collection method. (Schreier 2014.)

Content analysis can be used in nearly all qualitative research. According to Tuomi & Sarajärvi (2009) it can be used as a separate method but also as a theoretical framework that can be used in combination with different analysis methods. As a method, qualitative content analysis has three distinctive characterising features: it reduces the data, it is systematic, and flexible (Schreier 2014). Content analysis aims to create a clear description of the study subject by organizing and reducing the data to a clear and concise form without losing any of the information. (Tuomi & Sarajärvi 2009.) According to Elo & Kyngäs (2008) the purpose of content analysis is to achieve a compressed description of the phenomenon with the outcome of concepts or categories.

Leech & Onwuegbuzie (2007) state that constant comparison analysis in probably the most used qualitative data analysis method. This analysis is also called coding. It can be done deductively, inductively or abductively (Leech & Onwuegbuzie 2007). In this thesis inductive coding is utilized. This means that "codes emerge from the data" rather than being identified prior (Leech & Onwuegbuzie 2007). According to Patton: (2002: 453) "Inductive analysis involves discovering patterns, themes, and categories in one's data. Findings emerge out of the data, through the analysis interaction with the data". Inductive analysis is more suitable than deductive when there aren't enough of prior studies or the information is fragmented (Elo & Kyngäs 2008)

Organising qualitative data in inductive content analysis consist of three main steps: open coding, creation of categories and abstraction (Elo & Kyngäs 2008). Open coding means going through the text and giving them headings that describe the content. Categories are formed from these headings. Then these categories are grouped under higher tier headings. In abstraction generating categories aims to devise a general description of the research subject, so the categories are labeled with content-characteristic words. Similar subcategories form categories and these categories are grouped together to main categories. Abstraction process can, for example, consist of sub-category, generic category and main category. (Elo & Kyngäs 2008.)

In constant comparison analysis or coding, a subset of data is read, then divided into meaningful smaller sets that are each labeled with a code or descriptive title and second subset of data is read and compared to the previous data subset; all similar sets are grouped under the same label or a new label is formed. When all the data has been analysed and coded, the similar grouping is done with the codes. From these code group-

ings a theme is identified. (Leech & Onwuegbuzie 2007.) Graneheim & Lundman (2004) use different terms, but the steps are basically the same. The unit of analysis is the original text, in this case the separate postmortem. The text is then sorted into content areas and divided to meaning units that are condensed. The meaning units are then abstracted and given a code. Codes are compared to each other in their differences and similarities and then divided into subcategories and categories. The latent content of the categories then forms the theme. (Graneheim & Lundman 2004). A code can fit into multiple themes and themes can be formed by sub-themes or be broken into them. They state that "the manifest content, that is, what the text says, is often presented in categories, while themes are seen as expressions of the latent content, that is, what the text is talking about." (Graneheim & Lundman 2004: 111.) Content analysis emphasises differences and similarities of the codes and categories (Graneheim & Lundman 2004).

Content analysis can be continued by quantification of the analysed data (Tuomi & Sarajärvi 2009). According to Leech & Onwuegbuzie (2007) classical content analysis is basically the same as constant comparison analysis, but you count the times the codes are utilized. This study combines both constant comparison analysis, as the codes emerge from the data and themes are formed, as well as classical content analysis since the occurrence of the codes is also valued. Schreier (2014) states that the coding frame can be the main result of qualitative content analysis but "findings can also be presented in quantitative style" which means for example percentages or reporting coding frequencies. Reporting the results is done by describing the process (Elo & Kyngäs, 2008). There is always some level of interpretation involved when analysing texts which affect the trustworthiness of the results (Graneheim & Lundman 2004).

4.4 Analysis of the research material

The analysis was done by first reading through all the chosen postmortems, then making a table of their rights and wrongs titles making a brief description (meaning unit) of the actual content of these titles. Then these were given a category or a code that describes what that point is related to. Categorisation is based on the content of the right or wrong, but also the title given by the writer of the postmortem influenced the chosen category. This was done because in many cases titles and content may be slightly different. While the title may be broad, the actual content described may be narrow or vise

versa. Some of the given titles may contain several aspect of the development such as *Barrel-aged Design and Gourmet Prototypes* (39) *Character Animation and Controls* (13). In such cases the focus of the content influenced to which category the given point is assigned to. The titles are given clout because they are the things the developers have chosen to use to describe the right or wrong of the development. Some of the titles are quite self-exploratory while others are quite canny such as *An Over-Worked Chainsaw* (33). Close reading of the post mortem content does reveal many more rights and wrongs in the postmortems than just the one chosen title gives out, but in this study only one thing per right and wrong was chosen.

After all the categorisations were done in this first level, the categories were again grouped under broader categories. Finally, these categories were combined to broad general categories, the main themes. Main categories or themes have the same rights and wrongs, but lower level categorisation was done separately for the rights and wrongs as the issues were quite different in them. Five main categories or themes and 30 subcategories were identified with 148 specific reasons, codes. While many of the categories could be part of several main themes the emphasis is on what is the thing that it affects the most. For example game design can be found in the theme of design and development process as well as the game category, but the design in design and development process is related to the design that is done during the development process, whereas in the game theme it refers to issues with final product that were caused by design choices. As Graneheim & Lundman (2004) state a code can belong to multiple themes and themes can be formed by sub-themes or be broken into them.

5 RESULTS OF THE POSTMORTEM ANALYSIS

In this chapter the findings of the postmortems content analysis are reported. First we identify the main categories, the themes that were found. Then we go through them individually, introducing the subcategories and reporting the number of occurrences of what went right in the project and what went wrong in the project and explain the content of the subcategories using the codes. The content analysis main frame can be found in appendix 2. Then the most common reasons for successes and failures discussed in the postmortems are illustrated and discussed. Lastly these findings are compared to academic literature on the subject.

5.1 What kind of rights and wrongs there are in indie game development

The five main categories, or themes, of the analysis are technological development, project management and production process, business, design & development process and the game. Technological development includes two subcategories of platform issues and technical issues. Production process and project management includes resource management, vision and direction, personnel, time and scope related issues. Business theme includes things that are affiliated to the business side, such as PR & marketing, financial, legal, release issues as well as connections, audience and attitude. Design and development process theme focuses on design choices, prototyping and development process; things that are associated directly with the product development rather than production process. The game theme includes problems and successes that are related to the finished product. It also includes game design issues that have affected the end product such as modes, game elements and interaction in game. Figure 1. shows the overall occurrence of the rights and wrong in these five main categories.

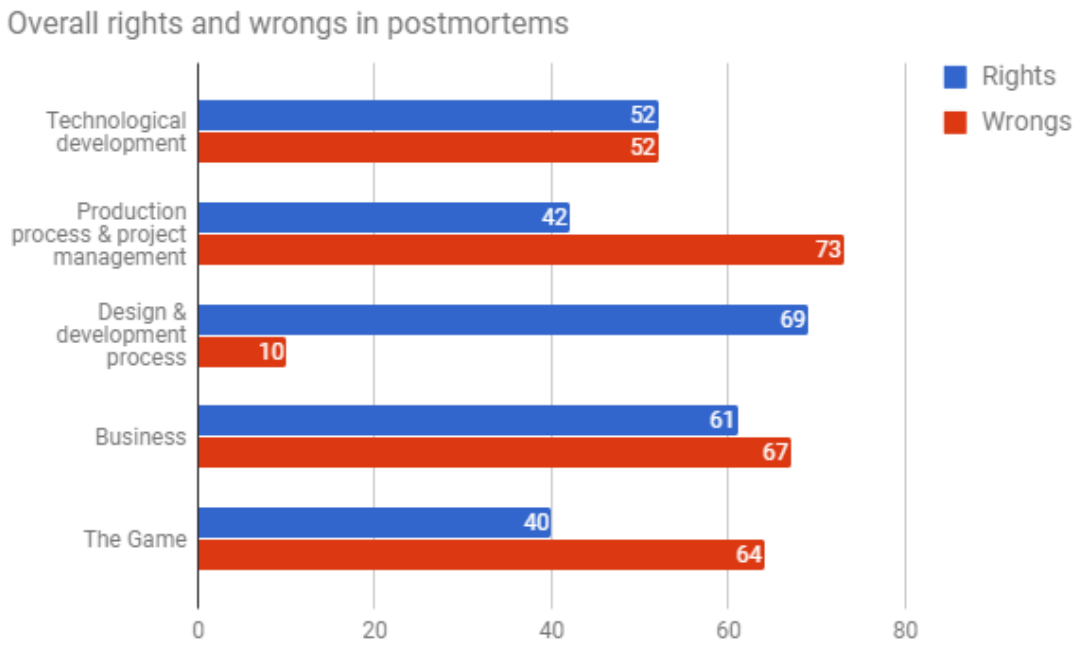

Figure 1. Overall occurrence of the rights and wrongs in postmortems

5.1.1 Technological development

Technological development was a reason for success and failure in equal numbers. It had two main categories: technological issues and platform. The distribution between rights and wrongs in these categories is illustrated in figure 2. The rights and wrongs of **technological issues** shared subcategories of bugs, coding, testing & QA (quality assurance) and development tools. However, the categories of AI and adapting to smaller device were only found in rights, and underestimating technical challenges and lack of an updater were only found in wrongs. Technological issues were more frequently a reason for success in the project. *Development tools and technological* choices covered nearly half (48%) of the technological development rights. The reasons behind these rights were similar; using the right tools and a good engine makes the development easier, whether it means using own tools, choosing the right engine or discarding old tools. *Testing and QA* was the second most common reason for the rights (26%), mostly this meant playtesting, doing iteration and listening the feedback. *Coding* rights (17%) meant choosing a coding language that allowed rapid development, different platforms or libraries. Also, *bugs* were mentioned a few times as a project right, such as fixing the bugs immediately and having a good bug tracking systems.

The most common technological development wrong was *testing and QA* (33%). Mostly, this was due to the fact that there was either too little testing done or it was done too late in the project. Also, testing with niche audience and ignoring testing feedback were mentioned as a reason for testing and QA failures. *Coding* issues (23%) and *development tools and technological choices* (23%) shared the place being the second most common reason for postmortem wrongs in technological issues. Coding issues meant, for example, compatibility problems, problems converting to target platform or coding database issues. Wrongs in the development tools and technological choices meant issues with chosen tools, such as making a too big game with flash or a bad choice of engine. Another issue with a few mentions was underestimating technical challenges (15%). Also, *bugs* and *lack of an updater* were mentioned as a project wrongs in technological issues.

Platform issues were more a reason of failures in the postmortems, especially relating to *meeting platform requirements* (42%), such as meeting technical certification requirements. Platforms app *size limit* (33%) was solely listed in the wrongs. General *platform* wrongs (25%) meant problems with the game in another platform version such as pc or mobile. Platform rights were mostly due to *Steam (40%),*which was solely mentioned in the rights and general *platform (40%)* rights. Steam allowed to circumvent censorship and enabled easy updates, while general platform rights meant choosing a good platform or making a quick transition to another platform. Meeting platform requirements was also mentioned as a platform related right.

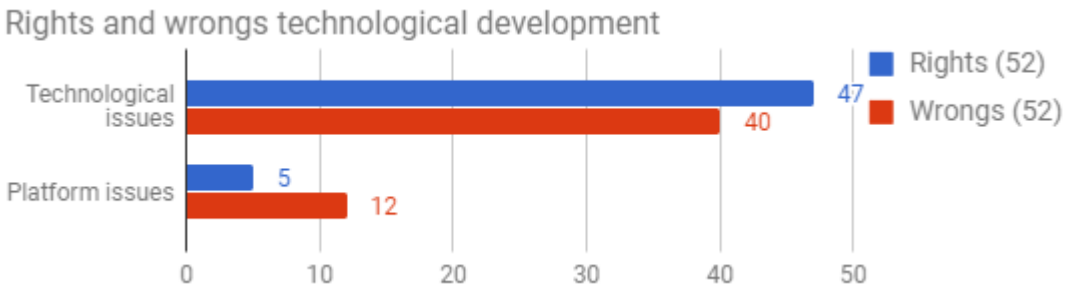

Figure 2. Technological development issues in rights and wrongs

5.1.2 Production process and project management

Production process & project management was significantly more common in postmortem wrongs, especially in resource management (41%) and time issues (23%) subcategories. The rights and wrongs shared subcategories of time; resource management; personnel; project management and vision & direction. Inexperience subcategory was only present in the wrongs. Overall distribution of rights and wrongs in project management and production process can be seen in figure 3.

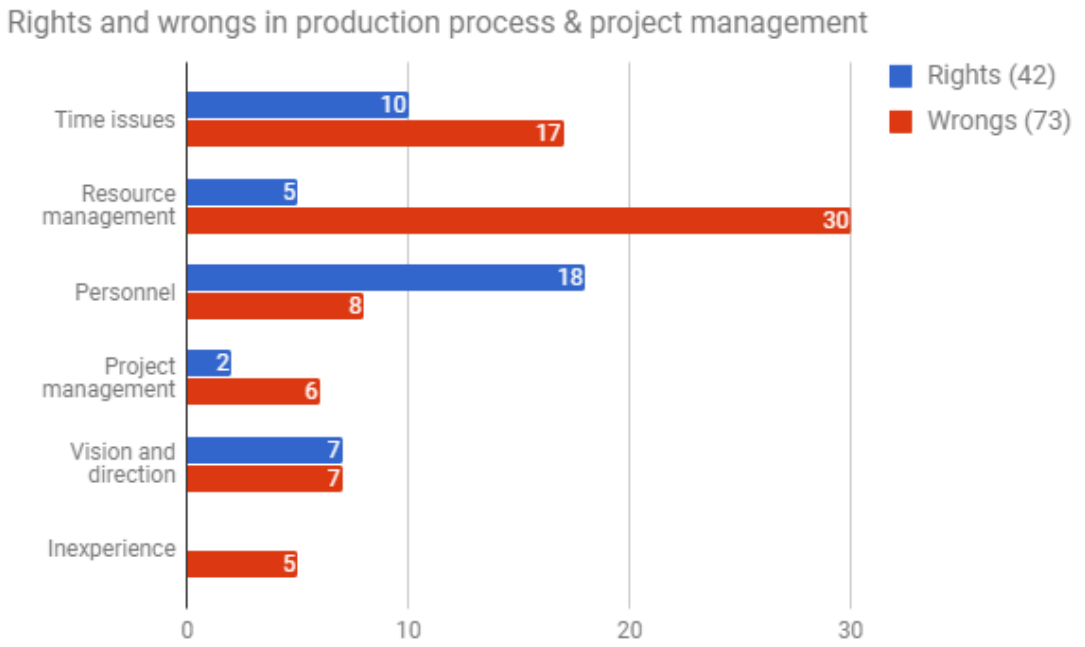

Figure 3. Project management and production process rights and wrongs.

Resource management was the most common reason for failures in production process & project management. The main issue with project wrongs in resource management was *feature creep* (30%) and thus having to cut out different parts of the game such as features, graphics or levels due to resource restrictions. Often this meant that the development team spent too much time working on features that ended up being cut out from the final product. Another major resource management issue was *resource distribution with multiple projects* (20%). Having to switch between projects constantly, changes in staff, and key people being tied up in another project are some example of problems that occured when running multiple projects at the same time. They were followed by unrealistic or too ambitious *project scope* (13%), lack of *planning* (10%), especially in pre-

production phase, and poor *documentation* or the lack of it (10%). *Other work*, having to do *rework* and *project bottlenecks* were also mentioned as project wrongs. The most common thing that went right in resource management was well thought out *project scope* (40%). Other rights were *cutting out unnecessary branches* thus reducing the game's size and only keeping great ideas, *no feature creep*, and *remembering to have a life* besides work.

The most common wrong with **time issues** was too tight *timeframe and crunchtime* (47%). Crunchtime was often the result of errors found late in the production and having insufficient time for testing and polishing. Poor documentation, lack of prototyping, building a company simultaneously with the game, having to lay off people, and changes in platform updater were also reasons behind crunch time. In general, trying to keep a deadline meant serious crunch time at the end of the production. Poor *scheduling* (23%) was also a time related wrong in postmortems. All of the scheduling problems were caused by too optimistic time estimates and not having any experience how long certain game development phases take. Other time related wrongs were *toll on personal life* (18%) and *unforeseen delays* (12%). The most common rights in the time subcategory was *development time* (40%). Development time composed of factors such as having enough of time, finishing on time, being able to have rapid development or long development time allowing good polish. *Scheduling* (30%) was another major time related right. It composed of managing to keep the due dates, having short deadlines that allowed iteration, and having no crunch. Other time related rights were *organized development*, *forced delay* and having *polishing time* by postponing launch.

Personnel was more common as project right than project wrong. The *team* was both the most common personnel right (56%) and the most common personnel wrong (63%), however the reasons behind these were different. The reasons behind team rights were simply having a good team, having a small team, having a good combination of veterans and newbies in team, utilising staff between projects, creative team building and being able to keep the original team intact. The team wrongs were caused by ignoring team problems, failing to empower every team member, not being able to utilize staff while people moved between projects, team members having excessive initiative and having overlapping skillsets and thus butting heads. Other wrongs related to personnel were having *unbalanced team* of mainly artists and single programmer, problems with

collaborative working and general *small team problems* where a lot is dependent on single person. Other personnel rights referred to *working method and environment, communication and education. Working method and environment* meant having a good work environment, cultivating good atmosphere, embracing different styles of work, having fun or working from home around the world. *Communication* between team for example having a well distributed pipeline in communication among remote workers. *Education* such as getting a degree in computer science while working helped and reading books about game development was also one of the personnel rights.

Project management issues as project wrongs were equally divided between *leadership*, *project management*, and having to wear *too many hats* so to speak. Leadership problems consisted of having to learn leadership in an expanding company and inexperienced leadership. Project management issues were related to having no project management and lack of project management experience. Having to wear too many hats meant in these cases having to all the other work besides actual game development such as general management, paperwork, marketing and not realising how much time they take. The only direct project management rights were *empowering employees* in the game development process by giving them right to propose new projects and vote on them and discovery-driven *planning* to be able to focus on areas with highest value to production while controlling the risks.

Vision and direction had the same amount of right and wrongs in indie postmortems. In general all the rights can be summed up having a clear *vision* & *being focused* on keeping that direction. Whereas, on the "what went wrong side", the most common issue with vision and direction was *change in the project direction* (43%) during the production. Other wrong wrongs were related to *lack of direction*, having problems *maintaining the vision*, getting *sidetracked* and losing *concentration* on the project.

Inexperience was only cited as a thing that went wrong in the game production. Most commonly it referred to *general inexperience* (40%) in game development, especially with game coding. Other inexperience related issues were *getting help too late* in the project, *not doing homework* on the platform with its due-diligence issues in the beginning and having *on-the-job training* for coding.

Project management and production process was significantly more often the cause of problems in development. The most problems were in resource management and time issues. Overall the reasons for problems were generally related to lack of experience in production and general project management process. Managing the project can be difficult when making the game at the same time.

5.1.3 Business

Business category was almost equally the reason for success as well as failure. Rights and wrongs shared the subcategories of attitude, legal issues, finances, connection, audience release, and marketing. Studio location was a factor only with the rights and workplace with the wrongs. The overall right and wrong distribution between these categories is shown in figure 4. The most common business category rights in postmortems were related to connections (29%) and audience (27%), while PR & marketing (25%) and release (24%) were the most common business related reasons for failures.

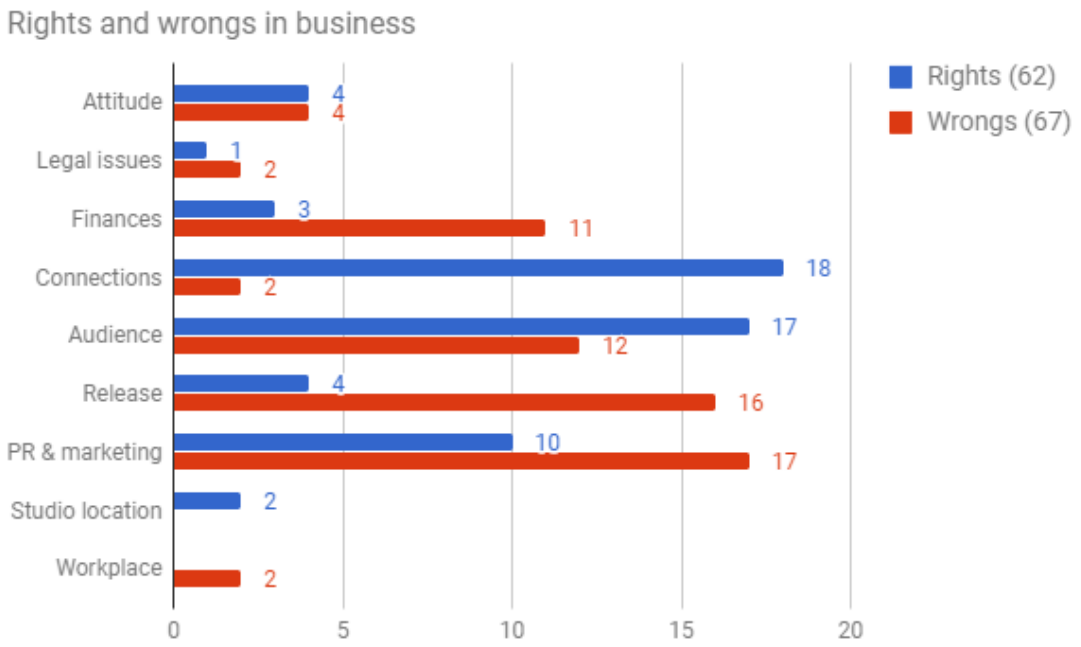

Figure 4. Business rights and wrongs.

In the postmortems rights the most important **connections** were having a *partner or a publisher* (56%) and *outsourcing* (28%). Other connections were *getting help* unexpectedly or having friends help and *getting an agent*. Connections in postmortem wrongs

were all related to outsourcing issues; choosing a poor outsource partner and eventually having to do the outsourced work in-house.

Audience rights related mostly to game *community* (52%) and *recognition* (29%). Community meant supporting the game community, managing to build good fan base and having social and community features in the actual game. Recognition referred to getting enough attention and exposure to gain name for the studio for future work. Also *feedback and sales,* such as getting good reviews or enough sales to be able to break even or continue development to other platforms, were mentioned as audience related right. Audience wrongs related mostly to *misjudging the audience* (33%), for instance, having an unclear target group, not targeting women or thinking that the game needs to be difficult while the audience wanted a more casual game. Other postmortem wrongs were issues with *meeting expectations,* such as managing to meet beta expectation or having the game type lead to wrong expectations. Poor *reception* was the result of controversy or assuming reviewers would forgive missing features due to low price. Also, problems with *communicating to gamers* in how to proceed in game, *loss of community* after the preview by not giving any news or updated the game and not thinking about *user-experience* by having too broad difficulty ramp were mentioned as audience related wrongs

PR & marketing rights were mostly related to general *pr & marketing* (50%), such as having marketing plan, having a PR agent and stepping up marketing efforts. Others marketing rights were entering *festivals and events*, having an unusual *stance on piracy*, and *good attitude towards the public* by answering to hostile feedback politely thus creating positive PR. PR and marketing wrongs were mostly due to *lack of pre-release marketing* (35%). Other wrongs were *lack off or too little marketing, losing marketing buzz* before release and *wrong marketing efforts* such as relying on platform marketing solely or marketing through the wrong channels. Also, having *no marketing planning* was mentioned as a PR & marketing wrong.

Release was the second most common reason for failures in business category. Most of the release wrongs related to *launch* (50%) due to various reasons. For example, having a bad launch start due to lack of experience on android launch, missing opportunities to be a featured game, having lots of bugs in game during launch, bad release timing, and losing promised promotion with xbla. Also, going for same the launch date for different

platforms or not going for simultaneous launch for different platforms were mentioned as launch related wrongs. *Trial & demo* (25%) as a release wrong referred to for example having a bad demo that didn't display the game well enough or the trial not selling the game enough. Other release related wrongs were that it *took too long to release (*19%) the game and having *no soft launch* to test the game. Release rights included factors such as *releasing early and often* by adding features, *soft launch* in limited territory, having a *strong launch* due to created buzz and having *enough customer support* during the launch. **Studio location** was also a business related right. This meant that location had good talent pool, game community and affordable costs.

Finance rights were having diverse payment options to get different type of players, self-funding to have total control over the project, and paid beta that financed the finishing of the game. Legal rights referred to retaining IP and thus retaining control over game development.

5.1.4 Design & development process

Design & development process was significantly more common as what went right with the project. Many of the design process rights were seen as the wrongs with the finished product rather than as a wrong of the design process, for example game arts. Also many problems that are caused by design process wrongs manifest themselves as problems in the finished game. Overall distribution of rights and wrongs are shown in figure 5.

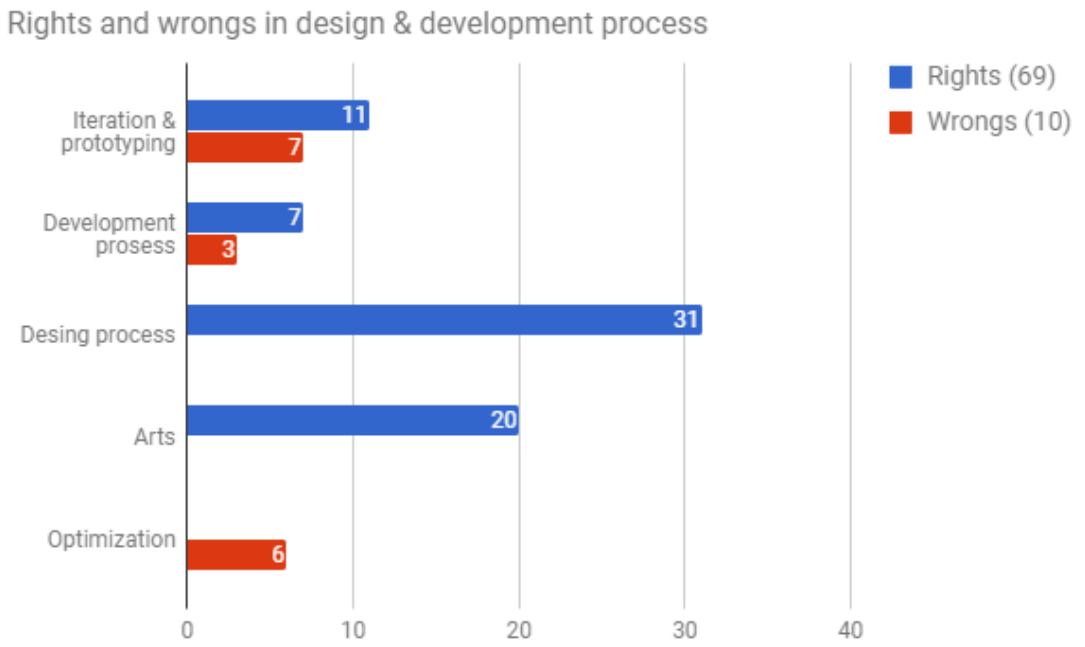

Figure 5. Design and development process rights and wrongs

Design process was the most common subcategory of design and development rights. Mostly it was due to *game design* (71%). Reasons behind this were such as design to strengths, sticking and having design principles, good creative direction, genre or core gameplay mechanics choices. Other rights were having a great *original idea*, good *design process* due to AI assistance or right order of implementation, *rethinking the design*, *keeping the game simple* and *streamlining gameplay experience*. **Arts** was the second most common project right in design and development process. It referred to various visuals, art style, keeping the game 2D, change in art direction or sticking with it.

Iteration & Prototyping had only one project wrong of *not doing enough of prototyping*, and thus making critical design choices too early on. G*eneral iteration and prototyping* was the main reason behind iteration & prototyping rights (81%). General prototyping referred explicitly to gameplay and game feature prototyping. In brief, the reasons behind this were such as having an iterative design process which meant doing instant prototyping, having short iterations cycles, doing lots of iteration and prototyping early on. Other rights in this category were *polish iteration* and *hardware experimentation* that meant prototyping different control methods.

Development process was more common as the project right. Most development process rights referred to *general development process*. It meant for example unstructured or decentralized development with little or no managers, artisan development with friends helping and focusing on art side of the game or open development where game makers were talking to the public, having the game community help in making and testing the game. Other reasons were having a *creative freedom* thus allowing experimenting with ideas and *redefining project* when it was going to wrong direction. Development process wrongs related to general *development process*, especially coding side of the process. The wrongs were caused by developing on the fly, having decentralized development, unpredictability of the iterative design process and wasting time while having no clear development direction.

Optimization was only perceived as a project wrong in design and development process. Main issue was *underestimating optimization*, for example not realising how long it takes or finding serious problems while optimizing. Other optimization wrongs were *refinement issues* and *premature optimization*.

5.1.5 The game

The game category refers to the finished product. While many of its subcategories could fit into other main categories they are differentiated by that they refer to the actual finished product, to the game itself, rather than to a part of the design or production processes. The game was more common as the reason for failure in post mortems.

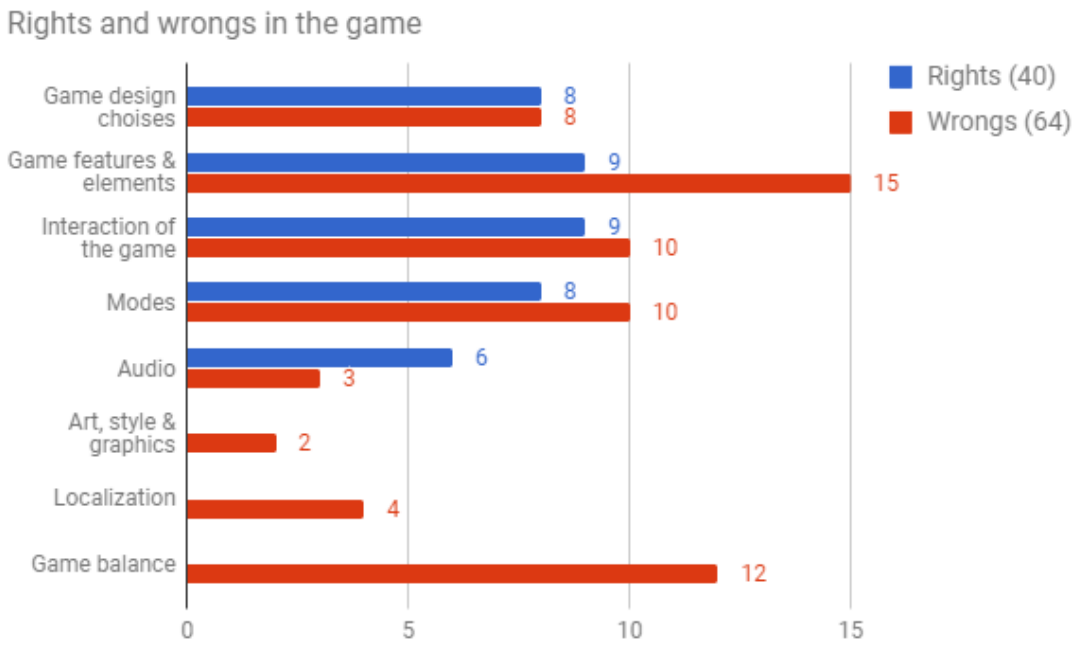

Figure 6. The game rights and wrongs

Game features & elements was the most common thing to go wrong in game category. In most cases it was due to *tutorial* (53%). The reasons behind tutorial failures were plentiful such as forgetting the tutorial completely, having too much to teach, too easy tutorial, not iterating tutorial enough, bugs in tutorial or an unclear tutorial. Another significant reason was poor or lack of *boss battles* (26%) either due to omission of bosses or not having time to implement them properly. General *game features* such as poorly implemented character types or the lack of character types and unnatural *dialog* that would have needed more work and iteration. The success side game features and elements had to do with characters, worlds, levels and single features such as weapons. It was the most common reason for success along with interaction of the game.

What went right with the **interaction of the game** was most commonly *game mechanics* (78%), such as fighting system, gesture control and physics-based gameplay. The other interaction right was having good *game controls*. The wrongs of the interaction of the game were mostly due to *game mechanics* (30%) and *controls* (30 %). Mechanics were related to unclear reward system, and too strict mechanics that limit expansions. Controls were related to poor control scheme, lack of control scheme page and unusual

split controls. Other game interaction failures were poor *interface* and *gameplay* 20% such as little variety and little flaws in gameplay.

Game balance was the second most common issue in game category wrongs. Mostly it was due to game difficulty such as having difficulty spikes, too steep learning curve and too easy game. Other reasons were too long game or balance in gameplay between levels. **Game modes** as the postmortem rights included *modes and expansions* and *level designer*. Modes and expansions included things like having expansion, going online, adding features and modes. On the postmortem wrongs game modes referred mostly to *co-op & multiplayer mode*. This meant poor co-op implementation, leaving out multiplayer mode or putting lot of time in multiplayer mode development when very few played it. Other reasons were not having a *single-player mode*, l*ack of additional content*, *misplacement of the content* mode wise and *not having enough modes*.

Game design choices were equally common as project failures as well as successes. On the project rights it referred to having a good *story* and *x-factors in play experience*, such as humor, ethos and that "one more turn"-feel. Other reasons were *environmental storytelling* and *future proofing* by having a game that is still playable with future graphics. On the project wrongs side game design choices referred to mostly general *design missteps* such as art vs player, separating gameplay types, game that was too hard for players to understand, or having difficulties in manifesting what kind of game it is. Other reasons were poor *genre type choice* and poor *replayability*.

Audio was more common as project right. In project rights this referred to having good *sounds and music*: having a good soundtrack using acted voices, good sound atmosphere. On project wrongs side audio referred to poor *audio implementation* planning, having difficulties getting proper *voice acting* and lack of *sound effects*. Other project wrongs in the game category were **localization** and **arts, graphics & style.** Localization included *localization & compatibility* issues such as forgetting localization altogether and making it impossible to implement due to choice of graphics implementation. Also, issues with using *cultural references* were mentioned.

5.2 The most common reasons for success

The five most common higher level category reasons for success were technological issues, design process, arts, connections and personnel. Their occurrence frequency is shown in table 2 below. Of the five most common reasons two belonged to design and development process (DD) while business (B), production process & project management (PP) and technological development (TD) had one each. The game (G) had none.

Table 2. The most common main category reasons for success

The most common main category reason for successes		**Number of occurrences**
1.	Technological issues (TD)	47
2.	Design process (DD)	31
3.	Arts (DD)	20
4.	Connections (B)	18
5.	Personnel (PP)	18

On a lower subcategory level the most common singular reasons for success were development tools and technological choices; game design; arts, style & visual choices; testing and, the team shared the fifth place with partner/publisher. Their number of occurrences is illustrated in table 3. When compared to the five main themes formed in the content analysis, technological development and design & development process each had two and production process & project management and business had one subcategory reasons for success. To summarize technological development and design and development process were the common themes behind most of the singular reason for success. It could be said that technological development and design and development process were the main causes for a success in the project.

Table 3. The most common singular reasons for success

The most common subcategory reasons for success		Number of occurrences
1.	Development tools & technological choices (TD)	22
1.	Game design (DD)	22
2.	Arts, style & visual choices (DD)	20
3.	Testing (TD)	12
4.	The team (PP)	10
4.	Partner/publisher (B)	10

5.3 The most common reasons for failure

The most common reasons for failures in the main categories were technological issues, resource management, time issues, marketing, and release. Their frequency is shown in table 4. On the five main themes business and production process & project management both had two of the most common main category level reasons for failure, while technological development had one. These results suggest that production process & project management along with business are the most common pitfalls for indie developers.

Table 4. The most common main category reasons for failures

The most common main category reason for failures		Number of occurrences
1.	Technological issues (TD)	40
2.	Resource management (PP)	30
3.	Time issues (PP)	17
4.	Marketing (B)	17
5.	Release (B)	16

The most common subcategories reasons for failure were testing and quality assurance, game difficulty, feature creep, development tools and tutorial shared the fifth place with launch as is shown in table 5. Technological development and the game both had two of the most common singular reasons for failure while production process and project

management and business each had one. Design & development had none. Design and development was not present in either most common main category reasons or most common individual reasons. When compared to the most common rights, the singular reasons for failures had much fewer occurrences; this can be because overall the failures are more divided in regard to singular reasons. This also means that when interpreting the failure results more emphasizes should be put on more general reasons, than on singular reasons.

Table 5. The most common singular reasons for failures

The most common subcategory reasons for failures		**Number of occurrences**
1.	Testing and quality assurance (TD)	13
2.	Game difficulty (G)	12
3.	Feature creep (PP)	9
4.	Development tools (TD)	9
5.	Tutorial (G)	8
5.	Launch (B)	8

5.4 Are postmortems highlighting same aspects as academic literature?

In academic literature indie is often defined and explained as a phenomenon by using some of the following aspects; its political-economical position against mainstream game production, its specific aspects of style, creativity and aesthetics or its role as part of community, participatory culture and service orientation. Also, crowdfunding and digital distribution play an important role when discussing indie games in academic literature. When examining the meaning of independence it can relate to the production, the product or the producer (Kemppainen 2009). Another perspective divides independence to financial, creative and publisher independence (Garda & Grabarczyk 2016). While these aspects are not directly visible in the postmortem analysis results, they can be seen in the individual codes and some of the subcategories.

Political-economical position against mainstream game production is harder to see in postmortem analysis results. According to Lipkin (2013) *indies* are often viewed as ar-

tistic and creative compared to the mainstream games. This can be seen in also in the analysis of postmortems as they did often raise arts as a major success factor in the studied postmortems. As Fisher and Harvey (2013) stated indie can be seen as alternative to dominant practices, especially in artistic and design decisions. Game design & development was one of the most common reasons for success, it is not directly related to political economical position, but it can be assumed that the freedom that is thought to being part of indie game development is present in the game development process. Also, this shows in the postmortem failures; design and development process had the least mentions as the project wrong in all of the main themes.

Desire to work with own timetables was mentioned by Lipkin (2013) as a part reason for of independent development. Time issues and various resource distribution issues such as remembering to "have a life", manifested in both in the rights and wrong. Even though Whitson (2013) stated that developers have sought out independent work due to crunch time and lose of creative control in mainstream production. Crunch time and toll on life is seen in many postmortem wrongs. On the other hand good team and studio location, working method and environment were seen as a positive. Parker's (2013a) notion that easier access to development tools has allowed more indie productions can also be seen in the postmortems as development tools were often seen as something that went right in the production. Martin & Deuze (2009) pointed out that games aren't often considered independent if the rights are owned by another party, however, IP-rights was only mentioned once as project right and not at all in the project wrongs. Wright's (2015) suggests that the creative control and freedom of independent development is often contrasted with the need to make a game that meets market demands. Needing to meet these demands is seen in postmortems, for example, when feedback and sales are mentioned as success and in various failures related to audience.

As O'Donnell (2012b) mentioned freedom of the small independent development often results in production process where the developer has to wear many hats, whereas in bigger productions roles are more specific and limited. This was seen especially in the postmortem wrongs. Having to wear multiple hats was mentioned as a problem itself, but it can be seen manifesting in other postmortem wrongs, especially in production process & project management, in categories such as resource distribution, inexperience, project management, personnel issues. Having to do all the work related to game development either by oneself or with limited number of workers and doing work that is

not your strong suit can result in many problems in the development. Production process and project management was the most common theme in postmortem wrongs.

The aspects of style, creativity and aesthetics in independent games was clearly visible in the postmortem analysis, especially relating to game art. Design process also included things like original game idea and development process had creative freedom. The "low-tech and …"cheap" graphical materials" which Juul (2014) stated are often seen in indie production are clearly visible in the analysed postmortems as several of the arts right specifically mentioned 2D style and using low cost resources to be able to achieve unique visual style. As O'Donnell (2012a: 105) pointed out indie games often have less and clearer design and aesthetic aims. This was also mentioned directly as a project right, having a clear idea what to do in the design as well as art wise, keeping the game or the art simple and maintaining that vision.

Being a part of a community, participatory culture and service orientation was also partly seen in the postmortem analysis results. Audience was the sixth most common singular reason for success. Having a game community, getting recognition as a game developer and positive feedback were mentioned as rights and wrongs. While outsourcing and having a partner or a publisher may not be counted as being part of a game development community, connections were important right in the postmortems. Supporting occupational communities, having communities for sharing knowledge, peer support and active networking (Guevara-Villalobos 2011) were mentioned when talking about participation to game festivals and getting help in the production. Audience was also quite significant project wrong, whether it referred to misjudging audience, communicating to games meeting expectation, losing community.

Co-creation where consumers are involved is often a characteristic that is mentioned when explaining indie development in academic studies (eg. Lowthorpe et al. 2013). This was visible in the post mortems. For example in the category of game community many of the rights were things such as building community, having a fan base early on and sharing the development, taking in players ideas. This can also be seen in the game expansions and modes and level designer categories. Players can either create new levels or have aided in deciding what kind of new features are added in expansions.

The production, the product and the producer division that Kemppainen (2009) proposed was partly visible in the postmortem analysis. The economical distinction of the production independence is not clearly seen in the post mortems, apart from few mentions on using own money to finance the game or doing other subcontracted games to be able to finance the production. Self-funding and issues with getting funding was more a reason for failure in postmortems than a success factor. New business models have been a disruption in the independent game development scene making it harder to monetize games, but it has also allowed choosing the business models (Lowthorpe et al. 2013). This is visible as monetization is often a failure in postmortems; however payment options and paid beta were mentioned as a success. The product, meaning the game, was clearly seen in post mortems. According to Kemppainen (2009) using toned down visuals and having creative solutions are part of the product independence. This was seen in many of the postmortems. While the category game has more than just style, it was the third most common reason for failures. Kemppainen's producer independence which means indie spirit, artistic and business independence can be seen in project rights such as game design choices, the main category of design and development process as well as in business category, especially in attitude toward risks.

Garda & Grabarczyk (2016) perspectives of independence found very little support in the postmortem analysis. Financial independence, strict self-funding was mentioned only once as a project right, but finances were mentioned five times as a wrong. The creative independence, where the game's intended audience is the developer himself is hard to see in post mortem analysis. Maintaining vision and having an original idea may refer to it, but none of the postmortems stated out loud that the game was intended only to developer not to any other audience. Publisher independence, were the developer is also the publisher was not mentioned either as a project right nor wrong, though many of these games were self-published. However, having a partner or a publisher was mentioned several times as a project right.

Digital distribution and crowdfunding were very seldom mentioned in the indie postmortems. Digital distribution was not mentioned as often as one might expect by the emphasis in academic literature on how much it has aided indie games to enter game markets. Platform and distribution we mentioned as rights and the digital distribution platform Steam was specifically mentioned. Also, meeting platform requirements, meeting platform size limits were mentioned as a wrong, so even though digital distribution

may aid indie developers, it also has some limitation. Finances were more of a failure in post mortems. Crowdfunding that is thought to being an enabling factor for independent production was not mentioned as a project right. Kickstarter was only mentioned once, and even then it was a project wrong. Funding and monetization were also generally more common as a project wrong.

6 DISCUSSION AND CONCLUSIONS

This study examined how indie games are explained and discussed in academic literature, what are their defining features and aspects. Also, other key phenomena that are strongly linked with independent development were mapped out. Independent game development postmortems were examined through content analysis. The research questions were: what are the main problems and reasons for success in indie game development postmortems and are the defining features of independent games that were addressed in academic literature, visible in the postmortems as failures or successes. In this chapter the results of this research are revisited and compared to prior postmortem studies. The limitations of these results are addressed and future work suggested.

The post-mortem analysis revealed that the most common main theme in postmortem rights was design and development and in wrongs the main theme was production process and project management. In this study, the most common general reasons for success were technological issues, design process, art, connection and personnel. On a more detailed level, the most common success factors were: development tools & technological choices, game design, arts, style & visual choices, testing, the team and partner/publisher. The most common general reasons for failures were technological issues, resource management, time issues, marketing and release, while the most common subcategory reasons for failure were testing and quality assurance, game difficulty, feature creep, development tools, and tutorial shared the fifth place with launch. The findings of this postmortem analysis were similar to the previous postmortem studies, especially with the project rights.

In Wasburn & al.'s (2016) study the most common rights were game design, development process, team and art. The most common factors that went wrong were obstacles, schedule, development process and game design. In Tschang's (2005) study the most common positive aspects were technology, design and project management and the most common pitfalls were project management, process and design. The most common problems in Petrillo et al.'s (2008) post mortem analysis were feature creep, and too ambitious scope issues, cutting features, design problems and delays or too optimistic schedules, this study focused only on the wrongs.

Similar to these other studies technology, design process, arts and personnel were all seen as positive factors in the studied postmortems. In this study the production process and project management was the most common main theme that went wrong. This was also seen in the previous postmortem studies; Callele & al.'s (2005) study found that project management was by far the most common reason for failure, but also the most common reason for success. When compared to Washburn & al's results (2015) design, team (or personnel) and art are similarly among the most common reasons behind success, while time and schedule issues were a common factors in failures. Tschang's (2005) results shared the technological issues and design as the common project rights. Time issues and resource management such as project scope, feature creep and having to cut out features were common pitfall issues with Petrillo & al.'s (2008) results. Technological issues, resource and project management, schedule issues are common problem factors in all of these studies.

Unlike in these previous studies, where game design issues were among the most common reasons for failures and also one of the most common reasons for success in two of them, the design and development was not present in either most common main category reasons nor most common individual reasons for failure in this study. On the success side, however, design was clearly one of the main reasons for success as it was in prior studies. In the main categories, two of the most common positive aspects were design related; design process and arts. Also, in the subcategory level design played an important role: game design and arts, style and visual choices were among the top reasons for success. The disparity why design is so visible in the successes side, but hardly an issue among what went wrong is partly due to the fact that in this study, the game design choices that lead to failures in the end product are presented in the game category rather than in the design process. This was done because the postmortems discussed them more as a negative in the end product rather than design misstep in the design process. It might also be explained in some ways by developers not seeing the fault in their design process, but only in the end result.

In this study, connections such as having a partner or publisher, was a success factor in postmortems that was not seen in the previous studies. On the failure side, marketing and the product (game) related features such as having too difficult game and poor tutorial were not factors in the previous postmortem studies. These differences can, to a certain extent, be explained by the differences in the category formation between the

studies. Furthermore, they might be explained by the general inexperience in game development, that many indie developers have, or the lack of understanding in the general game development process as a whole. Indie developer must do more than just code or design the game; all the other work, such as marketing and general business management related to game development, may not be so familiar to them, causing problems in the development. Also, while testing and quality assurance play an important role in the mainstream game productions, indie developers often do not have the extensive resources to properly test the game, which causes problems in the end product such as poor tutorial, or too difficult game.

Interesting in the results of this study is why the game, the end product of the game development, is rarely counted among the successes. On the other hand, technological and artistic successes can be seen to be more part of the development cycle, so they might be seen more clearly as a development success. Or it could be that, the end product is not so evidently valued as part of the actual development process.

Many of these studies used, to some extent, the same postmortems. However, in the previous studies, there has not been a division between independent games and mainstream games in their results. It could be suggested that the problems and success in independent game development are not that different from general game development if these prior studies can be seen as presenting general game development. However, in order to make such claim, there should be a comparison analysis done on mainstream postmortems that uses the same categorisation.

There have been many changes in the game industry that have aided the rise of indie games. Digital distribution has brought the consumer and content closer to production; developers share the space with consumers. Audience has also taken the role of the financier. (Martin & Deuze 2009). Many studies state that increasing consumers' role in production generates better product value (Stenros & Sotamaa 2009, Jöckel & al. 2008). According to Guillaud et al. (2013) crowdfunding has allowed new genres and ideas in game development as well as provided funding for projects that haven't been able to find traditional funding sources. Because certain types of games have drawn substantial funding, it seems that traditional game industry has failed to provide these kinds of games to satisfy consumer needs.

Crowdfunding and digital distribution have significantly aided independent game production and helped them find audiences in game markets. Digital distribution platforms do more than act as point of sale for games. A lot of the marketing and distribution for indie games happens in the same place, the same medium, digitally online. However, independent game developers hardly mentioned digital distribution or crowdfunding as something that went right or wrong in their game development process. It could be interpreted that, even though digital distribution and crowdfunding may have aided the market entry of independent games, they are not affecting the game development process directly. Furthermore, crowdfunding and digital distribution are still fairly new concepts that have only gained significant momentum in this decade. They may not be showing in the analysed post mortems as many of them were from the previous decade.

The key aspects and defining features of independent game development that were outlined by academic literature can be seen in the analysed postmortems. However, most of them do not manifest directly in the results. Some of the defining features are seen clearly in the results, but in most cases they are neither among the most common failures or successes, except arts and style. Creative and unique style was among the most common reasons for success. Many of the postmortems' perceived failures and success can be tied to key aspects of indie development. For example, personnel was among the most common reason for success. It can be linked to more preferable and freer working environment that independent development is seen to offer. In independent production it is easier to surround yourself with people you like to work with, whereas in mainstream production you are not able to choose your co-workers. Some of the other things that were seen in the academic literature as well as the postmortem analysis were creativity, working conditions, having to do all the work, inexperience, being part of community, co-creation and economic and financial issues. This might suggest that defining features of indie development, at least in the academic literature, are not a direct success or a problem with the actual game development process at least in any striking numbers.

Comparison of the postmortem analysis results of other studies is obscured by the fact that while the categories seem quite similar, the same thing might have been listed under another category in another study. All of these studies used different way of categorisation, even though some of the categories might have been named the same and easily understandable, there are more obscure categories. For example Washburn et al. study had "obstacles" and Tschang's "process" as one the most common failures. Most

previous studies formed the categories, or at least a part of them, prior to the analysis of postmortems based on other data about game development, whereas this study used inductive approach where the codes are formed from the data. Therefore entirely valid comparisons are not plausible.

This is also the main limitation of this study: content analysis results always have some level of interpretation (Graneheim & Lundman 2004), especially when inductive approach is used. This could be addressed by having co-researchers to do the same analysis and agree on the categories (Elo & Kyngäs, 2007; Graneheim & Lundman, 2004). As this was not done in this research the result are liable to interpretation differences. A more seasoned researcher, who is intimately aware of the how the game development process works, may interpret and categorise the results somewhat differently. Trustworthiness of content analysis of study is affected by "credibility, dependability and transferability" (Graneheim & Lundman, 2004). Credibility refers to how well themes and categories cover the data. This can be addressed by using quotes or agreement among the experts and co-researchers of the categories and where individual codes belong to. Dependability means that the data collection should be consistent over time. (Graneheim & Lundman, 2004.) In this case the data itself is always in the same form as the chosen postmortems followed the same pattern of five rights and wrongs. Transferability means can the results be transferred to other studies, which can be addresses by clear description on data selection, collection and process of analysis or statement about transferability (Graneheim & Lundman, 2004).

This study aimed to gather a broader perspective on indie game development by gathering their defining features and aspects from the current academic literature and analysing indie game development postmortems to gather the perspectives of indie developers of the accomplishments and pitfalls in their development process. The defining features and aspects of indie development were visible in postmortems, but they mostly were not direct causes for failures or success. When compared to other postmortems studies the result were quite similar, yet there were few differences. Design, art, personnel were all perceived as the reasons behind successes, while project management, technological issues, and scheduling were commonly perceived as causes for failures. In broader perspective this study showed the indie developers succeed in arts and design, but business, process and project management causes problems in the development. It could be speculated that independent development is comparable to game development as a

whole. The few differences may be explained by the different categorisations or they may be more characteristic with indie development, but this comparison of indie development to game development in general would need a need a new study.

As it was not possible with the parameters of this study, it would be interesting to have a study compare independent productions to mainstream productions in terms of postmortems and also do more extensive analysis using more background information. Such as what kind of differences there are in the problems and successes based on platform of the game or the genre of game, how the team size and previous experience correlate to these factors. Also, interesting aspect to study would be time; have postmortem problems and success factors changed in a longer time period, for example from the change of the millennium to today, especially now that there are new platforms, nearly all games are being sold digitally, and new funding alternatives are available.

Indie games, even though being hard to define, are a diverse subject for research and they offer multitude of research possibilities. Especially interesting would be how indie is seen among the public. One thing that could be studied is how indie games are referred to in media or game reviews. One player based approach could be surveying gamer conceptions and opinions on indie games. While what is indie might be hard to define in a simple manner, independent games and independent development is still an interesting and rich part of game development to study.

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APPENDIX 1: INDIE GAME POSSMORTEMS 2014-2004

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APPENDIX 2: CODING FRAME

Category coding frame of rights and wrongs in postmortems

			N:o occurences	
			RIGHTS	**WRONGS**
Technological development			**52**	**52**
	Technological issues		**47**	**40**
		Bug fixing & elimination	3	2
		Coding	8	9
		Testing	12	13
		Development tools & technological choises	22	9
		Underestimating technical challenges	-	6
		Lack of an Updater	-	1
		AI	1	-
		Adopting to smaller device	1	-
	Platform issues		**5**	**12**
		Meeting platform requirements	1	5
		Platform/Distribution	2	3
		Steam	2	-
		Size limit	-	4
Production process & Project management			**42**	**73**
	Time issues		**10**	**17**
		Scheduling	3	4
		Organized Production	1	-
		Development time	4	-
		Forced delay	1	-
		Polishing time	1	-
		Unforseen delays	-	2
		Timeframe/Crunch	-	8
		Toll on life	-	3
	Resource management		**5**	**30**
		Project scope	2	4
		Cutting out unnessary branches	1	-
		No Feature Creep	1	-
		Remembering to have life	1	-
		Feature Creep/ Cutting out stuff	-	9
		Other work	-	1
		Rework	-	2
		Resource distribution, multiple projects	-	6
		Bottlenecks	-	2
		Planning	-	3
		Documentation	-	3
	Personnel		**18**	**8**
		Team/ Staff	10	5
		Communication	2	-
		Working method/environment	4	-
		Education	2	-
		Unblanced team	-	1
		Collaboration	-	1
		Small team issues	-	1
	Project management		**2**	**6**
		Empowering Emplyees	1	-
		Planning	1	-

		Leadership	-	2
		Project Management	-	2
		Too Many Hats	-	2
	Vision and direction		**7**	**7**
		Vision & Being focused	7	-
		Lack of direction	-	1
		maintaining vision	-	1
		Getting lost	-	1
		Concentration	-	1
		Change in direction	-	3
	Inexperience		**0**	**5**
		inexperience	-	2
		getting help too late	-	1
		not doing home work	-	1
		On-the-job training	-	1
Design & Development Process			**69**	**10**
	Iteration & Prototyping		**11**	**1**
		Iteration & Prototyping	9	1
		Hardware experiment	1	-
		Polish iteration	1	-
	Development process		**7**	**3**
		Development process	4	3
		Creative freedom	2	-
		Redefining Project	1	-
	Design process		**31**	**0**
		Game design	22	-
		Rethinking the design	1	-
		Keeping the game simple	1	-
		Streamlining gameplay experience	1	-
		Original idea	4	-
		Design Process	2	-
	Arts		**20**	**0**
		Game art & style & visual choises	20	-
	Optimization		**0**	**6**
		Refinement	-	2
		Underestimating optimization	-	3
		Premature optimization	-	1
Business			**61**	**67**
	Attitude		4	4
		Risk taking	2	-
		Risk avoidance	2	-
		Holding back	-	1
		Fear of taking a risk	-	1
		Over ambition	-	1
		misc. attitud.	-	1
	Legal issues		**1**	**3**
		Retaining IP	1	-
		Name Change	-	1
		Piracy	-	2
	Finances		**3**	**11**
		Self-funding	1	-
		Paid Beta	1	-
		Payment options	1	-
		Funding	-	5

		Kickstarter	-	1
		monetization	-	5
	Connections		**18**	**2**
		Outsourcing	5	2
		Getting help	2	-
		Partner/Publisher	10	-
		getting an agent	1	-
	Audience		**17**	**12**
		Recognition	5	-
		Feedback & sales	3	-
		Game Community	9	-
		misjudged audience	-	4
		communicating to gamers	-	1
		meeting expectations	-	2
		Loss of community	-	1
		Reception	-	2
		User-experience	-	1
		Recognition	-	1
	Release		**4**	**16**
		Release	1	-
		Soft Launch/No soft lauch	1	1
		Launch	1	8
		Customer support	1	-
		Took too long to release	-	3
		Trial /demo	-	4
	PR & Marketing		**10**	**17**
		PR & Marketing	5	-
		Festivals, events	3	-
		Stance on Piracy	1	-
		Attitide towards the public	1	-
		Losing marketing buzz	-	3
		No pre- release marketing	-	6
		Wrong marketing efforts	-	3
		Lack of or too little marketing	-	4
		No marketing planning	-	1
	Location		**2**	**0**
		Studio location	2	-
	Workplace		**0**	**2**
		Working environment	-	1
		Growing pains	-	1
The Game			**40**	**64**
	Game design choises		**8**	**8**
		Future Proofing	1	-
		Story	3	-
		Environmental storytelling	1	-
		x-factors in play experience	3	-
		Game design missteps	-	5
		Genre/type choice	-	2
		replayability	-	1
	Game Features & element		**9**	**15**
		Game elements, characters, worlds, levels	9	-
		Game Features	-	2
		Boss battles	-	4
		Dialog	-	1

		Tutorial	-	8
	Interaction of the game		**9**	**10**
		Game Mechanics	7	3
		Controls	2	3
		Interface	-	2
		Gameplay	-	2
	Modes		**8**	**10**
		Game Expansions and Modes	6	-
		Level designer	2	-
		Not enough modes	-	1
		Single-player	-	2
		Co-op, multiplayer	-	4
		Lack of additional content	-	2
		Misplacement of the content	-	1
	Audio		**6**	**3**
		Sounds and music	6	-
		Audio impelemtation planning	-	1
		Voice acting	-	1
		Sound effects	-	1
	Art, style, graphics		**0**	**2**
		Art, style, graphics	-	2
	Localization		**0**	**4**
		Localization & compatibility	-	3
		Cultural references	-	1
	Game balance		**0**	**12**
		Game Difficulty	-	12