The diffusion of crowdfunded innovations

Research towards the adoption of Oculus Rift

Master thesis
New Media and Digital Culture
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Abstract

The adoption of newly introduced innovations has been a frequently researched topic, approached from different academic angles. This research investigates to what extent the diffusion of innovations theory by Rogers (1963 [2003]) is a useful framework for studying the diffusion of innovations through crowdfunding websites. These websites allow innovation developers to present their product to potential customers and allow them to participate in the development process by donating money, which generates social engagement, even though there is only a prototype available. Rogers' theory is based on the adoption of fully diffused innovations, whereas the case study for this thesis is Oculus Rift, a prototype seeking crowdfunding to reach commercial markets. To clarify the differences between an innovation and a prototype, Brian Winston's theory on different stages of media development is connected to Rogers' theory.

To find to what extent the diffusion of crowdfunded prototypes and innovations differ from each other, the four elements known to influence diffusion, **innovation**, **communication channels**, **social system** and **time** form the theoretical framework and spine of thesis. These four elements are analysed by means of an approach that resembles a hermeneutical circle.

The analysis shows that the general outlines of the diffusion of innovations, being time, innovation, communication channel and social system, form a decent framework for studying the diffusion of crowdfunded prototypes. Some of the four elements could use a different design, taking the differences between a prototype and a fully developed invention into account. When considering the element of innovation, this is where Rogers chooses to focus heavily on five perceived attributes of an innovation which, according to him, influence the rate of adoption of an innovation. This part of his theory could be redesigned, focussing on other perceived attributes that could influence the diffusion of crowdfunded innovations into account, such as the potential a prototype has, considering the fact that there is no prototype available yet.

Rogers' theory on communication channels, social systems and the way they influence the diffusion process remains valuable in relation to the diffusion of crowdfunded prototype, although it is essential to extend his theoretical starting point by acknowledging the influence the internet and the use of social networks can have on the diffusion process.

Taking the element of time and thus the innovation-decision process into consideration, analysis shows that the prototype seems to pass through similar stages of the diffusion process to some extent. It confirms the expectation that the decision process for prototype differs from the decision process for innovations, which is why the pre-innovation-decision process, or prototype process is presented. This process is an addition to Rogers' theory, which considers the differences between a crowdfunded diffusion process and a regular diffusion process, and shows how and at what point in time potential adopters involved in a crowdfunded diffusion process enter Rogers' innovation-decision process.

Preface

Innovators, early adopters, early majority, late majority and laggards. These five categories have recurred on a yearly basis throughout my bachelor 'Commercial Economics', but I never really got a full grasp of what they meant or in what theory they were grounded in. During my internship for this master, these categories returned once again. That was the moment I decided to intensify my knowledge about them, just like I decided to start the master New Media and Digital Culture, to intensify the knowledge I gained during my bachelor's education. The result of that decision is this thesis, in which I focus on the way innovations are accepted through crowdfund websites, and which elements can be of influence in that process.

My time at Utrecht University has not always been the easiest, education wise. The change from university of applied sciences to (pre)master was a large one and it has taken a lot of effort for me to get used to written exams – the research papers, and the accompanying work load. This improved throughout time and that is how I managed to end up here, looking back at my academic experiences while applying the finishing touches to my thesis. It has been a rocky road and I could not have done it without the support from my boyfriend Tim, my parents Piet and Karin, my sister Suzan and my Greek friend Marina. Their unconditional belief in my success helped me through every moment I suddenly questioned everything about my work.

Finally, I would also like to thank my supervisor Jasper van Vught for his helpful insights during our productive meetings, and for accepting the challenge of taking over the supervision from my late supervisor Marianne van den Boomen. She was a great inspiration to me and her wit, courage, seemingly endless knowledge and ability to get out the best in every one of her students is something I admire and something I will never forget about my time at the university.

Thank you.

Krista Ramakers

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1. Introduction

The diffusion and adoption of newly introduced technologies has been a subject frequently researched throughout the years. The starting point lies in the 1940s and 1950s (Rogers 2003, 39) and the research directions vary from the diffusion of agricultural innovations for farmers (Ryan and Gross, 1943) to the diffusion of news on the September 11 terrorist attacks (Seidel and Rogers 2002). Everett M. Rogers, communications scholar and sociologist, has introduced a theory on the subject of diffusion and adoption of innovations in the 1960s, which is one of the best known theories on that subject to this day. Diffusion research has been altered to fit several different research traditions. Despite distinctive differences in the research approach, it has led to remarkably similar findings (Rogers 2003, 39). These similarities lie in the characteristics adopter categories have, and the S-shaped curve diffusion of an innovation follows (ibid.). Rogers distinguishes nine major diffusion research traditions (ibid., 45), varying from anthropology, to education and communication. He considers diffusion research in the department of communication as research towards news events, technological innovations and new communication technologies. Today, the aforementioned research could be ranged among the research tradition of media studies.

Media studies have grown over the past few years due to the development and use of digital technologies. These have proven to be productive objects of research (demonstrated by Durham and Kellner, 2006, and Lister et al. 2009, Jenkins 2013). The use of digital technologies can influence the way media is used, which in some cases has led to the review of media theory.[1]

The rapid introduction of digital technologies nowadays, combined with theory on the diffusion of innovations as provided by Rogers, makes Evens, Stragier and de Marez (2011, 179) wonder if it is necessary to revise this theory. In their publication 'Diffusion Theory vs. today's ICT environment' (2011), the authors question 'to what degree the theory (which remained virtually unaltered in recent decades) still holds true in today's fast-evolving technology environment' and 'to what degree diffusion theory remains a reliable and valuable framework for the study of the adoption and diffusion of innovations' (ibid., 179).

The question posed by Evans, Stragier and de Marez implies that because of the pace at which today's technology environment develops, Rogers' theory needs revision too. However, it is important to acknowledge that fast-paced digital technological developments do not necessary require a review in media theory. Media scholar Brian Winston argues in favour of this by stating that 'the storm of progress blows so hard as to obscure our vision of what is actually happening. What is hyperbolised as a revolutionary train of events can be seen as a far more evolutionary and less transforming process' (1998, 1). By means of this quote, Winston emphasises it is important to stay critical when approaching

[1] An example of the way media use changed media theory is provided in 'Who Says What to Whom on Twitter' (Hofman et al. 2011). This publication illustrates how the 'two-step flow of communications' theory by Katz and Lazarsfeld (1940) does no longer hold true in relation to micro-blogging platform Twitter.

technological innovations introduced as ‘new’. It is important to question to what extent innovations presented as new and revolutionary, are actually so. Thus, it is important to realise the introduction of technological innovations do not require a self-evident change in theory.

Evans, Stragier and de Marez found the reliability of Rogers’ theory differs per innovation. For the innovations they researched (3G, a mobile telecommunication innovation, and digital television, also referred to as DTV), their findings show that the normally divided curve Rogers suggested needs modification for the adoption of 3G in Flanders, since the adoption of this innovation follows a two peaked adoption curve, contrary to the bell-curve Rogers predicts (ibid., 182). The first peak resembles the early adopters, which is followed by a backsliding amount of additional adopters, after which the second peak appears, which resembles the late majority. This shows there is an adoption discontinuity after the early adopters have adopted for 3G (ibid.). Additionally, the assumptions that serve as a starting point for defining adopter categories, as introduced later in this section, do not hold true for adopters of 3G and DTV in Flanders. For example, assumptions for higher income and better education among the more innovative were confirmed for DTV but not for 3G (ibid., 187).

Evens, Stragier and de Marez note that there is an ‘exponential increase of ICT-related innovations’ (ibid., 175-6) which is accompanied by an ‘even faster increasing number of failing innovations. Each year, the ICT market is spoilt with hundreds of high-tech start-up products that, despite having superior technology and promising returns, falter and fail’ (ibid., 176; Slater and Mohr 2006, 26). The introduction of (high-tech start-up) products with promising returns and superior technology is something that happens on a regular basis on crowdfunding websites. Crowdfunding is ‘the idea of getting people collectively to fund a product, cause or project’ (Clune 2013), which happens through websites designed for this specific goal. In 2013, crowdfunding has raised more than 5 billion American dollars (ibid.). Despite this great amount of money, there are a lot of projects which do not manage to collect enough funds: at crowdfunding website Indiegogo only one in ten projects get fully funded, whereas on its more technology oriented counterpart Kickstarter, about 44 percent of the projects get fully funded (Jeffries 2013).

The case study for this research is Oculus Rift, a prototype presented through a crowdfunding website (which will be further introduced in section 1.1). The funds gathered through the crowdfunding sites are used to cover larger scale production of the prototype, whereas the innovations of which Rogers researches diffusion, are fully developed and diffused. These different production stages can be distinguished by applying Brian Winston’s theory, who argues there are three stages in the development of potential media (Winston 1998, 9-15). This distinction is an important addition for this thesis, since it focusses on finding the extent to which Roger’s theory, analysing the adoption of fully developed innovations, is valuable for studying the adoption of crowdfunded prototypes.

The three stages Winston distinguishes are *feasibility* (the fact that there is knowledge and understanding, which forms a scientific competence for technologies to develop [Winston 1998, 4]), *ideation* (the technology from the ground of scientific competence is moved up to technological performance. In this stage, the technologist envisions and eventually starts building the device, which can be considered as a prototype [ibid., 4-5]), and *invention* (in this stage, the prototype is deemed as invention. Although the work in the laboratory does not differ from the prototype stage, social necessity becomes evident and turns the prototyped into an invention which is socially accepted [ibid., 9-11]). In line with this theory, crowdfunded innovations possess the characteristics that match the ideation phase, since there is usually only a prototype available, although there seems to be some form of social acceptance because funders have participated in funding the prototype. The innovations of which Rogers (2003) researches the diffusion process, possess the characteristics of the invention phase, since they have been fully developed and socially accepted.

Crowdfunded innovation Oculus Rift is thus in a different stage of Winston's development of technologies as media model than the innovations Rogers applies his diffusion theory to. On the other hand, the prototype of Oculus Rift has seemed to gain some form of social acceptance, since it has been funded by a reasonable amount of 'prototype adopters'. Rogers applies his theory about the diffusion of innovations in hindsight. By looking back at the diffusion, he recognises processes and adopter categories that are recurrent for every innovation. These recurrent findings allow Rogers to present a Bell-curve (figure 1), divided into five adopter categories (depending on their degree of innovativeness), spread over the Bell-curve normally.[2]

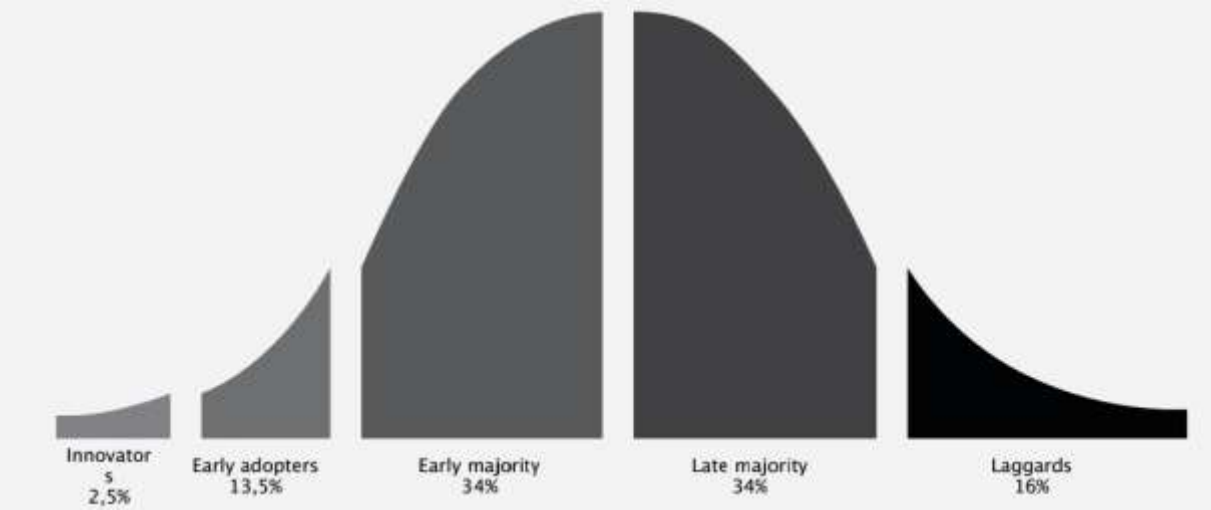

Figure 1: The innovation-adoption curve (Rogers 2003, 281)

[2] The five adopter categories are divided into standard deviations from the mean, based on the assumption that the adopter categories follow a normal division over the curve. A 'normal division' is in statistics also known as 'Gauss division'. The exact reasoning and calculations behind this method would require a lengthy elaboration that would not fit within the scope of this research. For elaboration on the concept of 'normal division', consult *Dictionary of statistics and methodology: A nontechnical guide for the social sciences* (Vogt and Johnson 2011).

Comparing the diffusion process of an innovation to the diffusion process of a crowdfunded prototype shows there are resemblances and differences in the processes. A crowdfunded prototype is in another development stage than a fully diffused innovation, although social engagement can be recognised in both diffusion processes. This is a reason to wonder to what extent crowdfunded prototypes follow the adoption process in the way Rogers has described it. By participating through funding, people already seem to be significantly involved in the technology that is presented through crowdfunding websites. This suggests that the technology already has passed through at least some initial stages of the adoption process, even though the technology has not surpassed the ideation stage yet, and that there is some kind of pre-innovation-decision process, or prototype-decision process. Of course it is not likely that all adoption processes Rogers recognises are resembled in the adoption process of crowdfunded prototypes, but despite these differences, the diffusion process of Oculus seems to show some resemblances to the diffusion cycle of fully adopted innovations Rogers has researched. By means of the four elements Rogers considers to be the key influences on the diffusion process, the extent to which the diffusion of fully adopted innovations is represented in the diffusion of crowdfunded innovations will be researched, possibly resulting in finding that Rogers' theory requires a revision or addition.

This leads the research question for this thesis to be: to what extent is the diffusion of innovations theory by Rogers (2003) is a suitable framework for studying the adoption of the prototype of Oculus Rift? The question by Evens, Stragier and de Marez (2011, 179) functions as a starting point for this research question ('to what degree does the diffusion theory remain a reliable and valuable framework for the study of the adoption and diffusion of innovations?').

The answer to this question will be provided by focussing on four elements which are of key importance because they play essential roles in influencing the diffusion process according to Rogers (2003, 5), as mentioned before. The key role of these elements determine Rogers' definition of diffusion as 'the process by which an *innovation* is *communicated* through certain channels over *time* among members of a *social system*' (ibid., 11). The four elements that influence diffusion are 1) **the innovation,** 2) **communication channels**, 3) **time** and 4) **social system** (further defined and operationalised in chapter 2). The sub question focusses on finding to what extent the different processes underlying the innovation, communication channels, time and social systems can be recognised in the diffusion process of Oculus Rift. Underlying processes, as mentioned in the sub question, are the *innovation-decision process*, which Rogers ranges under the element of **time** (section 2.4) and *perceived attributes of innovation* which are ranged under the element of **innovation** (section 2.1).

1.1 Case study

The case study for this research is the diffusion of Oculus Rift. Oculus Rift is a virtual reality headset, which, according to the developers is 'the first truly immersive[3] virtual reality headset for video games' (Oculus Team 2014). The development of the prototype Oculus Rift has been funded through crowdfunding website Kickstarter.[4] The project raised the 250.000 dollars they aimed for on the first day of the campaign. One month later, when the fund raising period for the project ended, Oculus had raised 2.4 million dollars. Oculus uses reward-based crowdfunding, treating funders as 'early customers, allowing them access to the products produced by the project they fund at an earlier date, better price or with some other special benefit' (Mollick 2013, 3). At the time of writing, Oculus Rift is not available for consumer use yet. Although it has not entered the commercial markets, social network giant Facebook paid two billion dollars for the head mounted device and accompanying software, because of the potential they see in the product, and in order to speed up the development process (Welch 2014).

The motives for selecting Oculus Rift as a case study, out of the numerous other successfully crowdfunded prototypes, are firstly based on the rapid pace at which the prototype met its funding goal. This reflects the way social engagement rapidly is realised although the product does only exist in prototype, the way in which the diffusion of crowdfunded prototype potentially differs from fully developed innovations. Additionally, Oculus Rift serves as a case study because it is one amongst many successfully crowdfunded prototypes, which raises the expectation that the results of this research are representative the larger amount of successfully crowdfunded prototypes. However, when using a case study, it is important remain aware of the fact that other cases might have other characteristic features which are relevant for the one research, but might not be applicable for another.

[3] While normally referring to being under the surface of, or 'in' a body of liquid, in the present context it refers to the experience of being inside the world of a constructed image. The image is not before the viewer on a surface from whose distance they can measure their own position in physical space. Rather, it appears to surround them. By extension the term is used to describe the experience of the user of certain new media technologies (particularly VR, but also videogames) in which the subject loses any sense of themselves as separate from the medium or its simulated world' (Lister et al. 2009, 424).

[4] Kickstarter (www.kickstarter.com) is one of many crowdfunding websites, which can be utilized to fund a variety of ideas for yet to be developed innovations. The website enables its users to upload a video and promotional text, set a goal for the amount of money that needs to be raised within a set amount of time which can be shared within social networks and beyond (Gerber, Hui and Kuo 2012, 1). Usually donators receive perks as a reward for donating, which grow more exclusive with the amount of money that has been donated. Kickstarter employs an 'all or nothing funding model' (ibid., 7), which means given donations are returned to the backers when an innovation does raise enough funds to meet their goal.

The diffusion of Oculus Rift is the object of case study for this research, although the method section (2.5) mentions the objects of study to be media utterances that have been made in relation to Oculus Rift. Diffusion is to be considered as 'the process by which an *innovation* is *communicated* through certain channels over *time* among members of a *social system*' (Rogers 2003, 11). Following this definition, when studying the diffusion of Oculus Rift, this means that these four elements are of influence on the process, and studying them can provide an insight in the way they influence the diffusion process. That is why, in the method section, online media utterances in relation to Oculus Rift are considered as the objects of analysis, because they provide an insight in the way the innovation, social systems, communication channels and time might have influenced Oculus' diffusion. Diffusion cannot be studied without paying attention to these elements.

2. Theory - Diffusion of innovations

Rogers' the theory provides an insight in the amount of time it takes for an innovation to be adopted, and which social processes and communication channels influence the attitude towards an innovation, and the adoption process of an individual or social group (ibid., 169). Although this chapter might seem lengthy and filled with arduous information, a proper introduction to Rogers' theory, and the comments that have posted in a response to this theory, is essential since this framework is the backbone of this thesis.

As has been introduced in the first chapter of this thesis, Rogers considers diffusion to be 'the process by which an *innovation* is *communicated* through certain channels over *time* among members of a *social system*' (Rogers 2003, 11). The following subsections introduce definitions of the four concepts innovation, communication channels, time and social systems, and the way this framework of four connecting elements can provide an insight in the diffusion process. The elaboration on the four elements differs, depending on its importance for the remainder of the research. This introduction will unveil the assumptions that are inherent to the concepts. After this framework has been introduced, the method section will explain how the framework is applied in the analysis in the remainder of the thesis, in order to find answers to the research and sub questions.

2.1 Innovation

Before shedding light on the five perceptions that influence the pace of the adoption process of an innovation, it is important to define what is to be understood as an innovation according to Rogers. Any idea, practice or object that is perceived as new by an individual can be considered as an **innovation**, 'whether or not an idea is "objectively" new as measured by the lapse of time since its first use or discovery' (Rogers 2003, 12), is to be considered an innovation. The newness of an innovation is determined by the individual and its personal experiences with previous innovations, just like the way an individual reacts to an innovation (ibid., 12).

The aforementioned definition does not distinguish an idea from a prototype or fully developed innovation, contrary to the distinction Winston (1998, 9-15) chooses to make. However, the distinction Winston makes will be maintained, a choice supported by Lyytinnen and Damsgaard's (2001) arguments. They state that technological systems (such as Oculus Rift) change overtime, developing from an idea to a commercially available product, which transforms and co-evolves into a full-fledged technological solution (2001, 179). Roger's approach could be problematic when finding if, for example, something abstract as a 'new idea' can fully diffuse up to the point of saturation. In actual practise, 'new' technological systems develop and get (software) updates on their way to becoming saturated. An example of this can be the development of Apple's iPhone, which has developed through several different models. The Oculus Rift can be considered an innovation according to Rogers' theory, although

throughout this thesis, this definition will be nuanced by applying the distinction Winston makes in the stages of development an innovation can be in. Applying this distinction will contribute to find the extent to which Rogers' theory is still a suitable framework for studying the diffusion of crowdfunded prototypes, and to clarify the state of development an innovation is in.

Rogers recognises five *perceived attributes of innovations*, which determine the pace of adoption for an innovation. The more perceived attributes are fulfilled by an innovation, the faster an innovation is adopted, although Rogers bases this statement on generalisations (Rogers 2003, 257), since the research evidence regarding the latter statement is not 'entirely conclusive' (ibid.). The perceived attributes will be introduced so that they can be used in the analysis that focusses on the extent to which the rapid pace of diffusion for Oculus Rift can be explained by means of these attributes. The perceived attributes that influence the diffusion process could be different for Oculus since the prototype is not available for commercial use yet, and since the prototype is introduced in a way that is different from the way Rogers' describes, which is by means of a crowdfunding website. The five perceived attributes are introduced below:

1. Relative advantage: This is the degree to which the idea is perceived as better than the idea that preceded it, not taking into consideration whether this is actually the case (ibid., 15). If the individual perceives the advantage of the new innovation over the old innovation, there is an apparent relative advantage (ibid.). The relative advantage of an innovation can be measured in factors of social prestige (adopting an innovation before another individual has) and in economic terms (an individual showing off it has enough financial resources to adopt an innovation), among others (ibid., 15, 230).
2. Compatibility: This is the degree to which an innovation is compatible with existing values, past experiences and needs of potential adopters (ibid., 15), which differs for each potential adopter. An ' idea that is incompatible with the values and norms of a social system will not be adopted as rapidly as an innovation that is compatible' (ibid.). For example, when the settings of an application for a smartphone are not compatible with the adopter's values on privacy, the adopter might reluctant to install and use it, or not even install it at all.
3. Complexity: This is the degree to which an innovation requires (technological) knowledge in order to understand and or operate it. Innovations that are perceived as easy to understand by members of a social system are adopted more rapidly than innovations that require a large amount of specific knowledge (ibid., 16). Rogers uses 'using an innovation' and 'understanding an innovation' as interchangeable concepts, without marking that it is not the same for a technological innovation. Actually understanding how an technological innovation works requires a lot more technical knowledge about the interaction between hard- and software. Simply using it means being able to operate a device, without exact knowledge of the technological hard- and software that is the base of it.

4. Trialability: This is the degree to which individuals are able to experiment or try an innovation in their own surroundings or daily life (ibid.). Innovations that can be sampled experimentally decrease the uncertainty that comes with the adoption of a new innovation, thus speeding up the adoption process (ibid.). Trialability can be measured by considering the options potential adopters have to try an innovation, and how many of these possibilities they have.
5. Observability: This is the degree to which potential adopters perceive the results of an innovation, through individuals who have already adopted an innovation. The observability of an innovation becomes apparent when an individual sees the innovation being used by friends, neighbours or other peers. 'The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it' (ibid.). This observation encourages peer-discussion, and individual evaluation requests about the experienced innovation-usage from peers its social system (ibid.). The observability for Oculus will be measured by taking the online conversation about the prototype into account.

The perceived attributes of 'relative advantage' and 'compatibility' will not feature in the analysis section, since researching the extent to which these two attributes are represented in Oculus' diffusion process requires a more psychological approach that does not fit in the scope of this research.

The attributes of an innovation as Rogers has described them, rely heavily on the technological features of an innovation, and the influence these have on the decision making process of potential adopters. This technology oriented approach has rightfully been criticised for the lack of focus on 'the innovation's specific context of use' (Evens, Stragier and de Marez 2011, 178) and the 'lack of attention to the user and non-users (ibid.). These critiques have been explored in depth by Lievrouw and Livingstone (2002), among others. In their *Handbook of New Media*, they dedicate a chapter to contradicting Rogers' diffusion of innovations with a social shaping of technology perspective. This is where they acknowledge how tempting it is to focus on the origins of technology, but point out this is a misleading approach. They support their statement by quoting MacKay and Gillespie, who state that 'technologies are created not by lone inventors or geniuses working in a social vacuum, but by a combination of social forces and processes' (Mackay and Gillespie 1992, 688). When studying the development and use of technological systems, which is the general subject of this thesis, it is important to not only acknowledge the technology and its features, but to also look at the bigger picture: the context in which the innovation (or in this case prototype) is presented, used and developed. Lievrouw and Livingstone make a convincing case, which means that this part of the analysis in section 3.1, will be approached from a focus on the prototype and its features, but also from a focus on the context (the social system in which potential adopters are and the prior knowledge they have) in which the prototype is presented.

The analysis in section 3.1 shows that when it comes to crowdfunded innovations, the approach Rogers suggest might not be able to explain Oculus' rapid pace of adoption, since his theory seems adequate up to the point that at least two attributes cannot be fulfilled because Oculus Rift has not evolved past the prototype stage. Additionally, the context in which the prototype has been introduced might be more important than the perceived attributes, in this case. For Rogers' theory, this might mean that it requires a revision when it comes to explaining the pace of adoption for crowdfunded innovations, by focussing on other perceived attributes that the five he suggests. It is important to, in addition to this, acknowledge the influence the context in which a prototype is presented, and to take other perceived attributes into consideration when researching the elements that influence the pace of adoption. This will be highlighted further in section 3.1.

2.2 Communication channels

To find if the communication channels and the distinction Rogers makes between them are relevant to prototypes that are in the ideation phase of Winston's media development process, it is necessary to properly introduce the theory he formulated regarding communication channels in this section. The analysis in section 3.2 will feature an analysis of online statements that have been made in relation to Oculus Rift, approached through a customized version of a hermeneutic circle (more on this in section 2.5). This analysis will show to what extent Rogers' theory on communication channels and their role in the diffusion process might be in need of a revision, because the use of internet by potential adopters has evolved significantly, or the extent to which the theory remains valuable for studying the diffusion of crowdfunded prototypes, because communication channels as Rogers describes them can still be recognised in the crowdfunded diffusion process.

Rogers defines *communication channels* as 'the means by which messages get from one individual to another' (Rogers 2003, 18). In the diffusion process, the content of a communication message is concerned with a new idea (ibid.). This process involves at least 'an innovation, an individual or other unit of adoption that has knowledge of, or has experienced using, the innovation, another individual or other unit that does not yet have knowledge of, or experience with, the innovation and a communication channel connecting the two units' (ibid.). For Oculus Rift, not many of the 9522 adopting individuals have been able to experience using a prototype, but the analysis will show they do have knowledge about the prototype, which they can share with other potential adopters, informing them about the prototype's existence.

Communication channels have different roles in creating knowledge, persuading or changing the opinion of adopting individuals (ibid., 204-5). Rogers distinguishes two kinds of communication channels, being *interpersonal channels* or *mass media* (ibid., 204-5). These two kinds can be connected to different stages within the innovation-decision process, based on the kind of information a potential adopter requires in different stages. Section 2.4 will elucidate which communication channels are connected to what stages in the innovation-decision process, by introducing this accordingly to the innovation-decision process.

Mass media have an audience of many and reach a lot of possible adopters rapidly. These channels are efficient for creating knowledge, spreading information and for changing weakly held (adoption) attitudes (ibid., 205). Newspapers, magazines and television broadcasts can be deemed mass media. The analysis will show to what extent mass media channels can be recognised in Oculus' diffusion process, although the mass media channels might be represented in an online fashion, since traditional mass media channels have found their way to the internet as well.

Interpersonal channels are those that link individuals who share a similar socio-economic status, education or other important personal situation, together. When the individuals participating in face-to-face information transmitting share 'common meanings, mutual subcultural language and are alike in

personal and social characteristics, the communication of new ideas is likely to have greater effects in terms of knowledge gain, attitude formation and change, and overt behaviour change' (ibid., 19). They provide a face to face, two way exchange of information, which allows one individual to give clarification or additional information about an innovation to another individual.

Rogers briefly mentions the arrival of the internet and e-mail which, at the time of writing (2003), was the most used application on the internet. Rogers acknowledges that the internet is facilitating a way to reach a large amount of people, similar to mass media (ibid., 215), although he considers the internet also to be an interpersonal communication channel, since it enables individuals to send personalised and cheap messages around the world (ibid., 215-6). By personalised messages, he only implies e-mails but acknowledges these messages can contain promotional messages which can speed up a diffusion process (ibid., 215-6).

Online (inter)personal communication has evolved significantly from e-mail, with the arrival of social networking sites such as Facebook (which is available for public use since September 2006 [Phillips 2007]) and Twitter (available since 2006 [Jansen, Zhang and Sobel 2009]). These channels play a significant role in the failure or success prototypes presented through crowdfunding websites such as Oculus Rift on Kickstarter have (Mollick 2013, 8). Through these channels, individuals are able to connect to friends, family or other acquaintances. Online social channels can be used to converse about shared content such as photo's, video's and URL towards websites with interesting information or food for thought (Kelliher et al. 2012, 1-2). Considering the aforementioned developments, for Rogers' theory, this might mean that just like mass media channels, these interpersonal channels can be recognised in the adoption process of Oculus Rift, although there are represented in an online fashion.

2.3 Social system

To find the role social systems have in the adoption process of innovations in the ideation stage, it is important to first define what a social system is according to Rogers, and how opinion leaders and change agents are situated in it. The analysis in section 3.2 will show to what extent the influences of a social system can be recognised in the adoption process of Oculus Rift, and will show the extent to which Rogers' theory on social systems is in need of revision, because the significant evolution of the use of internet, or to what extent an acknowledgement about the use of the internet will suffice. This will be verified by approaching online statements regarding Oculus Rift through a customized hermeneutic circle (introduced in section 2.5), in order to interpret their meaning in relation to Rogers' theory.

Rogers considers a social system as 'a set of interrelated units that are engaged in joint problem solving to accomplish a common goal' (Rogers 2003, 23), which can be built from individuals, organisations or subsystems. A social system is the place where diffusion is situated, which can influence this process significantly (ibid., 23-4). Influencing occurs through social and communication structures. Other factors relevant when studying how social systems influence diffusion are the norms and systems of a social system (for example cultural or religious bases) and the presence of opinion leaders and change agents. Opinion leadership indicates the way an innovative individual is able to 'influence other individuals' attitudes or overt behaviour informally in a desired way with relative frequency' (Rogers 2003, 27). Change agents are individuals who influence possible adopters in a direction desired by the company or person they work for, in order to stimulate desired behaviour: adopt the company's innovation (ibid.). Change agents often use opinion leaders to spread their message. Social systems influence the outcome of innovation-decisions: the decision to adopt or reject an innovation, made by an individual member or an entire social system (ibid., 28).

Rogers' theory on social systems and opinion leadership does not take into account the rapid development and use of online social networks. As mentioned in the previous paragraph, online personal networking has evolved significantly with the arrival of social network sites such as Facebook and Twitter, which can be considered as online social systems. Research has shown that opinion leaders can also be distinguished from 'regular' social media users (Cha et al. 2010, 11-2) on Facebook and Twitter. For example, opinion leadership on Twitter knows multiple interpersonal interactions. An individual can start following an opinion leader who share values that are similar to his or hers: this person posts messages that are interesting for the individual (ibid., 12). Subsequently, this individual can send interesting pieces forward to their followers, also known as retweeting (RT)(ibid.). Finally, the individual can respond to the interesting pieces by mentioning the follower and sharing its opinion (ibid.).

The influence opinion leaders can practise towards potential adopters cannot only be expressed in an offline context, but in an online context as well. This could be an important insight for the case study on Oculus Rift, since the adoption process seems indissolubly connected to the use of the internet and its social applications, because Oculus Rift is presented through a crowdfunding website. For Rogers' theory on social systems, this might mean that the theory remains valuable when studying the diffusion of Oculus Rift, although the social systems are represented in an online fashion which has to be acknowledged. As mentioned in the previous paragraph, research has shown that online communication channels (in which opinion leaders can be recognised as well, expectedly) play a significant role determining failure or success when it comes to prototypes presented through crowdfunding websites (Mollick 2013, 8).

2.4 Time

Rogers acknowledges the aspect of time is represented in three ways within in the diffusion process. The innovation decision process, innovativeness of an individual or other unit of adoption and an innovations rate of adoption in a system are ranged under the aspect of time (Rogers 2003,20), because time goes by when a potential adopter gains knowledge about an innovation, and decides whether to adopt it early or later on in the diffusion process. In this section, the innovation-decision process of innovations in the invention phase will be explored, after which it will be related to the innovation-decision process of Oculus Rift, which has not completed the ideation phase. This provides an insight in the extent to which the innovation decision process of innovations in the ideation phase corresponds with Rogers' theory, and whether it is in need of the expected revision mentioned in the introduction, because the crowdfunded diffusion process seems to follow a lapse that seems to differ from the diffusion process Rogers prescribes.

The innovativeness of an individual or other unit of adoption and an innovations rate of adoption in a system can only be determined and researched in hindsight, when the adoption of an innovation is saturated (ibid., 23, 221-2), regardless whether the innovation or prototype is in the invention phase or the ideation phase. This means these two elements cannot be researched in relation to Oculus Rift, since the prototype is far from being incorporated in everyday use.

The innovation-decision process

The *innovation decision-process* 'is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision' (Rogers 2003, 216). This process is divided into five stages, which are potentially not all relevant in relation to Oculus Rift. The subjects of the two final stages, implementation and confirmation, regard the diffusion of the innovation in everyday life, the innovation no longer being perceived as new, might not be relevant for the diffusion process of Oculus Rift since the prototype is not available for commercial markets yet.

When considering the innovation-decision process and its five stages, it is important to acknowledge that Rogers presents this in a very linear fashion. This has been criticised by Tvede and Ohnemus (2001, 54) among others, who argue for a less linear approach towards the assumption of adoption processes. Siding with the critique of Tvede and Ohnemus, the five stages from the innovation-decision process will be presented less separated in the analysis section, in line with Tvede and Ohnemus' critique, acknowledging that not every stage has to be completed, before an individual can reach the next stage, in order to move away from this linear approach.

The first stage is *knowledge.* The individual enters this stage from the moment he or she is aware of an innovation's existence and gains understanding about the working and functions of the innovation (ibid., 171). According to Rogers, the need[5] for an innovation usually instigates the start of the awareness-knowledge of an innovation. Innovations can instigate the developments of needs, but needs can also cause the development of an innovation (ibid., 172). For example, when an mobile photographer is dissatisfied with the photo quality or photo options on a smartphone, he or she might look into options to improve their smartphone camera, through additional lenses and applications. This can also happen the other way around, when mobile photographer becomes acquainted with an innovation coincidentally (such as the 'Moment' phone cover + lens looking for crowdfunding on Kickstarter and the photographer realises it would be an improvement of the current situation he or she is in). The communication channels mostly connected to the knowledge stage are mass media, since they can be utilized to create awareness about an innovation, by reaching a large audience with a single expression (ibid., 205-6). This stage is tightly connected to the results of the analysis of the communication channels, performed in section 3.2. The analysis will show to what extent this stage can be recognised in Oculus Rift's diffusion process, since a newly developed prototype has to be presented to the potential adopters one way or another, or that this stage is represented in a different way than Rogers has described it, because the way it is presented (a crowdfunding website) differs from the way a 'regular innovation' is being presented.

The second stage in the innovation-decision process is *persuasion*. In this phase of the process, the individual forms an attitude towards the innovation, which can be favourable or unfavourable (ibid., 174). In the persuasion stage, the individual starts liking the innovation by deciding what messages he or she regards as credible, and how he or she interprets information that is received (ibid., 175). The individual shares the acceptation of the message that is carried out by the innovation and the formation of a positive or negative image of this message and the innovation with peers. For example, a potential adopter might learn about an innovation through a mass media channel he or she does not like, or the innovation might be distributed by a brand the individual has a bad experience with. The fact that the message has been brought to the individual by a medium or a brand it does not like, can influence an adopter's opinion regarding the innovation. Mass media and interpersonal communication channels are more or less equally connected to this stage of innovation-decision. Mass media can provide an individual with more even more information about an innovation, whereas interpersonal contacts can help to convince the individual to adopt (ibid., 206-7). The analysis in section 3.4, paired with the knowledge from the analysis on communication channels, will explore to what extent the persuasion stage is represented in the diffusion process of Oculus Rift. This might show that the persuasion stage is represented to a certain extent, because the diffusion of a crowdfunded prototype up to this point does not differ from the diffusion of an innovation.

[5] A need is 'a state of dissatisfaction or frustration that occurs when an individual's desires outweigh the individual's actualities. An individual may develop a need when he or she learns that an innovation exists' (ibid., 172), where 'actualities' are to be considered as the current state of affairs an individual is surrounded by.

The third stage in the innovation-decision process is *decision*. In this stage of the process, the individual 'engages in activities that lead to a choice to adopt or reject an innovation' (ibid., 177). The individual does so by exploring additional information about an innovation and by showcasing the intention to try an innovation, in order to reduce the aforementioned uncertainty that comes with the adoption of an innovation even further (ibid., 199). The potential adopters can visit a store that sells the innovation, in order to try it for themselves there, or maybe get their hands on a sample if the innovation is suitable for that. In the decision stage, the previously mentioned attributes of adoption, especially the relative advantage, are considered and compared by the individual (ibid., 177). This is the stage where interpersonal communication channels play a major role. Opinions or additional knowledge are provided by peers, which can convince the individual to adopt or reject an innovation (ibid., 206-7). The analysis in the next chapter explores to what extent this stage needs altering, considering it in relation to the diffusion process of Oculus Rift, because for the crowdfunded diffusion process, this stage might be considered as the point in time where adopters decide whether to participate in funding the prototype.

The fourth stage in the innovation-decision process is *implementation*. Implementation occurs 'when an individual puts an innovation to use' (ibid., 179). This stage of the innovation-decision process is a practical one, the individual takes action whereas the previous stages all revolve around mental exercises of deciding and thinking (ibid., 179-80). Although the adopting individual has started to use an innovation, there is still a degree of uncertainty that has to be dealt with (ibid., 179). For some innovations, this regards questions about where the innovation can be obtained (does it have to be ordered through the internet, who are trusted resellers), for other innovations the workings and possible problem solving are unsure (ibid., 179). The implementation stage ends at a clear moment; 'when the innovation becomes institutionalised as a regularised part of an adopter's ongoing operations' (ibid., 180). At this point, the innovation loses its identity or perception of being 'new' with the disappearing of the relative advantage (ibid., 180). Analysis will show the extent to which this phase is represented in Oculus Rift diffusion process. This stage might not be represented in Oculus' diffusion process, because this is where the difference between a 'regular' innovation as Rogers knows them, and crowdfunded prototypes become more evident, since crowdfunded prototypes cannot be put to use just yet.

The fifth stage in the innovation-decision process is *confirmation*. Although the adoption of an innovation in the implementation stage might suggest the end of the innovation-decision process, Rogers recognises a fifth stage (ibid., 189-99). In the confirmation stage, the adopting individual integrates the use of the innovation in its ongoing routine, where the adopter promotes the use of the innovation to its peers and it recognises the benefits of using the innovation (ibid., 199). During the confirmation stage, *dissonance* and *discontinuance* may occur within the adopting individual. Rogers defines *dissonance* as a an uncomfortable state of mind that an individual seeks to reduce or eliminate (ibid., 189). This regards dealing with uncertainty and the question whether or not the adopting individual made the right choice to adopt an innovation (ibid., 190).

The process of *discontinuance* is what could follow the aforementioned dissonance. Discontinuance is 'a decision to reject an innovation after having previously having adopted it' (ibid., 190). The decision to reject an innovation has two varieties, *replacement discontinuance* (the decision to reject an innovation and replace it with an innovation that is considered as better) and *disenchantment discontinuance* (the decision to reject an innovation because the user is disappointed with its performance)(ibid., 190). The analysis in section 3.4 will show to what extent disenchantment discontinuance is represented in the diffusion process of Oculus Rift, taking in consideration that the prototype is still in the ideation phase and has not fully diffused yet, and does not fulfil the final two stages of the innovation-decision process, contrary to Rogers' claim that disenchantment continuance only happens in these two final stages.

Rogers acknowledges that it is impossible to provide a definitive answer to prove the stages in the innovation-decision process exist, as it is very difficult to 'probe the intrapersonal mental processes of individual respondents' (ibid., 195). That is why he chooses to consider the innovation-decision process as a simplification of a complex reality (ibid., 195). As mentioned in the introduction of the innovation-decision process, the approach to the innovation-decision process and its stages in the analysis will be less linear, following Tvede and Ohnemus' (2001, 54) arguments. When using the five stages in the analysis, the focus will move from the strict distinction Rogers makes between them, to an approach in which is acknowledged the stages could also be crossing over in the innovation-decision process in time, to prevent to suggest the impression that the innovation-decision process is linear and possible adopters pass through it stage by stage.

The first three stages of the innovation-decision process are expected to be represented for the diffusion of crowdfunded prototypes. At first sight, they seem to resemble to a certain extent to what happens in the innovation-decision process for Oculus Rift. The third stage, the decision stage seems to be a tipping point in the diffusion process of crowdfunded prototypes, where the potential adopter decides whether to crowdfund the prototype or not. The two final stages show less resemblances with the innovation-decision process as Rogers prescribes it, which possibly highlights the fundamental differences between the innovations Rogers has researched and crowdfunded prototypes, and the need for a revision of this part of his theory. This need for revision might be supported by that the process of disenchantment discontinuance will feature in the analysis, since this is a process that according to Rogers appears in the final stages of the innovation-decision process, however, for Oculus it seems to be relevant in an earlier stage. The analysis in chapter 3 will show to what extent the aforementioned expectations are fulfilled by the case study, and to what extent the innovation-decision process needs to be redesigned to fit the diffusion of crowdfunded prototypes.

2.5 Method

This thesis aims to explore to what extent Roger's diffusion of innovations is a suitable theory to use when regarding the adoption of prototype Oculus Rift, that has been introduced through crowdfunding website Kickstarter. The answer to the research question will be explored by means of the framework of four elements that are known to influence diffusion, as introduced in the preceding sections. The diffusion process of Oculus Rift will be subjected to analysis, approached through the framework of the four elements that influence diffusion: *innovation*, *communication channels*, *social system* and *time*.

The choice for using this framework to analyse the case study is supported by the approach Chigona and Licker (2008) apply in their article 'Using Diffusion of Innovations Framework to Explain Communal Computing Facilities Adoption Among the Urban Poor'. This is where they argue that using a theoretical framework, like the four elements that influence diffusion, has four benefits. The first one is that using a framework offers the ability to make predictions and secondly, using a theoretical framework allows researchers to observe or measure only some things in the diffusion process, which is more efficient than having to measure or observe everything (Chigona and Licker 2008, 58), although this could be considered a weakness as well. The third benefit is that using a theoretical framework can 'explain what is happening, using the terms of the theory' (ibid.) and the fourth benefit is that the theory can be put under stress, in order to improve it (ibid.). Especially the final argument supports the goal of this thesis.

The method that will be used to analyse Oculus' diffusion process according to the framework proposed in the first paragraph of this section, is most inclined to resemble a hermeneutic circle. Hermeneutics can be defined as 'the study of interpretation of texts' (Kvale 1996, 46), in order 'to obtain a valid and common understanding of the meaning of a text' (ibid.). Questioning is a key point within hermeneutics, according to Hans-Georg Gadamer. He notes that understanding is more than recreating another's meaning (Gadamer 1988, 375) and adds that 'questioning opens up possibilities of meaning, and thus what is meaningful passes into one's own thinking on the subject' (ibid.). When interpreting the meaning of objects subject to analysis, it is important to acknowledge that interpreting is influenced by elements such as personal predeterminations, history, experience and expectations (Laverty 2003, 24). Interpreting a text or object in context of others, without predeterminations, 'is achieved through a hermeneutic circle which moves from the parts of experience, to the whole of experience and back and forth again to increase the depth of the engagement with and the understanding of' the interpreted object' (ibid.). By taking an interpretation to a larger whole or context, and bringing it back in relation to the interpreted element, predeterminations can be minimalized.

The hermeneutic circle is usually applied to increase the understanding of one single object of analysis. For this research, the principles of the hermeneutic circle serve as a starting point for an altered version of the hermeneutic circle, which is applied to multiple objects of interpretation in the analysis section. The objects that are subjected to interpretation are online expressions that have been made in relation to Oculus Rift. These expressions reflect people's responses, feelings and opinions about the introduced prototype, and are gathered on from (the comment section of) Oculus Rift's Kickstarter page, which is continuously updated about new Oculus developments, and from social network sites such as Facebook and Twitter. The aforementioned social network sites allow searching by means of a '#' (hashtag). For Twitter, the search query was '#oculus', with a date filter for (re)tweets sent between the 1st of August 2012 until the 1st of September 2012. The object taken form Facebook was found through using the search function as well, which was set to show only 'group' results.

The objects will be related to a context (or, 'a larger whole' as Laverty [2003, 24] calls it), which in this case is a body of literature on the interpretation of media utterances on social network sites provided by Kelliher (2012), Cha et al. (2010) and Singer, Seyff and Fricker (2011). This context provides information about correctly interpreting the media utterances that are the object of this research, which will contribute to objectively approaching the objects, and to providing a more reliable answer on the research question.

A hermeneutic circle, even a customized one, has to end eventually, and its ending point can be discussed vigorously. For instance, Kvale argues (1996) that the hermeneutic circle ends when 'one has reached a place of sensible meaning, free of inner contradictions, for the moment' (Laverty 2003, 25). Contrary to this, Debasey et al. (2008, 59) argue that understanding can indefinitely be refined, but that this is eventually limited by a lack of resources or practical research limitations (ibid.). The circle for this research is brief because of practical limitations (the length of this thesis), and because of the altered design of the circle. This means the analysis can only go as far as interpreting the objects of research and connection their meaning to the larger whole, which is the body of literature on interpreting online media utterances, after which the objects and their meanings will be connected to Rogers' theory again, reaching a place of sensible meaning for that moment, and to find to which extent they fit into the theoretical framework.

3. Diffusion of innovations compared to the diffusion of Oculus Rift

This thesis aims to answer to what extent the diffusion of innovations is a suitable framework for studying the adoption of prototypes presented through crowdfunding websites. The answer to this research question is derived from the answer to the sub question, which focusses on finding to what extent the different processes underlying the innovation, communication channels, time and social systems can be recognised in the diffusion process of crowdfunded prototype Oculus Rift. This chapter will provide an answer to the sub question and eventually the research question, by approaching the diffusion process of Oculus Rift through the framework Rogers suggests, as introduced in the previous chapter. The diffusion process will follow the framework and will be analysed by means of an approach that resembles a hermeneutic circle, as illustrated in section 2.5.

3.1 The innovation and its perceived attributes

Rogers claims there are five perceived attributes of innovations. When an innovation is perceived as one (or more), the adoption process is executed more rapidly. The adoption of Oculus Rift by Kickstarter innovators happened rapidly: on the first day of the campaign the project met its goal of 250.000 dollars. The subject of this paragraph is to find to what extent the three perceived attributes, being complexity, trialability and observability[6], can be recognised in the adoption process of Oculus Rift, which might explain the rapid pace at which the Oculus prototype fulfilled its funding goal. Additionally, the context in which the prototype is presented will be highlighted as well, in order to find other reasons than technological deterministic ones, to find other factors that might have influenced the rapid diffusion pace as well.

Complexity indicates whether an innovation requires a high degree of technological or other specific knowledge from an adopting individual in order to use it (Rogers 2003, 257), which is how this perceived attribute is measured. This however highly depends on the interests and knowledge of the adopting individual. This is where the context in which a prototype is presented comes into play again. Although it is hard to determine how complex Oculus seems to potential adopters, a focus on the context in which the prototype is presented can be telling for the prototype.

A technological prototype such as Oculus Rift consists of a hardware and a software aspect (ibid., 12-3). The hardware for Oculus Rift is the headset, which has a motion tracker, positional trackers and chipboards (Oculus 2014, Oculus Team 2014). The headset can be plugged into a computer or mobile device, making a wire the connector between hardware and software. The software providing

[6] Researching the extent to which the other two components, relative advantage and compatibility, are represented in the case of crowdfunded innovations would require more psycho-sociological approach. This would provide insight in conscious and subconscious decision making, which does not fit into the scope of this research.

the graphic images in Oculus is readymade and provided by game developers and developing company Oculus (Oculus Team 2014). The adopting individual does not require great amounts of technological knowledge to use the Oculus headset, but in order to understand the working of the hardware installed in the headset, it does. Thus, Oculus Rift it only requires one wire and compatible software in order for an individual to use it. Because complexity depends on the adopting individual's technological knowledge, it is hard to determine to what extent Oculus has a high or low complexity, although considering the context in which the prototype is presented might give an insight in the way the group of possible adopters is composed.

When moving the focus from the innovation towards the context in which the prototype is presented, a website that is known for the highly technological and innovative projects that seek funding through it (Jeffries 2013), and the context in which the consumer project later will be suitable to use, it would be plausible to say the prototype is relatively easy to use. The main purpose for Oculus Rift is to create an immersive video game experience (Oculus Team 2014), and additionally the founders of Oculus Rift announced they would like to rely on help from game and interaction developers to help them write software and develop the product further (ibid.). In the context of technology-minded people, every day game console users and developers (the target group Oculus' campaign seems to focus on), Oculus Rift can be considered as relatively easy to use, although understanding it requires a lot more technological knowledge. In addition to this, donating to a crowdfunding project is proof of expecting a successful outcome and, eventually, use of the product (Mollick 2013, 3). The expectation to use a product like Oculus Rift could be proof that non-developer backers of the project are convinced they would know how to operate the device.

Complexity is to a certain extent represented in the crowdfunded diffusion process of the Oculus Rift. When taking the context in which the prototype has been presented as a starting point, it is safe to assume that the possible adopters who have decided to fund the project, are confident they know how to use the prototype. As complexity is a rather personal perceived attribute, it is not possible to specify this general conclusion any further.

Trialability indicates the degree to which an adopting individual is able to experiment with an innovation (Rogers 2003, 258), which can be measured by considering the opportunities and possibilities the potential adopter has to experiment with the innovation. The possibility to try an innovation makes the adopting individual acquainted with the use of the innovation and its possible advantages, which can positively influence on the pace at which the innovation diffuses. When the Kickstarter page started, there was only one prototype of the virtual reality headset and the goal of the crowdfunding campaign was to raise money to build more development kits (Oculus Team 2014). The 9.522 potential adopters who backed the virtual reality headset from all around the world (Oculus Team 2014) were not able to try Oculus Rift in person. Based on the information provided by the developing company, the product video and the question and answer section, they had to make a decision to donate, and donated an average amount of 255 American dollars, without being able to test or even see the prototype.

When focussing away from Oculus, towards the context in which the prototype is presented, it becomes evident that attempts to create virtual reality go back to the early 1960's, where filmmakers experimented with 3D cabinets, goggles and gloves (Robertson and Zelenko 2014). Throughout the years, the technological possibilities grew, but the virtual reality devices turned out to be a deception and too expensive to reach the masses (Russel 2014). Today, the technological possibilities are highly developed, screens show sharper images, are highly reactive, and technology is even able to eliminate nasty side effects from virtual reality devices, such as nausea and dizziness (ibid.). Additionally, the technology is available at a much more attractive price, making it more accessible for the masses. Oculus was, at the time of its introduction, 'widely seen as the most promising VR device in years' (Rubin 2014). This high potential might have influenced its rapid pace of adoption on Kickstarter.

Trialability does not seem to be represented in the diffusion process of the Oculus. Because the prototype has not surpassed the ideation phase yet, there is no innovation available for the consumer market which means possible adopters do not have the opportunity to test it. The limited availability of the prototype might even increase uncertainty about whether to adopt an innovation or not (or in this case: donate money), also because a project funded through a crowdfunding website brings a certain degree of uncertainty for the potential adopter about if the project actually delivers the product it promises (Mollick 2013, 1). However, Oculus Rift has been successfully backed by potential adopters who have not been able to try the prototype. For Rogers' theory on perceived attributes, this could mean that when it comes to crowdfunded prototypes, the focus should shift towards other perceived attributes, for example, taking the potential a product has and the degree of (mass media) attention this potential gathers, into consideration.

Observability indicates the degree to which individuals involved with the adopting individual can see the results of an innovation (Rogers 2003, 258). If the results of an innovation are easy to observe for potential adopters, the more likely they are to adopt it (ibid., 258). This is measured by taking the online conversation that developed on the topic of Oculus Rift into account. At the time of the Kickstarter page, there is only one video available on the Rift. This video shows short interviews with the CEO of Oculus, enthusiastic quotes from technology oriented blog The Verge ('The immersion level here is really something to behold.') and American news service MSNBC.com ('There are a lot of cool gadgets out there, but I promise you that you have never seen anything like this.') (Oculus Team 2014). Additionally, the video is filled with videos of people using Oculus Rift and short, positive interviews with opinion leaders and professionals in the field of (game) developers, such as John Carmack (who is a game developer who designed games like Wolfenstein 3D, Doom and their successors, and has been knighted with several awards). Later in Oculus crowdfunding process, which ran from 1st of August 2012 until the 1st of September 2012, other technology oriented blogs have uploaded videos of hands previews with Oculus (iWaggle 3D, 2012, PC Gamer 2012).

The observability in the diffusion process of Oculus Rift is represented to another extent than Rogers has pictured it. Although potential adopter could not see someone else actually using the headset, since the prototypes are not available yet, they could however have learnt about the Oculus through the aforementioned videos, uploaded on video sharing site YouTube, or through technology oriented blogs or news websites. Additionally, online social networks such as Twitter and Facebook, have possibly contributed to the spreading of the word on Oculus Rift (more on social networks and their possible roles in the diffusion process in section 3.2). For Rogers' theory, this means that the role of the internet in a crowdfunded diffusion process has caused a shift, which allows for observability to happen in an online way, instead of the 'classic' way he recognises.

The extent to which three out of five perceived attributes are represented in the crowdfunded diffusion process of Oculus Rift has been researched in the preliminary paragraphs. Trialability is to no extent represented in the diffusion process of the Oculus, since the prototype is not available for commercial use yet, contrary to the innovations Rogers has researched in his work. Observability can to a certain extent be related to the diffusion process of Oculus Rift, although it appears in another fashion than Rogers has pictured it. The current importance of the internet and all its applications allows potential adopters to see the use of Oculus Rift through videos and product descriptions, which is the internet version of 'seeing others use the product'. The attribute of complexity is to full extent represented in the crowdfunded diffusion process as well, based on the context in which the prototype is presented.

When researching why certain crowdfunded innovations reach their funding goal at such a rapid pace as Oculus did, Rogers' theory could do with some alteration that bares the differences between an innovation and a prototype in mind. Additionally, it is equally important to acknowledge that not all attributes Rogers proposes can and have to be fulfilled (like trialability in the case of Oculus Rift), in order for crowdfunded prototypes to diffuse rapidly. The alterations could focus on taking the context in which a prototype presented into consideration, and focussing on other perceived attributes of a prototype, such as the potential a prototype has and the media attention it generates with this.

3.2 Communication channels and social systems in the diffusion process of Oculus Rift

As introduced in section 2.2, Rogers considers communication channels to be the means by which a message travels from the source to a receiver, which can be categorised as mass media channel or interpersonal channel (Rogers 2003, 204-5). A social system is the place where the diffusion process happens, and the circumstances that are involved here can influence this process significantly, alike communication channels. Processes of social structural and hierarchal nature as well as norms and values are known to influence the diffusion process, and social systems are where opinion leadership is situated (Rogers 2003, 24-5). Communication channels play parts in the shaping and sharing of information, opinions and attitudes towards an innovation within a social system (ibid., 204-7). This paragraph will focus on finding to what extent communication channels and social systems can be recognised in and influence the diffusion process for prototypes in Winston's ideation phase. This will be found through approaching the crowdfunded diffusion process through the theoretical framework Rogers suggested, analysing it by applying a method that resembles a hermeneutic circle, interpreting the meaning of media messages related to Oculus Rift and Rogers' theory.

Social systems and interpersonal and mass media communication channels can be recognised to full extent within the diffusion process of Oculus Rift, although these processes seem to have converted into online versions, influenced by the he presentation of the prototype through an online channel, a crowdfunding website. The channels through which a message can travel have changed significantly compared to 2003, the year when Rogers last published an edition of his theory, but the online social systems and communication channels show resemblance to the features assigned to the offline ones. This statement will be supported by the arguments in the following paragraphs, by taking the interpretation of media messages in relation to Oculus Rift to more general theory and back again, to see to which extent their meaning fits into the framework Rogers' suggested.

The object of analysis, the product video posted on Oculus' Kickstarter page shows opinion leaders endorsing the Rift in the video on their Kickstarter page (Oculus Team 2014). These opinion leaders vary from people who have a positive status in the game world, such as John Carmack, Cliffy B. and Gabe Newell (all award winning game developers), who publicly acknowledged they support Oculus Rift, to quotes from renowned technology blogs such as the Verge and MSNBC, all positively endorsing the Rift. The influence from opinion leaders, especially the aforementioned game developers who are also represented on Twitter, is acknowledged by other Twitter users. Figures 2, 3 and 4 show (re)tweets that have been sent between the 1st of August 2012 until the 1st of September 2012, hash tagged 'oculus'. These tweets can be interpreted as a sign of respect for the game developers, particularly the tweet pictured in figure 2. The users seems to be amazed by the fact that an actual game developer supports something such as a Kickstarter project, which seems to tie some kind of status to the prototype.

Figure 2: A Twitter user Tweeting about game developer John Carmack supporting a Kickstarter project, by retweeting the original message (www.twitter.com)

Figure 3: A Twitter user forwarding a positive message regarding Oculus Rift by game developer Matthew Higby to his or her followers (www.twitter.com).

Figure 4: A Twitter user forwarding a positive message regarding Oculus Rift by Cliffy B. to his or her followers (www.twitter.com).

These interpretations can be supported by a body of research that has been conducted in the area of online social systems and opinion leadership. Cha et al. argue that opinion leaders can be distinguished from 'regular' social media users (Cha et al. 2010), on social networking websites Facebook and Twitter. The interpretation of the aforementioned tweets corresponds with the arguments Cha et al. (2010) provide, that opinion leadership can be distinguished in an online form. Relating this interpretation back to Rogers' theory, it is safe to conclude that communication channels and opinion leadership Rogers recognises offline, are represented in Oculus Rift's diffusion process to a full extent, although they appear in an online context. This is where the customized hermeneutical circle ends for the figures 2 tot 4. For Rogers' theory, this means that his theory on social systems and the opinion leadership that is represented in them is still relevant, although it is in need of a contribution or acknowledgement about the way the use of internet has found its way into the social systems, and how this influences the diffusion process.

Figure 5: Search results for Facebook groups focussing on Oculus Rift (www.facebook.com).

The essence of social systems is likeminded individuals being connected to each other. Websites like Facebook enable users to connect to friends, but also to people they do not know by joining groups that revolve around the user's interests. The objects for this part of the analysis are groups that have formed as a response to the introduction of Oculus Rift. Searching for 'Oculus Rift' and selecting the 'groups' feature on Facebook. The results show there are a lot of Oculus related groups, as presented in figure 5. The existence of these groups can be interpreted as an online social system, a place where likeminded individuals are connected to each other.

Taking the interpretation of the existence of these groups to a body of literature on the matter, it becomes evident that there are arguments to support the existence of online social systems. Ellison et al. (2007, 1114) state that 'online SNSs [social networking sites] support both the maintenance of existing social ties and the formation of new connections', by acknowledging that online and offline social networks overlap. The processes of social structural and hierarchal nature, norms and values as Rogers recognises them in a social system, are translated to the online medium, or at least show an overlap with the offline social system. The customized hermeneutic circle for the object shown in figure 5 ends at this point, which allows for the conclusion that Rogers' theory is to full extent represented in the crowdfunded diffusion process, although the influence the use of the internet has on social systems and the diffusion process has to be acknowledged.

Rogers distinguishes two kinds of communication channels: mass media and interpersonal channels. Mass media channels are represented to full extent in Oculus' diffusion process, although these channels have converged into online variants. Nguyen and Western (2006, 1) state that thanks to 'the unprecedented emergence of the Internet as a powerful news and information medium' (ibid.), the internet has formed a competitive force to reckon with for newspapers and television among others (which Rogers acknowledges as mass media). News is available on the internet for free, and internet users do not need to have an (expensive) subscription or wait for the newspaper anymore. The online variants of traditional mass media (the objects for this part of the analysis) have spread the news about the arrival of Oculus Rift on Kickstarter: British newspaper The Guardian has announced its arrival on the 11th of August 2012 by means of an article on their website (Gillett 2012), just like British Broadcasting Company (BBC 2012). The publication by Nguyen and Western (2006) shows that the mass media have converted into online variants. The mass media channels Rogers distinguishes are to full extent represented in Oculus' diffusion process, however, in a different fashion Rogers pictured them, which means that Rogers' theory needs is in need of a contribution or acknowledgement that shows the influence of the use of the internet has been taken into consideration as well.

The interpersonal communication channels also converted in relation to the possibilities the arrival of the internet offers. Facebook users are mostly connected to each other through an offline, personal connection (Ellison et al. 2007, 1114). These connections tie them together, both offline and online, whereby Facebook can function as a simple tool for passing on (personal) information (ibid.). Additionally, Twitter can also be used for this purpose, although this medium generally connects people with the same interests to each other, and provides less personal connections (Cha et al. 2010, 11-2).

As pointed out in the aforementioned paragraphs, the analysis of online media messages regarding Oculus Rift shows that social systems and opinion leadership know online equivalents to the extent Rogers has described them, tightly related with social networking websites. The communication channels Rogers described and the distinction he makes between mass media channels and interpersonal channels hold true in Oculus Rift's diffusion process and the same goes for full extent for social systems

which involve change agents and opinion leaders which these can be distinguished in an online social system as well.

The distinctions between mass media channels, interpersonal channels, social systems and opinion leadership are clearly represented, although Rogers' theory is not up to date considering the intensified use of the internet nowadays. For his theory, this means that it is important to acknowledge that the media landscape has changed over the past few years. Rogers definitions on communication channels and social systems are a solid foundation, but are in need of contributing work on the convergence of communication channels and the influence these can have on the diffusion process, brought on by the intense use of the internet and its online social networks nowadays.

3.3 Time and the innovation-decision process for Oculus Rift

In this paragraph, the five stages in the innovation-decision process are paired with the communication channels Rogers has assigned to them, as introduced in section 2.2 and 2.4. This combination of knowledge is related to the adoption process of the prototype of Oculus Rift, to find to what extent the stages of the innovation-decision process can be recognised in the adoption process of a crowdfunded prototype. Additionally, this section shows to what extent the innovation-decision process needs to be redesigned to fit the innovation-decision process of crowdfunded prototypes, in line with the assumptions and expectations that the innovation-decision process is preceded by a pre-innovation-decision process, as mentioned in the introduction. The acquired knowledge will be paired with the conclusions from sections 3.1 and 3.2, to be able to provide an answer to the research question of this thesis.

The first step of the innovation-decision process is *knowledge*, which indicates the moment an individual becomes aware of the presence of an innovation. This is the stage where the individual gains information about how the innovation functions (Rogers 2003, 169). The communication channel that proves to be most useful for this stage is mass media, according to Rogers (ibid., 205-6). The launch of the Oculus Rift Kickstarter page has been announced through a press release on the first of August 2012 (Oculus 2014). This press release has been posted in the 'Technology' department of the BBC website (2012), a blogpost in the category 'Games' of the Guardian's (Gillett 2012) website, and some smaller technology websites with more limited audiences (The Verge, Robertson 2012 and Tweakers.net, Hulsebosch 2012). These websites spread the word about Oculus Rift's appearance on Kickstarter. Additionally, it is also possible that the tech-interested potential adopters accidentally stumbled upon Oculus' Kickstarter page, while browsing around the website. Another possibility is that possible adopters learned about the innovation through a social network site such as Facebook or Twitter. As introduced in section 2.2, this is where people can share video's, photo's or links to whatever they want to share, possibly informing others about the existence of an innovation if they were not aware about that yet.

The awareness about the prototype might even be created by the funders themselves. Mollick (2013, 8) has studied the amount of Facebook friends a funder has and found that crowdfunding projects by funders with a higher amount of Facebook friends generally have a higher chance of meeting their funding goals on crowdfunding websites, although for Oculus Rift, this seems[7] not to be the case. Oculus' CEO personal Facebook page and Twitter do not show any messages about Oculus Rift, posted between the 1st of August and the 1st of September 2012.

[7] It's not possible to state with absolute certainty that Palmer Luckey did not post anything. Tweets and Facebook posts can be removed at any time, or hidden from timelines for users not connected to the online social network users (www.facebook.com/palmer.luckey and www.twitter.com/palmerluckey).

The communication channels that can inform potential adopters about the existence of an innovation have expanded significantly (as acknowledged in section 3.2), the knowledge stage is, to full extent, represented in the diffusion process of Oculus Rift. The possible adopters ended up on the Kickstarter page through mass media or interpersonal channels, or possibly through tweets about the innovation from followers. No matter how the potential adopters have heard about the prototype, the fully backed crowdfunding project shows they ended up on the Kickstarter page where they learn about the prototype and where they gain information about how the prototype functions, before they decided whether to participate. This means that this phase in the crowdfunded diffusion process to strong extent resemblances the knowledge stage in the innovation-decision process Rogers prescribes.

The second step in the innovation-decision process is the persuasion stage, the stage wherein potential adopters form a positive or negative opinion towards the innovation and the decision to adopt (Rogers 2003, 174-5). Gathering information about an innovation from mass media can influence the attitude a possible adopter has towards the innovation, which is something that might have already happened simultaneously to the knowledge stage. The medium that sends the message about Oculus Rift can influence an attitude the adopter has towards the news that comes to him or her (Dijkmans, Kerkhof and Beukeboom 2015, 58). It is possible that the potential adopter has formed an opinion simultaneously to the moment he or she first heard about the prototype, and that the line between the knowledge and the persuasion stage blurs because they are executed simultaneously.

For the persuasion stage, interpersonal communication channels and mass media channels are equally important (Rogers 2003, 206-7). The arrival of social media and the rapid growth of the amount of users enables online interpersonal communication, but also caused mass media such as newspapers and television channels to be represented at social media. For Oculus, this is where the help of opinion leaders and enthusiastic quotes by prominent technology blogs and news sites came in handy. As mentioned in section 3.2, several award-winning game developers have endorsed Oculus Rift in the introductional Kickstarter video. Additionally, technology oriented blogs such as Engadget (Smith 2012), The Verge (Robertson 2012) and Arstechnica (Orland 2012) have had the possibility to try the Oculus and share their findings with their audience, influencing the opinion of the possible adopters positively or negatively.

The persuasion stage can be recognised in Oculus' diffusion process to full extent, although the process might have been executed simultaneously to the knowledge stage, and not as separated as it appears to be in Rogers theory. The potential of the innovation combined with the way it rapidly gained backers on Kickstarter, generated a lot of buzz. Technology blogs proved to be eager to try the innovation and respected game developers have endorsed Oculus Rift from the start. A lot has been written about the innovation and paired with the aforementioned facts and theory on the way media brands influence opinions and opinion leadership (Dijkmans, Kerkhof and Beukeboom 2015, Tang and Ni 2015), it is possible to acknowledge that these factors might have played their part in opinion the potential adopter has formed about the innovation. This means that at this point in the innovation-

decision process, the decision process for crowdfunded prototype resemblances Rogers' theory to full extent.

The third step in the innovation-decision process is the decision stage, in which a possible adopter decides to adopt an innovation by seeking additional information and having the intention to try the innovation, or reject the innovation as a whole (ibid., 199). For Oculus Rift, the potential adopter does not have the possibility to try the prototype since its developers are seeking funding to develop the prototype out of the ideation phase. However, more and more preview videos appeared on the internet throughout the crowdfunding period, showing the potential adopters how the prototype functions and reviewing it (PC Gamer 2012, iWaggle 2012). The latter comparison with the features of the decision stage shows that these features cannot be clearly distinguished in the innovation-decision process for Oculus Rift, because the prototype has not been developed to an invention yet. However, the moment an individual decides to contribute to the Kickstarter page of Oculus might indicate an intention to adopt, since participation in crowdfunding is witnessing to expecting a successful outcome (Mollick 2013, 3). The decision stage might, for prototypes in the ideation phase, be the stage in which a potential adopter decides to take the leap by deciding to donate money through crowdfunding, as proof of his intention to adopt. For crowdfunded prototypes, this might mean that they need or go through a shorter, fitted type of (pre-) innovation-decision process or prototype-decision process, which ends with the decision to donate money or not.

This is the point where the crowdfunded innovation-decision process starts to differ from innovation-decision process Rogers has prescribed. In the innovation-decision process, this is the moment where a potential adopter decides to adopt a fully developed invention in this stage, whereas potential adopters of a crowdfunded prototype such as Oculus Rift decide whether to donate money or not. Before being able to decide to which extent this makes Rogers' theory less valuable when studying the diffusion of crowdfunded prototypes, it is essential to find to what extent the remaining stages from the innovation-decision process differ from the stages Rogers has prescribed.

The fourth and fifth step in the innovation-decision process, respectively the implementation stage and the confirmation stage, can both be ongoing and lengthy. The implementation process is about the continued use of an innovation and using it on a regular basis (Rogers 2003, 199), whereas the subject of the confirmation change is recognition of the benefits of using the innovation, promoting these benefits and the innovation to others, and integrating the innovation's use into the individual's daily routine (ibid.). These two stages are to no extent represented in the crowdfunding process of the Oculus Rift, since the product is still in its ideation phase and not available for commercial use (presumably, Oculus will release its consumer version of the Rift in the first quarter of 2016 [Kuchera 2015]), which is a prerequisite for these two stages.

For Oculus Rift, the innovation-decision appears to end in the aforementioned decision stage, which seems to end with the decision to contribute to a crowdfunding project, or to reject the contemplation to contribute. However, Rogers mentions the process of *disenchantment discontinuance*, which usually appears in the fifth and last confirmation stage. It would seem the features of disenchantment discontinuance are to some extent recognisable in the process that started when Oculus announced social media giant Facebook paid 2 billion dollars to get in on the virtual reality headset and it development. Disenchantment discontinuance appears (Rogers 2003, 190) when an adopter decides to reject an idea, because he or she is disappointed with an innovations performance. Although it is not possible for consumers to fully adopt Oculus Rift yet, the amount of money spent and the speed of funding might indicate the intention to adopt.

Facebook has purchased the concept of the virtual reality headset for two billion dollars on 25 March 2014. The fact that Oculus has made this decision has led to feelings of resentment among the adopters (Benedictus 2014, Strange 2014). The early supporters who have backed the project through Kickstarter feel they have been involved with the start of a local project, happily donated money because they recognised the potential the prototype had. Oculus gratefully took their money, rewarded them with thank you letters and t-shirts and then went ahead and sold the idea to the social media giant for a staggering amount of money. The founders become millionaires and the funders are left with nothing, except for their reward and disappointment (Benedictus 2014). In the comment section of the Oculus Kickstarter page, backers state:

'So where does one go to get their $300 back? I think we as backers have a right to have the product too, and I'm not okay with my money being spent on technology that goes into the hands of Facebook' (Hansen 2014).

'I am saddened that the independent dream that was Oculus is now selling out to Facebook. Honestly, I feel that every single donor should get a '"kickback/refund" form that $2 Billion (they'd still have plenty left over!) to put towards a Kickstarter project that isn't a masquerading gold digger. The whole idea of Kickstarter is to support people in making the world a better place through original ideas and technology, not selling out to corporate America. […] A shame and disappointment to everyone who backed Oculus; it's a damn shame' (Rogeraususa 2014).

Both comments show an accurate summary of the sentiments expressed in the comments, combined with a lot of other comments from people who want a refund or lost the belief in the innovation. This can be considered as a clear sign of disenchantment discontinuance, without the innovation actually being in the hands of what could have been possible adopters.

This is where the greatest differences between Rogers theory and Oculus' adoption process appear. As mentioned in the preceding paragraphs, the innovation-decision process as Rogers prescribes it seems to end at the decision stage for prototypes that have not surpassed the ideation phase yet. This is earlier than Rogers predicts, because the innovation is not available for commercial markets. The decision stage seems to be the moment in time where an individual decides whether to donate money or reject the crowdfunded prototype. Despite the expected earlier ending of the innovation-decision process, there is an evident process, that of disenchantment discontinuance, which Rogers ranges among the confirmation stage. This stage does not exist for Oculus Rift, since the prototype is not developed in an invention for commercial use, let alone it is implied in an adopter's everyday life. The fact that disenchantment discontinuance occurs, might indicate that for crowdfunded prototypes, the decision stage is the moment when an individual decides to participate in crowdfunding, but that there is a new stage, in which the individual reflects on new developments regarding the prototype, present.

This means that for the aspect of time in the diffusion process, Rogers' theory innovation-decision process is in need of a revision or redesign, to a certain extent. This confirms the expectation that has been formulated in the introduction: there seems to be some kind of pre-innovation-decision process (or a prototype-decision process). This prototype-decision process exists of a knowledge stage, a persuasion stage and a decision stage, similar to Rogers', although it is followed by a reflection stage, in which the potential adopter monitors the results of their participation in crowdfunding and further development of the prototype. This is where he or she values the development process and takes the decision to adopt or reject the fully developed invention into consideration, moving into the innovation-decision process Rogers has suggested. This suggested new model will be depicted more extensively in the conclusion.

4. Conclusion

The goal of this thesis is to find to what extent the diffusion of innovations theory by Rogers (2003) is a suitable framework for studying the adoption of Oculus Rift, which is presented by means of a crowdfunding website because the prototype is still in the ideation phase of Winston's media development model. The sub questions focus on the framework Rogers has developed, being the four specific elements that are known to influence diffusion: the innovation, communication, social system and time. The sub question questions the extent to which these elements are represented in the diffusion of Oculus Rift. The answers to this research question have been sought by following the theoretical framework on elements that are known to influence diffusion, and analysing the diffusion process element to element, by applying a research method that is inclined to resemble a hermeneutic circle.

This thesis focuses on answering the extent to which the diffusion of innovations is a valuable framework for studying the diffusion of Oculus Rift. The answer to this question is that the general outlines of the theory, focussing on the innovation, communication channels, social system and time are a solid framework for studying the diffusion of crowdfunded innovations, although the way the elements are filled out might need an adjusted design, which bears in mind that crowdfunded prototypes have not come into existence (yet).

In his theory, Rogers does not take different stages of product development into consideration. As a contribution to this, this thesis connects the distinction Winston makes between products in the ideation phase – prototypes - and products in the invention phase – inventions - to Rogers' theory. Rogers chooses to approach the innovation, or in case of this thesis the prototype, with a strong focus on the perceived attributes the technology has and the positive way they can influence the pace at which an innovation diffuses. Aside from the existing critique that this approach does not take the context (the social system and the values and knowledge within it) in which an innovation or prototype is presented into account, it has become evident that Oculus fulfilled two perceived attributes to full extent. However, despite fulfilling only two attributes to extent, the prototype of Oculus Rift reached the goal of the crowdfunding campaign rapidly. Rogers' theory on the perceived attributes could use an alternative design, which focuses on other attributes, which are more suitable for the development circumstances a prototype is in, such as the potential a prototype has.

Regarding the communication channels and social systems that can influence the diffusion process according to Rogers, analysis shows that they are to full extent represented in the diffusion process of Oculus Rift, although they seem to have converged into online versions, as an extension of the offline versions Rogers describes. This part of Rogers' theory is in need of an extension, in which Rogers' current theory is a solid starting point. However, especially for crowdfunded innovations, it is essential to take the unescapable influence of the use of internet and its applications into account. The internet and the use of social networking sites the internet enables, form an extra dimension to the way

communication channels and social systems form and influence the diffusion process, which in case of crowdfunded prototypes starts with emerging on a crowdfunding website.

When approaching the innovation-decision process Rogers proposes for inventions, through the distinction Winston applies, it becomes apparent that the innovation-decision process for inventions to a certain extent resembles the decision process for crowdfunded innovations. The difference is however, that the diffusion of a prototype seems to follow a kind of pre-innovation-decision process, or prototype-decision process. For Rogers' theory, this means that the innovation-decision process he proposes, needs some redesigning. This redesigned process has been introduced in section 3.3 and is visualised in figure 6, below. The path the potential adopter of a crowdfunded prototype follows, is as follows: the knowledge and persuasion stage are represented to full extent. The decision stage for a prototype seems to be the moment a potential adopter decides whether to donate money to a crowdfunding project, and after this stage there might be what could be called a reflection stage. This is the stage where the crowdfunding participant has time to reflect on the developments of the prototype to an innovation, and to decide what is his or her attitude is towards it. This could also be the stage where disenchantment continuance appears. Then, after the reflection stage when the prototype has been developed to a full-fledged innovation, the potential adopter learns about the development from prototype to innovation in the knowledge stage, makes up his or her mind attitude about it in the persuasion stage, and decides to buy or reject the innovation, entering the decision stage again, and eventually finishes the innovation-decision process Rogers describes. The figure below shows the stages separately, but it is important acknowledge it is also possible a potential adopter passes through multiple stages at the same time.

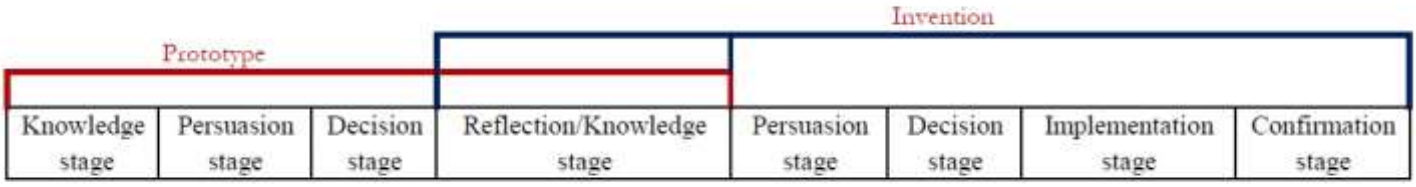

Figure 6: The suggested design of what would be a 'prototype-decision' stage and its transition into the innovation-decision process.

5. Discussion

Every research method knows its pros and more importantly cons that must be acknowledged. The research method for this thesis, a case study approached through a hermeneutic circle, is no exception to that. To start off with, the results of case study research need to be presented with a lot of nuance (Flyvbjerg 2006, 219-21). Because a case study focusses on a single subject in particular, it calls for great care when summarizing, concluding and generalising, as has been highlighted in section 1.1.

As has been mentioned in the method section of this thesis, the use of a (customized) hermeneutic circle as a research method knows its critiques as well. The most frequently heard critique questions the point where the circle ends (Kvale 1996; Laverty 2003), as highlighted in section 2.5. Another critique is that it is important to 'bear in mind that the understanding [the point at which the circle ends] cannot be final' (Debasey et al. 2007, 65), and that there is no final truth: the interpreted meaning can change constantly.

In addition to the critiques in the previous paragraphs, it is equally important to realise that this research only represents a small part of Rogers theory on the diffusion of innovations. The selected framework that is the backbone of this thesis, only represents a part of Rogers theory. The theory this has been formulated meticulously and is built from a variety of elements. Many of these elements require a social or even psychological approach, since they deal with human decision making, which is a complicated research subject that does not fit in the scope of this thesis, as has been mentioned in the concerning sections. There are many elements to be researched, before it is possible to provide a satisfying answer to the question whether diffusion of innovations theory needs revision in relation to crowdfunded innovations.

The conclusion of this research can be considered as starting point for further research. This future research can be derived from the prototype-decision process as introduced in section 3.3 and 4 (and figure 6), in order to find out to what extent this prototype-decision process is useful in relation to the diffusion of crowdfunded prototypes other than Oculus Rift. Additionally, there is a lot of ground to cover on the social/psychological aspects of Rogers' theory. Covering the decision making process involved with crowdfunded prototypes could provide an more personal insight in how potential adopters make the decision to participate in crowdfunding. This knowledge could additionally contribute to finding to what extent the prototype-decision accurately describes the stages a potential adopter of crowdfunded prototypes passes through.

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