

Gamification in knowledge management: How to score intrinsically in the game of motivation

An explorative study for Ericsson AB

by

Axel Avenberg and Andreas Sjöblom

Abstract

Gamification is an increasingly common motivational tool, and knowledge management is rising to become an important part of strategies in knowledge intensive organizations. The academic infancy of gamification and the relatively young field of knowledge management provide ample opportunities for novel research. This thesis attempts to understand what needs to be considered when designing a practical application of gamification to increase motivation for knowledge management in a knowledge-intense organization. Abductive action research was carried out at Ericsson AB to answer the question, where the researchers were embedded in a knowledge management transformation team. Empirics primarily gathered from interviews, together with a theoretical framework was used to synthesize a set of guidelines. These guidelines served to help with the development of a gamified application for knowledge management. Finally, a plausible concept of an application based on the guidelines and theory is presented, together with recommendations of how to proceed with the development of the concept.



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Preface

Title

Gamification in knowledge management: How to score intrinsically in the game of motivation

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Background

Ericsson has realized the potential of implementing a gamified application for knowledge management. For Ericsson, as one of the leading companies in communications equipment, having an efficient knowledge management process is of immense importance in order to utilize the knowledge the organization has gained over the years as well as spreading new knowledge. Knowledge management at Ericsson is currently in a state of transformation, where a new way of working is being developed. One possible implementation in this transformation would be the gamification of the knowledge management tools that will be used after and during this transformation.

Problem description

The current systems in use for knowledge management at Ericsson are not perceived as living up to their potential and a lower than desired level of engagement in knowledge management activities has been discovered. A strategy for remedying these difficulties engagement has begun to be developed. Changing the culture and behavior of the employees through a new way of working will present further difficulties, and gamification is studied as a potential solution to these issues of engagement.

Purpose

The purpose of this thesis is the exploration of what could be important to consider when creating a gamified application for increased long-term engagement among employees. Especially the engagement when it comes to participation in knowledge management activities. The study also has the purpose of exploring how such an application could be formulated for implementation in the real setting existing at Ericsson.

Method

This thesis has been conducted with an explorative approach and lends itself to a creative abductive action research process. Answering the research questions required collaborative action research with Ericsson as well as the inclusion of interview subjects from the areas of knowledge management and gamification. The research process was divided in the phases of exploratory theory research through a literature study and the qualitative data gathering through interaction with Ericsson and interviews with both Ericsson employees and experts in the areas.

Conclusions

The problem of lacking engagement in knowledge management activities are answered through synthesizing motivational theory which ties into gamification, and knowledge management strategies. What to keep in mind when designing an application aimed at increasing long-term engagement among employees are presented through several guidelines for this design process as well as a prototype of a gamified application for knowledge management.

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1 Introduction

The aim of this introductory chapter is to provide the reader with an understanding of the research problem and the purpose of this thesis. A short background of the research area and the research problem is presented, followed by the research questions this thesis seeks to answer. The chapter is ended with the delimitations and the disposition of the thesis.

1.1 Background

Using gamification, which is defined as the use of game elements in any context that is non-game related (Deterding, et al., 2011), to motivate employees is becoming an increasingly common practice (Egham, 2011). Although the term gamification has increased in popularity since the gamification boom of 2010, the concept of using points and other game elements has existed for a long time (Zichermann, 2017). A few examples of this are frequent flyer miles, food-store point-based coupons and hotel loyalty clubs (Zichermann, 2017). While gamification has shown promise in e-learning (Behnke, 2015), customer support and sales to name a few (Chou, 2017), some critics consider it a passing management fad (Boulet, 2012).

Motivating employees to spend those extra few minutes every now and then to update the company knowledge bank (Cabrera, et al., 2007), or foster a culture of communication with others to solve problems as a community (Hara, 2009), is not an easy thing. Without motivation, knowledge management is a tool without substance, and will only be applicable on paper (Cabrera, et al., 2007). In business, today, there is a critical gap between the use of knowledge management strategies and realizing the motivational challenges a new way of working entails (Malhotra & Galleta, 2003). The fact that gamification is on the rise (Anderson & Rainie, 2012) and in many cases shows positive results (Andriotis, 2014) means that even though most applications of gamification used today have largely been focused on increasing employee performance when performing simple tasks or employee learning (Lieberoth, 2015), recent research has shown that knowledge management is an area where gamification could be used (Swacha, 2015) (Silic & Back, 2017) (Schacht & Maedche, 2015). These motivational challenges in knowledge management activities have been experienced by Ericsson AB. The organization seeks to become a knowledge organization and parts of the organization have come to the realization that new ways of working must be explored to reach this goal. One such potential avenue has by the knowledge management transformation team been identified as the implementation of gamification. The authors of this study were embedded in this team for the duration of the thesis and were tasked with exploring this topic.

1.2 Problem description

As knowledge is increasingly viewed as a critical organizational resource, the need for proper ways to manage it grows (Davenport & Dörjé, 2001). Effective knowledge management demands efficient knowledge sharing and one of the key barriers for knowledge sharing is the failure to create engaging and motivating ways for employees to participate (Cabrera, et al., 2007) (Swacha, 2015). Recent research and the commercial success of gamification as a motivational tool show great potential in many areas (Perryer, et al., 2016). While there is some research on the topic of gamification and knowledge management (Schacht & Maedche, 2015) (Silic & Back, 2017) (Swacha, 2015), there is a gap in the understanding of what one needs to consider when creating a practical application. This gap in existing theory proves suitable for an explorative study, and the gap has practical implications for Ericsson in that they are currently amidst a reorganization with some focus on engagement in knowledge management.

1.3 Purpose

The purpose of this thesis is to explore what is important to consider when creating an application of gamification to increase employees' long-term motivation for knowledge management at a knowledge intense workplace, and how such an application in a real setting could be conceptualized.

1.4 Research questions

Two research questions based on the purpose of the thesis has been formulated, and the second research question is answered based on the answer of the first research question.

1. What can be important to consider when creating a gamification application for increased long-term motivation in knowledge management activities at a knowledge intense workplace?
2. How can a gamified knowledge management application for a knowledge intense workplace be conceptualized?

1.5 Delimitations

This thesis is primarily focused on the practical implications of gamification and knowledge management aimed at knowledge intense organizations. The width and interdisciplinary character of knowledge management and the lack of a cohesive academic view of gamification combined with the limited time and resource available to the authors, as students, had an impact on the study's theoretical depth. How different cultures react to gamification and knowledge management or communities of practice relate to these topics have not been considered, although they are promising avenues of further inquiry.

Gamification has been studied far more thoroughly from a structured learning perspective, such as in universities, and some of the results from that field can be used in a work environment application (Perryer, et al., 2016). It was assumed that knowledge intensive work shares similarities with learning, as this is an aspect of said work.

One of the frameworks of knowledge management this study will adhere to is the concept developed by Alavi & Leidner (2001). This concept entails the creation, application, transfer and storage of knowledge within an organization. Since this study mainly focuses on the element of knowledge sharing and storing of knowledge these are the parts of the framework which will be studied and described in depth. The acquisition and application of knowledge are highly relevant to any knowledge management concept, but will in this report take a smaller part of the research material as they do not have an immediate effect on the outcome of this study. Knowledge creation mainly refers to the development of new content or the replacement or improving of existing content. Though this study seeks to design enablers for sharing, which include the improving, through editing, of existing knowledge, the area of knowledge creation is according to Alavi & Leidner (2001) more focused on the continuous interplay between tacit and explicit dimensions in an organization. Thus, the thesis is more aligned with transferring explicit knowledge between individuals and between individuals and the group or organization rather than the conversion of knowledge between tacit and explicit dimensions (Alavi & Leidner, 2001). Likewise, the application of knowledge is an important part of the knowledge management systems of an organization (Alavi & Leidner, 2001), but this study is more concerned with the individual access to the appropriate knowledge at the right time rather than what the individual does with that knowledge after it has been acquired. However, the step of gamifying the application of knowledge would be an interesting topic to further investigate.

1.6 Structure of thesis

This thesis is made up of seven chapters aimed at giving the reader an accurate picture of the research and the results. The thesis is divided into the chapters: Introduction, Research approach, method and execution, Theoretical framework, Empirics, Analysis and synthesis, Conclusion, and Discussion and contributions.

The first chapter contains a short background of the reasons for this thesis, the topics chosen, the environment the thesis has been developed in and the problem this thesis aims to explore as well as the limitations of the thesis and the structure of the thesis.

The second chapter explains the frame of approach used when facing these research questions and which methods were used and how they were executed. It also discusses the ethics of the study and the steps taken to ensure the trustworthiness of the thesis.

The third chapter seeks to study the current state of the areas of knowledge management, motivational theory and gamification. This is done through a thorough examination of the literature in these areas and the specific areas of study were derived from the needs of the organization as well as the perceived gaps in theory that became apparent during the research.

The fourth chapter aims at giving the reader an insight into the background of the company where the authors were embedded, as well as providing some information on the current state of the organization and where the organization wants to be in the future, as well as the findings from the interviews conducted.

The fifth chapter entails an analysis of the theoretical material and empirical data used in the exploration of the field of study as well as a synthesis of how these correlate and support each other to provide input on how to help achieve the goals of the organization.

The sixth chapter presents the results of the thesis. This is done through a list of guidelines to follow in the creation of such an application as well as a concept of how such an application could be constructed.

In the seventh chapter the conclusion and contributions are presented and the thesis is discussed. The answers to the research questions is followed by the practical and theoretical contributions. The discussions include the method and execution of the thesis, and how the results were found as well as the theoretical and practical contributions this thesis has provided.

2 Research approach, method and execution

This chapter aims to give the reader an understanding of how the research problem was approached, what methods were used and why these methods were chosen. It further discusses limitations of the methods that were used and how they affect the quality of the research.

2.1 Research approach

This thesis has an explorative purpose since it seeks to study something that is unexplored or that hasn't been scientifically studied in depth before, as described by Blomkvist & Hallin (2015). Saunders, et al. (2009) echoes this and states that an exploratory study is a valuable means of finding out what is happening, seek new insights and asking questions in a new light. They further explain that an exploratory study can be especially useful if there is a need to increase the understanding of a problem, as it might show that there is no reason to pursue further research in that particular area. The focus in an exploratory study is initially broad and, as the research progresses, becomes progressively narrower.

This thesis lends itself to a creative abductive action research approach since it focuses on exploring a way gamification can be used to increase long term motivation for knowledge management in a particular context. Creating a plausible concept that can be tested is an appropriate use of creative abductive approach (Ciaran J, 2016), rather than proving a specific hypothesis or building theory which correspond to the deductive and inductive approaches (Saunders, et al., 2009). An abductive approach can be understood as a hypothesis to the best design or inference to the best explanation, called creative and selective abduction (Ciaran J, 2016). Kirkeby (1994) explains abduction as similar to induction but with a heavier reliance on theory and using an iterative process between the theory, empirical data and the research activity (Dubois & Gadde, 2002). According to Dubois & Gadde (2002), what is found through empirical research as well as new insights from theoretical material serves to make modifications to the original design or framework.

This thesis is carried out on behalf of Ericsson's Business Unit Network Services, in the Project Area of Customer Services and Network Roll-out. The authors of this thesis are embedded within the Knowledge Management Transformation team at Customer Support Portfolio and Services, which is concerned with developing Ericsson's support offerings concerning networks. Due to the fact that the authors of this thesis have been embedded at Ericsson for the duration of the research and partaken in meetings and events during this time is a characteristic of action research. Olsson & Olander Røese (2005) suggest action research as a suitable form of research when the researchers use theoretical findings to interact with the studied organization with the purpose of both affecting change in the organization as well as learning from the process. Being embedded in the knowledge transformation team at Ericsson also provided insights into the challenges of day-to-day work, the organization's culture and inspiration for the concept. If the authors were based somewhere else this data would not appear, Dubois & Gadde (2002) refer to this type of data as active data. One of the reasons abductive action research is suitable as an approach for this thesis is because the area of gamification is comparatively new and unexplored, while the area of using it in knowledge management activities is even less so, and by using an iterative process between theory, empirical data and active data of the studied organization, this gap in theory is to a certain extent abridged (Dubois & Gadde, 2002). The process is shown in Figure 1.

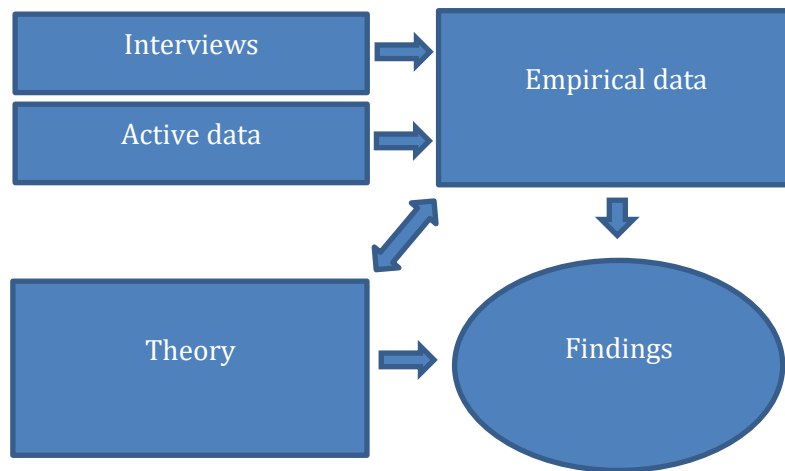


Figure 1: Research approach

2.2 Execution

A search of the literature, interviews with ‘experts’ and group interviews were judged to be of most use, Saunders, et al. (2009) recommend these as the principal methods of exploratory research because of the breadth and depth of information that can be gained. Denscombe (2010) states that questionnaires, interviews, observation and documents are the main methods of collecting empirical data in social research and researchers should base their decision on the criterion of ‘usefulness’. Due to the limitations on time and resources on the study, observations and questionnaires were disregarded as their utility was considered lower relative to the chosen methods and the resources they demanded. However, Denscombe (2010) argues that a combination of different methods can be used by the researcher to look at the research topic from a variety of perspectives with each method approaching the topic from a different angle.

The research for the thesis started with a literature review, followed up by interviews and the coding thereof. The data gathered was grouped, after which it was compared to the theoretical framework and synthesized which led to the development of the guidelines, after which the concept was created. Active data has been gathered throughout this entire process and different “mockups” or pretotypes were presented continuously in order to gauge response. The general workflow is shown in Figure 2.

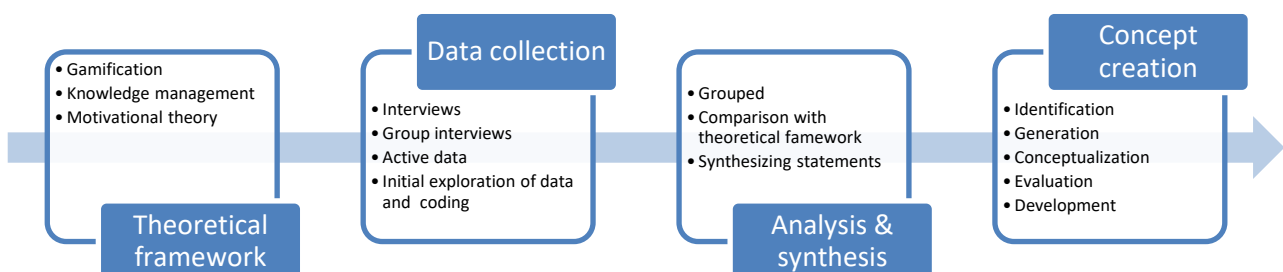


Figure 2: General workflow

2.2.1 Theoretical framework

Relevant and significant literature on the topic was reviewed and a theoretical framework was developed to show how the findings and the concepts relate to previous research, as suggested by Saunders, et al (2009). A keyword search was performed against google scholar, Linköping University Library website (<http://www.bibl.liu.se>) and Lund University Library website (<http://www.lub.lu.se/>) for topics listed in Table 1. The search results that after a brief examination seemed relevant were read in order to reach a competent level of knowledge in the studied subject areas. Care was taken to approach the areas of research without bias in the form of a rigid set of ideas that dictated the focus of the investigation, which is important in explorative research according to Saunders, et al (2009). The literature search was carried out in an iterative manner to compare the gathered data with relevant research.

| | |
|-----------------------------------|---------------------------------------|
| Gamification | Gamified knowledge management systems |
| Knowledge management | Community of practice |
| Gamification Knowledge management | Knowledge management framework |
| Knowledge management framework | Ways of working |
| Gamification framework | Knowledge worker |
| Motivational psychology | Knowledge worker gamification |
| Motivational theories | Game design |
| Work and motivation | Game design motivation |
| Gamification user types | Engaging game design |

Table 1: Keywords

2.2.2 Data collection

Interviews were chosen as the primary empirical data gathering method, as Blomkvist & Hallin (2015) state they provide a good way to make unexpected discoveries, which is important in exploratory research. Interviews also have the advantage of being a relatively simple means to learn about individuals' ideas and thoughts, it is an appropriate method when the purpose is to develop a deeper understanding of a phenomenon and its dimensions (Blomkvist & Hallin, 2015). Wienclaw (2015) also state that the depth and breadth of the information that interviewing techniques give the researcher, when properly used, cannot be archived using other data collection techniques.

While individual interviews can provide depth and details in relation to specific issues, group interviews were included because they offer other possibilities. One disadvantage of individual interviews is the limited number of views and opinions available to the researcher, one person does not have the entire picture. Group interviews provide a practical solution to this problem as they allow a breadth of perspectives to emerge (Saunders, et al., 2009), and is according to Denscombe (2010) a good way to get the participants to speak their minds and reflect on other participant's perspective. Saunders, et al. (2009) further propose that group interviews may provide an efficient way for researchers to interview a larger number of individuals than would be possible through the use of individual interviews.

It was important to gain direct access to the prospective interviewees and that the interviews were viable in terms of the costs in time and travel involved, as suggested by Denscombe (2010). Considering the time and costs of travelling to meet interviewees in person and the restrictions on time and resources at the disposal of the authors, steps had to be taken to increase the feasibility of using interviews as the primary data gathering method. Using the internet to conduct the interviews and group interviews, a solution proposed by both Saunders, et al. (2009) and Denscombe (2010), eliminated these issues. An additional benefit, mentioned by Saunders, et al. (2009), of using the internet is that it removes problems associated with

recording and transcription such as cost, accuracy and informants' disinclination. However, they point out that interviews carried out over the internet have their own set of ethical issues that need to be considered.

As the authors were embedded in the company a lot of information was gathered through casual conversations with the knowledge management transformation team. This team consisted of a number of people, however content relevant to the thesis was primarily collected from five members of the team who were largely present at the offices where the authors were located for the majority of the study.

Informant selection strategy

The number of interview subjects was not set, instead the size of the sample grew until sufficient information for the purpose of the research had been accumulated. This cumulative approach is appropriate if the study is explorative, uses qualitative data, is small in scale and the sample size can't be known in advance (Denscombe, 2010), which makes it a good choice for this study. The interview subjects were chosen on the basis of their relevance to the subject being investigated and knowledge or experience of the topic. This purposive sampling allows the researcher to focus on getting the information that will best help answer the research questions (Denscombe, 2010). The combination of the cumulative approach with a non-probability technique such as purposive sampling is an appropriate sampling strategy when a representative sample is not necessary, as suggested by Denscombe (2010).

Preparing the interviews

The themes and question areas that were of interest for each interview where written down in three interview guides (see appendix A), as described by Blomkvist & Hallin (2015), these were used to prompt the informants into sharing their thoughts about the subject in a semi-structured manner. The first interview guides were developed based on the initial literature review to gain a better understanding of knowledge management and gamification, how they related to each other and what one need to consider when implementing them. The guides were changed as new data was collected and incorporated seen in Figure 3 (GC=Gamification consultant, KMC=Knowledge management consultant), this iterative process of collection and analysis is according to Denscombe (2010), a tendency of qualitative research. The changes that were made were that the topic of the impact of gamification was removed and a question was added to explore the topic of using of gamification in changing organizational culture.

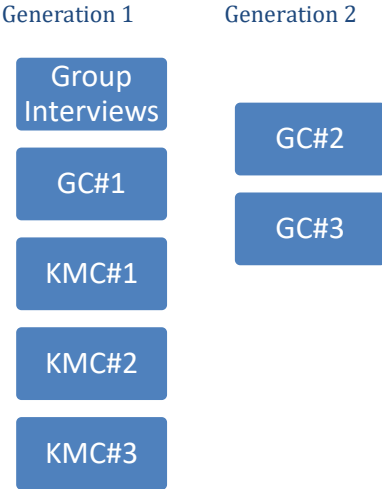


Figure 3: Evolution of Interview guides

A statement of intent, a simplified consent form, was prepared and sent to all informants, except for the group interviewee, prior to the interview (see appendix B). This was done to make sure that the interviews were carried out in an ethical manner in accordance with the standard measures that Denscombe (2010) list:

- Informants will remain anonymous;
- Data will be treated as confidential;
- Informants understand the nature of the research and their involvement;
- Informants voluntarily consent to being involved.

Conducting the interviews

A series of semi structured interviews were conducted where the informants were chosen based on relevancy of experience and knowledge in the fields of KM and gamification (see Table 2). The informants were contacted by mail and each interview was approximately one hour in length.

| <i>Informant ID</i> | <i>Expertise</i> | <i>Experience of subject</i> | <i>Medium</i> | <i>Recorded</i> |
|---------------------|----------------------|--|----------------|-----------------|
| <i>GC#1</i> | Gamification | Gamification Consultant for a couple of years | Google hangout | N |
| <i>GC#2</i> | Gamification | Working with gamification or motivational design for 16 years | Skype | Y |
| <i>GC#3</i> | Gamification | Worked in the area of gamification and digital learning for 12 years | Skype | Y |
| <i>KMC#1</i> | Knowledge management | KM Consultant for 16 years, now runs own consulting firm | Skype | Y |
| <i>KMC#2</i> | Knowledge management | KM Consultant for 18 years | Skype | Y |
| <i>KMC#3</i> | Knowledge management | KM Consultant for 17 years | Skype | Y |

GC=Gamification consultant, KMC=Knowledge management consultant

Table 2: List of informants for individual interviews

A semi-structured group interview was also conducted and recorded via Skype with support engineers at Ericsson’s customer support in India. There were six informants who were selected based on their experience of working in a knowledge intense customer support. The interview was facilitated with the help of a member of the knowledge management transformation team and the session lasted for approximately one and a half hour.

2.2.3 Analysis

The analysis of the interview material was based on Denscombe (2010)’s view of qualitative analysis, which are based on the analysis being an evolving process in which the data collection and data analysis phases occur alongside each other. It goes from detailed study of localized data to more abstract and generalized statements about the topic, and the values and experiences of the researcher are seen as factors influencing the analysis.

Transcription of the interviews was viewed as a crucial step and plenty of time was set aside for this. This decision was based on Denscombe (2010)’s recommendation regarding transcribing the data as a substantial part of the method of interviewing, since it makes it easier to analyze and establish a connection between the researchers and the data. The data was then explored and obvious recurring themes were identified and notes were written down. The transcripts were then coded, where sentences were the unit of data. For example, “Using gamification in knowledge management is good” could be one code that was attached to a note. The codes were then grouped

into themes that were identified (see Figure 4), where each theme captured the content of that group as well as how the themes related to each other. The coded data was then written up, anonymized and quotes were used to illustrate points. This written presentation was then compared to the theoretical framework to synthesize development and design guidelines for creating the final concept.

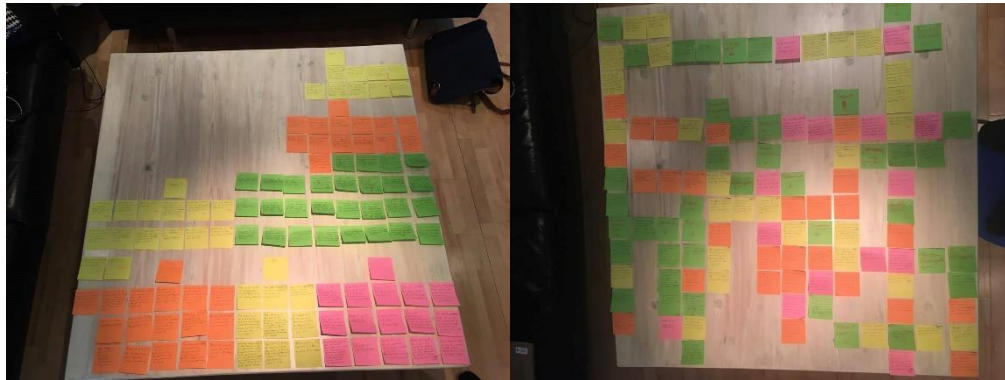


Figure 4: Coded data grouped by informants (left), data grouped into themes (right)

2.2.4 Concept creation

The concept creation model of this study, which is shown in Figure 5, was created based on concept mapping (Trochim, 1989) and using a mix of brainstorming sessions (Osborn, 1948), design thinking (Brown, 2008) and unstructured discussions on the concept at the organization. These methods were all used in tandem with members of the organization where the authors were embedded and were revised in regular intervals after discussions and presentations for the organizational representatives.

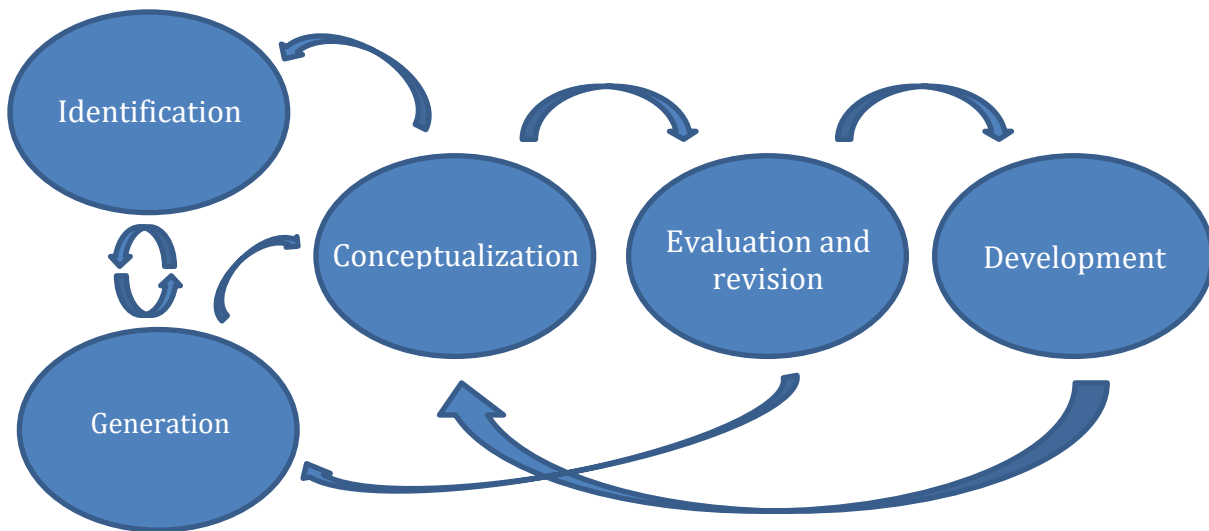


Figure 5: Concept mapping model

The different steps of the concept mapping model used were identification, generation, conceptualization, evaluation and revision, and the development of design and development guidelines for gamification of long-term motivation for knowledge management and the subsequent concept based on these.

Identification

The step of identification concerns the identification of the existing problems as well as the exploration of possible paths towards a solution, which was done through interaction with the participants of the organization and the input from outside sources through interviews as well as gaps discovered in theory. An approach similar to design thinking was used to form the process of identification and generation of ideas (Brown, 2008).

Using identification and feasibility, discussions of the defined problems consisted of a process of inquiry and a thinking process to conceive new possible realities (Dijksterhuis & Silvius, 2017). This process was not so structured as to have predetermined steps, which is not a necessity in these types of human-centered iterative creation approaches (Brown, 2008). The method of design thinking (Brown, 2008) contains “spaces” which are named identification, ideation and implementation. While the actual implementation of the results of this thesis are not included in this report, a concept for how implementation could work is included as the result of the study. The steps of identification and ideation in design thinking served as a basis for how the concept creation model’s first parts were created. Especially the process of iterative re-hashing of ideas and problem identification were supported by this method.

Generation

The generation of ideas were done with these identifications in mind while doing multiple brainstorming sessions with and without the aid of outside participants. The brainstorming was not done following the exact routines as described in the initial design of how brainstorming sessions were envisioned by Trochim (1989), but using the basis of brainstorming with an added element of evaluation and discussion. This added element of positive feedback and constructive criticism provided, as stated by Lehrer (2012), further material for the generation of plausible ideas and the possibilities of these ideas.

What was implemented in depth from the method as developed by Trochim (1989) is the involvement of a diverse group of people in the generation of concepts, done through discussion groups at the organization as well as through interviews with people from different backgrounds with different experiences. These ideas were then iterated again through the identification process and further evaluated in the conceptualization step, then returning to the identification step to seek new insights from the sources used.

Though classical idea generation through the process of brainstorming focuses mostly on quantitative generation, an element of discussion and criticism was used in the process of this study, this to further align the different ideas with the purpose of the study, and gaining new ideas through understanding the viewpoint of others, increasing the quality of the ideas (Lehrer, 2012).

Conceptualization

Through conceptualization of these ideas, pretotypes were developed which were then presented to relevant participants at the organization. Three pretotypes were created and presented to the organization and the members of the team where the authors were embedded. These pretotypes were discussed and constructive criticism of the design, functionality and feasibility was used as data in the iteration of idea generation. A pretotype is by Wiles, et al. (2016) defined as “a set of techniques, tools, and metrics for gauging the interest in a product, prior to full-scale development”. This differs from the other type of pre-release design known as prototyping in that a prototype is designed to see the product in action, meaning it is a functioning design.

Pretotypes were designed in order to follow the mantra of “failing fast” which is further corroborated by the design thinking method (Brown, 2008). The pretotypes contained basic visualizations of the elements found through the step of idea generation, and were not fully

functional, in order to save time and resources just to get a better understanding of how such a design would be accepted (Savoia, 2011).

Evaluation and revision

The concepts which were evaluated and discussed provided more inspiration for ideas and insights into the problems that exist. As a method of evaluating the insights gained from interviews and unstructured discussions, a “card sorting” was used. Card sorting as a method described by McLinden (2017) can be used to document ideas and evaluate how they can be grouped in order to provide new material for identifying and generating ideas, which is why after the step of evaluation and revision, iterations back to idea generation were done.

This card sorting was done through documenting keywords and phrases found in the interviews and grouping these into categories which were previously discovered in theory and the cards or statements were analyzed based on this theory and the interaction with members of the organization (see Figure 4). These groupings were further distilled and iterated through the creative process into process and design guidelines which were then used in the development of the application.

Development

The development of the design and process guidelines were achieved through an iterative process of all the previous steps and constant reevaluation of the results and concepts as well as their connection to theory. The development itself was done with the implementation step of design thinking in mind (Brown, 2008). The resulting application itself was changed numerous times in order to better fit into the needs and problems found in the study.

2.3 Method limitations

2.3.1 Interviews

The interviewer introduces the potential of bias which can influence the data negatively or positively (Wienclaw, 2015). The interviewer’s expectations, beliefs, prejudices, or other attitudes may affect the interview process and the interpretation of the data collected. A biased or untrained interviewer can inhibit the gathering of additional information and higher quality data which is the purpose of interviews (Wienclaw, 2015). Another thing that has the potential to affect the quality of the interview is the influence of the interviewer’s behaviors and attributes on the interviewee (Wienclaw, 2015). The appearance, demeanor, training, age, gender, and ethnicity of the interviewer may impact the interviewee’s perception or how they respond to questions. It is important to consider the characteristics of both the interviewer and the interviewees when utilizing interviews as a data collection tool in order to determine the reliability of the data. The same interviewer was used for the interviews in all but two interviews, to limit the impact of the interviewer. The authors also attempted to be polite, punctual and as objective as possible, refraining from positive or negative comments. Using the internet to conduct the interviews also limits the effect the interviewer’s characteristics has on the informant to a small degree, according to Denscombe (2010).

There are distinct difficulties that need to be considered together with the potential advantages of using group interviews. Saunders, et al (2009) raise the issues of certain participants trying to dominate the interview, making some participants publicly agree with the views that they privately disagree with. They further state that the researchers’ opportunity to develop individual level of rapport with each participant is limited in a group interview, therefore high level of skill is required to be able to conduct this type of discussion successfully, while at the same time recording the data. In group interviews, managing the discussion carefully and making sure

informants have the opportunity and are comfortable enough to state their points of view, is very important (Saunders, et al., 2009). In the group interviews the interviewer took a passive role, only interjecting to steer the discussion or provoke focus on particular areas. An atmosphere of exploration was also established by the interviewer through the opening statement, to facilitate a more open atmosphere.

2.3.2 Informant selection

Good research selects its items for study on the basis of specific reasons linked to the area of research and the requirements of the methods (Denscombe, 2010). Convenience sampling, as described by (Denscombe, 2010), is built upon selections which suit the convenience of the researcher and which are close at hand. Convenience as a factor is likely to enter into sampling procedures, because researchers have limited resources at their disposal. To avoid this, informants were chosen for their expertise and time was the only resource that needed consideration due to the use of the internet.

2.3.3 Document search

The main types of written sources used in this study are journals, books and academic articles. Denscombe (2010) raises some disadvantages of documentary research. The credibility of the source (Denscombe, 2010), the documents used vary in age to a great extent, however, most of the older sources are well established theories. The intention behind the creation of documents can undermine its credibility as well (Denscombe, 2010). Documents affiliated with consultancies were regarded extra critically due to the bias they express for their particular area of expertise. However, consultancies are a driving force in both knowledge management and gamification research, making it hard to completely avoid this. A critical stance was taken regarding the facts stated in the documents, when possible documents that stated contradictory information were also used. However, due to the relative youth of the studied area this was not always possible.

2.3.4 Research credibility

Validity

Validity is concerned with whether the collected data and methods reflect reality and cover the crucial aspects of the subject (Denscombe, 2010). Literature, multiple interviews with experts in the same and different fields and employees of different hierarchical levels were used to obtain different perspectives. This use of multiple sources is an application of data triangulation (Denscombe, 2010), which is a way to increase the validity of the research to an extent. In addition, the researchers spent a majority of the time embedded in the company to be able to relate their work to the purpose of the thesis.

Changing the interview guides decreased the validity of the thesis, but it allowed greater exploration of the topic. By recording the interviews and frequent re-familiarization with the data, the risk of decontextualizing the words of their meaning, as described by Denscombe (2010), in the process of coding and categorizing the transcripts was to some extent avoided. Context, the events surrounding the production of the data, words that precede and follow the units of data that are used in the analysis, is an important part of qualitative data (Denscombe, 2010).

Reliability

Reliability is the degree to which the study can be replicated to produce consistent results (Denscombe, 2010). Qualitative data are generally unstructured when they are first collected, the techniques used for the analysis are time-consuming and describing the decisions made by the researchers to the reader of the research is difficult (Denscombe, 2010). The impact of the context and of the interviewer means that the data collected is unique to the specific context and the specific individuals involved, which makes consistency and objectivity hard to achieve leading to

decreased reliability (Denscombe, 2010). Given the dynamics of the research environment and the qualitative nature of the thesis the possibilities of yielding the same results are almost non-existent. However, the reader is provided an account of how the study was conducted, the choice of methods, the motivations for choosing them and their application in the research process as well as details about how the data was analyzed.

Generalizability

Generalizability refers to the prospect of applying the findings from research to other examples of the phenomenon (Denscombe, 2010). Qualitative data might be less representative and the detailed, in-depth study of a small number of instances make it hard to generalize the findings (Denscombe, 2010), which is the case in this thesis. Nevertheless, the result of the analysis is to some degree generalizable, since the problem which this study is aimed at solving is not a problem unique to the organizations where the authors were embedded. The concept can be applicable to other similar situations and used to inspire other systems, however some elements are unique to Ericsson.

Objectivity

Objectivity is the measure of how neutral the results are, the degree to which researchers are unbiased and impartial in their approach to data (Denscombe, 2010). The intrusion of the researcher's own identity, background and beliefs in qualitative research have a role in the creation of data and the analysis of data. This means that the findings need to be more tentative and cautious, because it operates on the assumption that the findings are creations of the researchers and not facts. The authors attempted to be objective by continuously challenging their views and assumptions.

The interviews that have been formally organized have given a lot of valuable data, and this data is quantifiable and can therefore be categorized and sorted per the results found. Though these interviews and discussions have given structured data, for this study a lot of informal situations and business meetings have taken place while the authors were embedded at the company. Constant contact with employees of the organization as well as inclusion in steering groups and management initiatives have given a deeper understanding of the company. This has also colored the perspective of the authors and this bias needs to be considered in the analysis, discussions and conclusions.

In the quest to find a suitable solution to a problem or to analyze data, there is a danger of underplaying certain data which does not fit into the conclusions and results the research is showing. The researcher can then feel pressure to disregard this data, in order to show a less ambiguous result. These ambiguities and inconsistencies in the data may inhibit a researcher's ability to generalize data and results. These inconsistencies are however important elements in any research, and in qualitative analysis these possible inconsistencies need to be acknowledged and documented in order to sidestep this wish for an unambiguous result (Denscombe, 2010). This study has incorporated some data which is in conflict with the result of this thesis in order for the reader to better be able to critically view the research provided in this thesis.

2.4 Research Ethics

The thesis was conducted in accordance with Swedish law. When doing academic research, integrity is of utmost importance, and research misconduct fundamentally undermines the search for knowledge (Allen, et al., 2016). This research misconduct which has per Allen, et al. (2016) been widely defined as the "fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results", has been considered in this study. The question of fabrication and falsification of research results has been to a high extent nullified

through the thorough documentation of the interviews through transcription of these as well as the validation of the data retrieved by the participants. The approach to plagiarism has been to be detailed in the attributing of statements and theoretical data through citation of the sources.

According to Shilton & Sayles (2016) anonymizing individual-level data, while protecting the individual to some extent, may still put the group they represent at risk. Scrutiny may be directed toward the group or community to which the interviewees belong if the responses from the anonymized sources are met with criticism. Furthermore, with the existence of social media, and through the use of digital media, keeping sources anonymous is becoming more difficult (Shilton & Sayles, 2016). Through the use of careful consideration when choosing interview subjects, and the general description of them to ensure no clues to their identity are easily discovered, this threat to their integrity can be mostly averted.

3 Theoretical framework

This chapter outlines the theories and research that are relevant to the purpose of this thesis. The aim of the chapter is to provide the reader with sufficient information and material to understand the research and the comparisons done in the analysis. The chapter first introduces the concept of gamification and motivational theory, followed by theories regarding knowledge worker motivation and a section dealing with gamification and knowledge management. Lastly, an analysis model of the theoretical framework is presented and explained.

3.1 Gamification

To understand what gamification is, there is first a need to understand games. Games have existed since ancient times and are an integral part of all cultures throughout history. They are one of the oldest forms of social interactions among humans and are defined as a formalized expression of play which allows practitioners to go beyond direct physical interaction and immediate imagination (Orsini, 2010). There are several important aspects of games beyond the immediate definition. Digital games have reached an incredible level of complexity as compared to classical games (Nareyek, 2001). Chess and similar games, like Go, still retain a form of “nobility” status among games, since they are complex in the number of combinations of moves one can make on the board. Computers being able to match the human brain in its capacity to accurately predict outcomes is a recent phenomenon (Murgia, 2016). Since digital games provide an infinitely larger range of movements and freedom it also adds an additional layer of complexity, too complex some contend (Towell, 2014). For example, moving around in a game seems simple but there are many variables at play to achieve it (Ichiishi, et al., 2014). The feeling of games is also a high interesting area, with environmental physics and graphics and freedom of choice (Ravaja, et al., 2004). However, some games that are quite far from meeting today’s standard of graphical requirement, or diversity of choices, are still played by gamers seeking compelling storylines (Schell, 2005). This shows the compelling power that the feel of a game holds over our interest and motivation, going beyond the simple visual needs of players (Lazzaro, 2004).

Deterding, Dixon, Khaled and Nacke (2011), define gamification as: the use of game design elements in non-game contexts, which is one of the most common definitions that is used in the literature. The term gamification is often used to cover other terms like serious games, games with a purpose or game-based learning (Djaouti, et al., 2011) (Deterding, et al., 2011), these concepts relate to game-based applications and their definitions are not mutually exclusive, but they serve different purposes that distinguish them from each other.

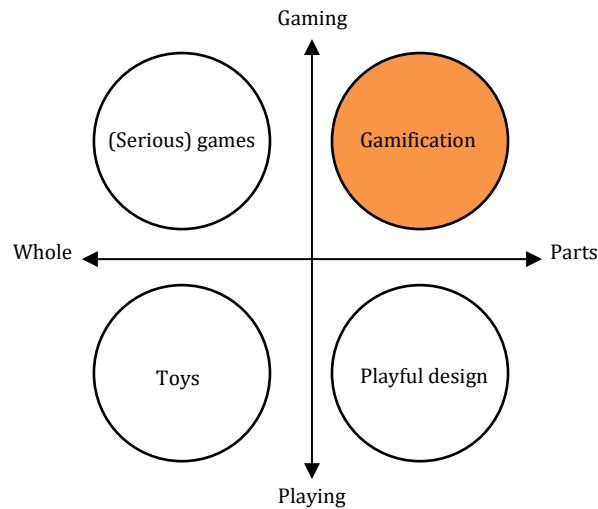


Figure 6: Gamification placed between game and play, whole and parts, (Deterding, et al., 2011, p. 5)

Based on these concepts, Deterding, et al. (2011) categorize gamification along two dimensions (see Figure 6), where one axis is the amount, going from parts to whole, of game elements in an application (A list of gamification elements can be found in Appendix C). The second dimension, gaming to playing, covers the area of application. The distinction between them is that games captures playing structured by rules and competitive strife toward goals (Deterding, et al., 2011). Play does not necessarily contain rules or a clear goal, nor does it necessarily have an element of competition and is often more imaginary in nature (Smith & Vollstedt, 1985), play denotes a more freeform, expressive, improvisational recombination of meaning and behaviors (Deterding, et al., 2011).

3.1.1 Gamification and motivational theory

Gamification is fundamentally a motivational tool, it is therefore important to understand motivational theories. This section gives a brief overview of different motivational theories that have been related to gamification in academic literature.

Gamification and Self-Determination Theory (SDT)

Ryan & Deci (2000)'s Self-Determination Theory (SDT) is based on the concept of intrinsic and extrinsic motivation. They suggest that the different kinds of motivation exist on a continuum, on one end is a lack of motivation and on the other lies intrinsic motivation. In between the extremes are different kinds of extrinsic motivation. They define intrinsic motivation as performing and activity without receiving an apparent reward. Engagement in the activity being the reward in and of itself, since the person can derive enjoyment from performing the activity in question. Extrinsic motivation is defined as the desire for a specific outcome, and that extrinsic motivation considers the instrumental value of an activity (Ryan & Deci, 2000). An example of what extrinsic motivation can be is given by Ryan & Deci (2000). This example is stated as an employee completing a training course and being given a bonus for having participated.

Landers, et al. (2015) suggests gamification can utilize both intrinsic and extrinsic motivators and that the SDT taxonomy of needs may apply in the context of gamification. This is echoed by Aparicio, et al. (2012) who states that, in order to maintain intrinsic motivation one must satisfy three psychological and social needs: autonomy, competence and relation. These three correspond to Ryan & Deci (2000)'s three basic psychological needs:

- Competence is to seek control of the outcome and experience mastery.
- Autonomy is the universal urge to be causal agents of one's own life and act in harmony with one's integrated self
- Relatedness is the universal want to interact, be connected to, and experience caring for others

According to Aparicio, et al. (2012), perceived autonomy is at its highest point when an individual performs a task out of personal interest or enjoyment. In order to satisfy the need for autonomy, using positive feedback and providing an individual with choices, while not in detail controlling the instructions given to said individual has been shown to provide good results (Aparicio, et al., 2012). He further states that competence relates to the need to participate in challenging tasks and feeling competent and skilled. Aparicio (2012) also draws parallels between the need for relatedness and purpose, where purpose encompasses the social aspects of relatedness but introduces a common goal.

Gamification and goal-setting theory

Goal-setting theory proposes that goals directly motivate action by directing attention and effort toward goal-relevant activity and away from goal-irrelevant activity, the underlying assumption is that individuals perform differently because they have different goals (Locke & Latham, 2002). Three mechanisms for applying goal-setting theory to gamification are badges, progress bars, and levels (Landers, et al., 2015), where badges and levels can be seen as explicit signs and progress bars are progress alerts. In gamification, badges are a virtual commodity awarded to an individual for completing a specific task, which can be viewed as a goal (Landers, et al., 2015). The combination of goals and feedback has been shown to positively impact performance (Locke & Latham, 2002), badges should be accompanied by a source of feedback like progress bars in order to maximize the likelihood of successful performance (Landers, et al., 2015). Locke & Latham (2002) state that in order for goals to lead to performance, individuals must be committed to their goals. As a task becomes more complex the effect of goals becomes dependent on the individual's ability to develop appropriate task strategies (Locke & Latham, 2002). Creating small sub-goals in the form of easy early levels within the gamified system allows the user to boost their confidence in their ability to attain the goal, which has been shown to be an important factor of performance by impacting goal commitment and task strategies (Landers, et al., 2015).

Gamification and operant conditioning

Casinos and recreational game designers have used operant conditioning, the concept of positive and negative reinforcement, to foster a certain behavior after the rewards are taken away (Skinner, 1956), to motivate their users continued engagement for their games without continuous rewards for a long time (Nicholson, 2015). Operant conditioning is used in gamification systems to engage people in real-world behavior without having to supply rewards consistently and is the foundation of what Nicholson (2015) refers to as reward-based gamification. He states that the concepts of adding badges, levels, leaderboards, achievements and points to a real-world setting serve as positive reinforcement elements. When and how a user receives points and at what rate they are given is instrumental, since the efficiency of point-based systems rely heavily on a previously defined reinforcement schedule.

Gamification related to expectancy theory

Expectancy theory includes three components: Valence (V), Instrumentality (I), and Expectancy (E) as described by Vroom (1995):

- Valence refers to the affective orientation toward a specific outcome, these outcomes or rewards can be extrinsic like pay and promotion or intrinsic like feelings of accomplishment or enhanced self-esteem, to a particular individual.
- Instrumentality is a probability belief linking one outcome to other outcomes that have associated valence.
- Expectancy is the strength of the belief that action will lead to an outcome.

A function based on these components give an individual's level of motivation to engage in a given behavior, through the formula: $Motivation = V * I * E$ (Vroom, 1995). In simpler terms, an individual's motivation for a behavior is based on the perceived effort that will lead to successful performance that will lead to an outcome which has high value for the individual. If an individual places value in earning points or badges and sees a clear path from effort to performance and performance to outcome, then the individual is motivated to engage in the action, that is, the game elements may have valence in a VIE sense (Landers, et al., 2015). A link between gamification and the instrumentality component of expectancy theory is that the relationship between actions and rewards is clear (Landers, et al., 2015) and the perception that performance will lead to outcomes is consistent with instrumentality in expectancy theory terms (Vroom, 1995).

Flow theory and gamification

One theory behind creating an engaging experience is the concept of flow, defined by Csikszentmihalyi (1992) as a state of optimal intrinsic motivation, full concentration, absorption and intense immersion. This means that during the performance of a task, the user feels neither overwhelmed nor uninterested by the task at hand. The user also feels a loss of self-awareness where the time, worries and physical symptoms are forgotten. Flow is not something easily reached, it is built upon three main foundations as explained by Csikszentmihalyi (1992). The first pillar is maintaining a complexity and capability balance, so the user feels challenged yet hopeful of completing the task with a reasonable amount of work. The second part of the foundation is the availability of feedback to be able to change directions depending on the current environmental prospects as well as those of the future. The last defining part of reaching flow is the existence of clearly defined goals, for without a goal there is no purpose, and without purpose there can be no motivation. The basic idea of flow in gamification is, according to Nicholson (2015) that the difficulty of the system increases as the player's skill increases; a player who is in a state of flow is fully engaged with the system. Many gamification systems do not get more challenging, which creates boredom. If the challenges presented to the player are too far above his or her skill level, this creates anxiety and frustration.

3.1.2 Applying gamification to motivate employees

Perryer, et al., (2016) states that in learning strategies and the educational literature, the success of gamification is well established. But the understanding of successful implementation gained in that area does not always translate into practical applications if there is a different outcome focus, which can be the case in work environments (Perryer, et al., 2016). While they point out that there is evidence to support the implementation of game mechanics to motivate employees to complete their day-to-day jobs, it is also clear that gamification is not suited to every context and situation. However, where gamification can be strategically aligned and implemented to engage employee motivation, there is tremendous potential (Perryer, et al., 2016).

Perryer, et al., (2016) suggest taking a more holistic and longer-term view to understand the motivations underpinning gameplay offers the potential for productivity and job satisfaction, to ensure the game design, elements and goals motivate individuals to solve problems and achieve strategic outcomes (Perryer, et al., 2016). Dale (2014) also suggest that gamification has potential to become an integral part of the workplace. He describes the benefits of gamification as a tool to engage users on an emotional level and motivating them to achieve their goals. Perryer, et al. (2016) describe learning, rewards, individual and group performance, as well as the mechanics which motivates employees to achieve these, as characteristics of gamification relevant to the workplace. Schacht & Maedche (2015) summarized proposed benefits of gamification by various researchers as the following:

- Direct and immediate feedback
- User engagement and satisfaction
- Room for errors
- Guidance
- Deepening of Learning
- Social credibility and recognition
- Rewarding self-efficacy
- Group identification and team building

Dale (2014) however, suspects that implementers focus on aspects of the technology and the mechanics of gamification applications rather than on engaging with its users, which often results in failed projects. Another potential danger of gamification in the context of a workplace is the impact of failure not only on the users but also the program, a single failure can derail current or prospective programs and other initiatives as the negative perception spreads and is carried into the future (Neeli, 2015). Schacht & Maedche (2015) summarized proposed critique of gamification by various researchers into some negative trends:

- Replacement of intrinsic motivation by extrinsic rewards
- Additional layer of control and pressure
- Loss of freedom (when mandatory)
- Improve quantity instead of quality
- Non-systemic, reward-oriented, not user-centric and pattern-bound

Roy, et al. (2015) explain that gamification carries some implications for the users' intrinsic and extrinsic motivation. They further explain that intrinsic motivation has been found to outperform extrinsic motivation, having a more long-lasting influence on performance and leading to autonomous self-regulation. Although extrinsic motivation can provide short-term stimulation, it also poses the risk of demolishing existing intrinsic motivation if it teaches the users to only perform the activity when rewarded. Many gamified systems rely on extrinsic motivational cues, by rewarding activities with badges or by encouraging competition. By replacing the existing higher order intrinsic motivation with extrinsic, gamification can potentially harm highly motivated people (Roy, et al., 2015) (Heinzen, et al., 2015). Furthermore, in the case of removal of the gamification elements, and hereby also the corresponding extrinsic motivation cues, there is a risk of leaving unmotivated people behind (Roy, et al., 2015).

Ledford, et al. (2013) dispute this to some extent, they state that motivation is the sum of extrinsic and intrinsic motivation and that even if extrinsic rewards reduce intrinsic motivation it does not completely overwhelm intrinsic motivation causing negative motivation. They further explain that depending on how extrinsic rewards are implemented, it is possible to increase as well as decrease intrinsic motivation. Some rewards have positive to neutral effects on intrinsic

motivation. Praise, for example, serve as a form of verbal reward which significantly increases intrinsic motivation. Some rewards have a consistently negative effect on intrinsic motivation, for example rewarding someone for simply participating. Vassileva (2012) further point out that even the distinction between intrinsic and extrinsic motivation is called into question by some researchers, who state that it is dependent on individual characteristics.

Reward-based gamification

Creating and implementing reward based gamification systems based on extrinsic motivation is relatively simple, according to Nicholson (2015). A designer chooses the behaviors that are to be changed and assigns points. These points can then be used to determine levels and in leaderboards to encourage competition. A system of achievements can be developed to encourage behaviors that are outside of the point structure, designing badges for the achievements further allows a subject to publicly display their success within the system. However, Neeli (2015) states that mechanics like rewards, statuses, etc., are typically used to indicate the ability of players within the gamified environment, but in the workplace, these gamified mechanics can conflict with organizational roles. Nicholson (2015), presents three situations when gamification based on extrinsic rewards is useful:

- If the purpose is to achieve immediate and short-term change. An immediate spike in engagement is common as users explore the new system. The behavior can continue if the organization is willing to continue supplying rewards that motivate the users. However, if the rewards stop the behavior might stop with it.
- If the goal is to teach a skill with real-world value. The user is rewarded while learning the skill, but when the user masters the skill and recognizes its real-world value the rewards are no longer needed. The real-world benefits of the skill become more motivating than the gamification rewards.
- If the user has no way of developing intrinsic motivation to perform tasks that do not require creative thinking, reward-based gamification can improve performance. However, this can be a never-ending process once begun, the users will expect an increase in the rewards to match their increases in performance.

Meaningful gamification

The dangers with gamification solely based on extrinsic rewards, according to Nicholson (2015), make it less useful if the goal is to create long-term change in the subject's behavior. He suggests that a more appropriate approach in this scenario is to build intrinsic motivation. Rather than providing rewards for behavior, designers can create systems that help users find their own reasons for engaging with the behavior. Nicholson (2015) calls this concept meaningful gamification and it's based on the three needs of Self-Determination Theory. Players engage with games for other reasons than getting a good score, people play games to explore or experience a narrative, to make interesting choices, and to interact with other people. There are other game design elements that designers can use to increase intrinsic motivation, instead of increasing extrinsic motivation through rewards (Nicholson, 2015). Nicholson (2015) stresses that it is almost impossible to design a gamification system that benefits every user and that users need to be empowered to create within the gamification system. Another key to increase the chances of long-term change through building intrinsic motivation is if the system is built with the user's benefits at the center and that systems provide users with the ability to learn and to demonstrate mastery in different ways (Nicholson, 2015). Aparicio, et al. (2012) give a few examples of mechanics which may fulfill the needs of the SDT. The mechanics which could fulfill the need for autonomy include user profiles, configurable interfaces and privacy control, to name a few. The competence mechanics include feedback mechanics, optional challenges, progression information, and could also include the points, badges, leaderboard, and level mechanics. The

social relation need could be met by using groups and messages as well as connections to social networks, blogs and chats.

3.2 Motivation and knowledge work

As opposed to some traditional professional types of work, the expertise of knowledge work is not something which is acquired during a single learning period, but something which must be constantly improved, and reflected upon, as well as adapted to new circumstances and revelations (Maier, 2007). Knowledge worker is an ambiguous definition due to the varied nature of knowledge work (Jayasingam, et al., 2016). According to Jayasingam, et al. (2016) knowledge workers differ from their non-knowledge worker counterparts in that their daily work tend to deal with complex and new technologies and may be unpredictable, multi-disciplinary and non-repetitive which involve the utilization and creation of knowledge. Their work usually has very little structure and the relative complexity of the work they perform means that it in most cases can't be standardized, as the knowledge work often requires ingenuity and collaboration in order to be successful.

As explained by Maier (2007), knowledge workers require a different kind of management than other more traditional types of professions. A knowledge worker requires less direct supervision and direction, and instead flourishes with more freedom, but with protection and support by leadership acting behind the scenes. Effective knowledge work is comprised of conditions and resources which help harnessing and developing the performance potential of knowledge workers, such development of one's own competencies (North & Kumta, 2014). According to North & Kumta (2014), current research argues that motivation means creating enabling conditions that reinforce personal motives and thus make people contribute and do their best to achieve the goals of the organization. While traditional rewards related to performance are largely based on extrinsic motivation, intrinsic motivation gains importance when sharing and developing knowledge. They propose three key drivers of motivation that are strong in knowledge workers. These are the quest for autonomy, the innate desire for mastery and the need for purpose, sharing a similarity with the needs stated in Deci & Ryan (1985)'s Self-Determination Theory. Management styles that provide the knowledge workers with autonomy, mastery, and purpose are required to enable a significant shift in the performance and productivity of knowledge workers.

North & Kumta (2014) state that when designing a knowledge-oriented incentive system it is important to remember that every employee is a source of knowledge for the organization and it is essential to motivate them through individualized customizable incentive systems. They list four ways to motivate knowledge workers:

- Accomplishing challenging tasks leads to learning and a demonstration of competence, the practice of assigning young knowledge workers to simple routine tasks at the beginning is disastrous for motivation.
- Recognition from experts with higher qualification is generally considered as a very important motivational factor.
- A further source of motivation is enabling advanced learning, the opportunity to participate in a highly rated seminar or to train under the guidance of top experts in their field of specialization is of much more value than an increase in the salary.
- Another motivational factor is a culture of openly sharing information as well as stimulating workplace lay-out and equipment.

3.3 Knowledge management and gamification

Several authors have identified that gamification can be leveraged in the area of knowledge management (Swacha, 2015) (Silic & Back, 2017) (Shpakova, et al., 2016) (Paul, 2016). Knowledge management has been defined as a conscious strategy for moving the right knowledge to the right people at the right time (O'Dell, et al., 1998). Another definition of knowledge management is by Haney & Driggers (2009) defined as controlling the process of identifying, organizing, storing, disseminating, using and maintaining knowledge in order to support strategic goals. (Girard & Girard, 2015)'s general definition will be used in this thesis:

“Knowledge Management is the process of creating, sharing, using and managing the knowledge and information of an organization.” - (Girard & Girard, 2015, p. 14)

According to Liebowitz (2001), information is defined as patterned data whereas knowledge is the capability to act on information. Knowledge includes sets of facts and rules of thumb that experts may have acquired over the years, as well as their own experiences during this time. This is similar to the view held by Kyoratungye, et al. (2009) that data is the lowest level of known facts, and the value in data by itself is very limited. They state that for data to provide significant value to an organization, it first must be structured, analyzed, and interpreted. After this has been done, the data has transformed into information, and can now be used in a meaningful way. If the information is validated and put into a context it can be called knowledge, since it is the contextual information that provides the understanding and rationale that we associate with knowledge. Maier (2007) has created a comprehensive definition of knowledge as follows:

*“Knowledge comprises all cognitive expectancies—observations that have been meaningfully organized, accumulated and embedded in a context through experience, communication, or inference—that an individual or organizational actor uses to interpret situations and to generate activities, behavior and solutions no matter whether these expectancies are rational or used intentionally”
- (Maier, 2007, p. 76)*

Knowledge management includes concepts from multiple disciplines, such as organizational behavior, human resources management, artificial intelligence, and information technology (Maier, 2007). The aim for knowledge management generally entails the increased documentation, codification, and visibility of knowledge while enabling easier access to knowledge and increasing knowledge sharing for an organization to be better able to leverage their knowledge assets (Maier, 2007).

The creation of knowledge is by Alavi & Leidner (2001) defined as involving the development of new content or the improving and merging of existing knowledge. Social and collaborative processes serve as enablers of knowledge creation as well as individual reflection (Nonaka, 1991). Alavi & Leidner (2001) further view knowledge creation in their model as the interplay between tacit and explicit dimensions of knowledge, and the flow of knowledge created when this new knowledge moves through the organization and the different levels of it.

Application of knowledge is the main focus of competitive advantage in a learning organization (Alavi & Leidner, 2001). An individual can learn many different things, but if that individual cannot utilize the knowledge in a proper way or in a task which serves an organizational purpose using this knowledge, then the knowledge is not applied correctly and does not provide the organization with more benefits than the existence of the knowledge itself, which does not further the organizational agenda. Applying existing knowledge in the correct way does present a few challenges, but Information Technology (IT) can in a positive way influence how these challenges

are overcome (Alavi & Leidner, 2001). This can be done through the integration and application of knowledge by facilitating the capturing, updating and accessing of organizational knowledge and directives in a fast way. For example corporate intranets can enable easier access to information concerning the directives of an organization, such as manuals, policies and organizational standards.

3.3.1 Knowledge sharing

Swacha (2015) has identified that if gamification can be used to create an environment better suited for sharing knowledge internally, the increased competence of employees and the ease of access to critical knowledge could provide a competitive advantage. This is corroborated by Silic & Back (2017) who found that gamification leads to higher job motivation, in the context of knowledge-sharing. Schacht & Maedche (2015) suggest that implementing a gamification system can increase individuals' motivation to share and reuse knowledge. Paul (2016) also suggests knowledge sharing as a potential area of application with examples like featuring top contributors on forums or design indicators that show the impact of sharing.

According to Earl (2001) knowledge sharing is seen as a key component of knowledge management. Knowledge sharing as defined by Davenport & Prusak (1998) is a voluntary act and distinguished from reporting. Reporting is based in an exchange of information incited by routines or structured formats whilst sharing is a conscious choice to participate in knowledge exchange of their own free will, implying there is no compulsion or coercion involved (Davenport & Prusak, 1998). Knowledge sharing, or knowledge transfer, can occur in a number of different ways and levels. These include transfer of knowledge between individuals, from individuals to explicit sources such as knowledge storage systems or databases, from individuals to groups, between groups, across groups, and from group to organization (Alavi & Leidner, 2001). An important process in the transfer and sharing of knowledge is the transfer of knowledge to where it is needed, which is not a simple process to implement. This is why having an effective system or process for locating and retrieving the pertinent knowledge is of great importance (Alavi & Leidner, 2001). Hendriks (2004) also state that a lack of knowledge sharing has been shown to be a significant barrier to establish effective knowledge management in organizations. Gupta & Govindarajan (2000) have conceptualized the process of successful knowledge transfer into five elements.

- The value attributed to the knowledge that was shared and the source of the knowledge, which can be related to the trustworthiness of knowledge (Eppler, 2003).
- The willingness of the source to share knowledge, which has a basis in culture and the perceived gain of this sharing.
- The existence and efficiency of the ways of transferring knowledge through the communication channels available for this purpose. This is the element which has received the most amount of study, and a lot of weight has been placed on this element in literature (Alavi & Leidner, 2001).
- The disposition of the individual seeking knowledge, and their willingness to partake in the shared knowledge, which similar to element number one and two can be connected to culture and the trustworthiness of knowledge.
- The ability of the receiving part of the transfer to assimilate and utilize the knowledge received, which is also known as the absorptive capacity of the receiving unit (Cohen & Levinthal, 1990).

Motivating to share knowledge

Efficient processes, structures and applications should be developed for sharing knowledge (North & Kumta, 2014). The most important part of knowledge sharing is that the personal

ambition of the individuals involved in the transfer of knowledge are similar to, or in best case scenario equal to, the ambition of the group or organization (Gurteen, 1999) (Cabrera, et al., 2007). This echoed by North & Kumta (2014) who state that in order to create and share knowledge effectively, corporate values, guiding principles, mission, vision and the reward systems must be aligned with the success of the business units and the individual contribution to the development of the whole company and that excessive internal competition in companies can limit knowledge sharing is. The key to successful implementation of knowledge sharing applications is the relationship between these ambitions and the motivations of the knowledge workers involved (Hendriks, 2004). Prevailing motivation theories suggests that the use of force or compensation are less effective motivators than factors such as social recognition and challenging work (Mitton, et al., 2007), and that the only thing that motivates an employee is the pleasure they take in their work and social aspects (Hara, 2009). Even though this is a fairly accepted opinion, in literature at least, there are still instances where these factors of compulsion are prevalent (Hendriks, 2004). Today there are many organizations who invest in a reward and penalty strategy for motivating their employees to share knowledge (Hendriks, 2004).

Giving employees incentive to step out of their comfort zone and start interacting with others to share their knowledge and improve the organization's knowledge pool without any instantly visible rewards given to the individual doing the sharing is a complex issue (Cabrera, et al., 2007). The individual in some cases still see their own knowledge as a resource that if shared, lessens their value, which is in contrast with the growing need of sharing and combining knowledge to keep up with a rapidly changing world (Gurteen, 1999). Through implementing motivational strategies, to enhance the experience of knowledge sharing and showing the results of this while assuring the employees that sharing knowledge increases their value to the organization instead of being detrimental to their value, the organization may increase their innovation capital as well as their knowledge repositories and employee engagement (Gurteen, 1999). Notwithstanding issues with disinclination to share because of fear of reducing the individuals own value to the company, there are other perceived issues related to the sharing of knowledge (Ardichvili, et al., 2003). Among these is an inherent hesitation to share knowledge among some because of the fear of criticism or not wanting to lead others wrong if your information happens to be incorrect (Jing, 2015). Another problem arises when inhibitions exist in the knowledge sharing process, which could be caused by too rigid or vague rules, since it could cause the employees to be hesitant about which information and knowledge they are allowed, or supposed to share (Gurteen, 1999). If an employee does not know which knowledge is supposed to be shared and which knowledge could be detrimental to their own organization if shared, it will most likely impact the knowledge transfer negatively and cause the employee to vie on the side of caution and therefore hold back in the knowledge sharing process (Cabrera, et al., 2007).

Knowledge sharing is not an absolute, it is not certain to be either beneficial or detrimental to the organization (Cabrera, et al., 2007). According to Hendriks (2004), if the sharing is done with the purpose of teaching, and the one partaking in the information shared is doing it with the intention of learning, the sharing will have a positive effect. The opposite is true when the sharing has been done in a haphazard way, only transmitting parts of the knowledge or in an inaccurate way, since inaccuracies may in some cases not only have no positive effect but may even have an actively negative effect on the organization (Hendriks, 2004). Improving knowledge sharing is not the same thing as improving or stimulating a knowledge-sharing behavior or culture (Cabrera, et al., 2007). According to Hendriks (2004), the quantity of shared data can be increased with monetary rewards and the system of "force", while the quality of said data cannot. Maier (2007) describes one organization that experimented with objective metrics like the number of articles published in the corporate Intranet. Within a year they abandoned this practice as it only led to a flood of articles of questionable quality, but neglected other important KM goals like the reuse of existing

knowledge. Thus, it seems very important to design the reward system around the KM goals and ensure that the participants understand the system.

3.3.2 Knowledge Storage/Retrieval

Another of potential applications in knowledge management suggested by (Schacht & Maedche, 2015) are storing and retrieval of documented knowledge and management of documented knowledge. Knowledge storing is a big part of knowledge management, and is sometimes known as organizational memory (Stein & Zwass, 1995). This is based in the theory that while organizations keep acquiring new knowledge and learning new ways in which to apply this knowledge, organizations also tend to forget, or lose knowledge as time passes (Alavi & Leidner, 2001). This organizational knowledge is by Stein & Zwass (1995) defined as “the means by which knowledge from the past, experience, and events influence present organizational activities”. On one hand, keeping knowledge which is pertinent to the organization is important, while on the other hand this could also have a negative effect on organizational learning (Alavi & Leidner, 2001). The negative aspects are based in the possibility of reinforcing single loop learning (Argyris & Schön, 1978), which in turn could cause the organizational environment to become set in their ways and be more averted toward change. Despite these concerns of knowledge storage and organizational memory, there are positive effects from the use of IT-enabled organizational memory on the performance of the organization and the individuals therein (Alavi & Leidner, 2001). One medium for the enabling of intra-organizational memory storage and usage is the implementation of groupware, which gives individuals the ability to store both structured and unstructured knowledge in the organizational memory, which then will be available across time and space (Alavi & Leidner, 2001).

To ensure the quality of knowledge added to any system, a process of evaluation must be implemented (Lan, et al., 2012). Only evaluating the content is not enough, since if the creator of content evaluated as irrelevant or faulty will not know of this unless receiving the feedback from the evaluators (Coll, et al., 2013). Thus by giving users the ability to provide feedback directly, through communication, as well as indirectly through using, editing and commenting on content a feedback loop will emerge which serves to increase the quality of content (Lan, et al., 2012). Constant evaluation of new or edited content also serves as a continuous assessment of the validity of the information contained in these knowledge objects (Lan, et al., 2012). Having correct knowledge is in many cases even more important than having a lot of knowledge, especially so in knowledge intense situations where technical data must be correct (Lan, et al., 2012).

Maier (2007) states it's often assumed that more knowledge is always better, however, he found that this is not always the case. Increasing the quantity of knowledge doesn't automatically mean that the organization can leverage the knowledge efficiently and the knowledge the organization is gathering is not necessarily useful, knowledge is also constantly evolving and it should be replaced when better knowledge is generated. According to Maier (2007), low applicability of knowledge, restricting the accessibility of knowledge or restricting the underlying infrastructure of knowledge sharing results in inefficient knowledge management and that this can be avoided by paying attention to the quality of knowledge (Maier, 2007). Eppler (2003) has created criteria for the quality of information and their opposites, listed in Table 3. The criteria are grouped according to level, which are interpreted as suggested by (Maier, 2007):

- The infrastructure level deals with the quality of the system that conveys the content.
- The process level deals with evaluating knowledge processes and knowledge-intensive business processes.
- The product level covers aspects of the resulting knowledge object, i.e. its soundness
- The community level deals with the receivers of knowledge and covers the reconstruction process and the use of knowledge in the receivers' context.

| Level | Criterion | Opposite |
|-----------------------------|-------------------|-----------------|
| <i>Infrastructure</i> | Accessibility | Inaccessibility |
| | Maintainability | Neglect |
| | Security | Exposure |
| | Speed | Slowness |
| <i>Process</i> | Convenience | Inconvenience |
| | Interactivity | Rigidity |
| | Timeliness | Lateness |
| | Traceability | Indeterminacy |
| <i>Product(Soundness)</i> | Conciseness | Polixity |
| | Consistency | Inconsistency |
| | Correctness | Falsity |
| | Currency | Obsolescence |
| <i>Community(Relevance)</i> | Accuracy | Inaccuracy |
| | Applicability | Uselessness |
| | Clarity | Obscurity |
| | Comprehensiveness | Incompleteness |

Table 3: Quality criteria of information (Eppler, 2003)

According to Maier (2007) these criteria are of special importance when the aim is effective and efficient reuse of documented knowledge. Eppler (2003) also suggests activities to increase the quality of content. Maier (2007) states the institutionalizing of these activities in the form of roles or processes will improve the quality of documented knowledge. Eppler (2003) categorizes these activities into four groups; integration, validation, contextualization and activation activities. The integration activities include the visualization of concepts, listing of sources, summarization, personalization and prioritization of content. Examples of validation activities are evaluating sources, indicating levels of credibility and reliability and comparison of sources, among others. Contextualization activities handle the context of the data, such as linking content, stating target groups, showing purpose and describing background. The last group, activation activities, include notifications and alerts, demonstrating steps, asking questions, using metaphors and storytelling and providing examples.

3.4 Analysis model

The analytical model, based on the theoretical framework, created by the authors of this thesis is shown in Figure 7. That the same game elements can be used to drive both intrinsic and extrinsic motivation is shown by it being a homogeneous element that both meaningful and reward-based gamification are based on. Vassileva’s (2012) spectrum of motivation theories in psychology is adopted in a limited fashion to help the reader and authors to navigate among the spectrum of theories. This is the distinction between extrinsic motivation (driven by external rewards or pressure from the environment) and intrinsic motivation (driven by enjoyment or interest that the individual experiences from the activity) which can be found in existing game design (Vassileva, 2012). However, she states it is important to note that there is no claim that this classification has any larger validity. While the effects or even distinction of extrinsic on intrinsic motivation is disputed, there is a consensus that they exist together and that gamification can drive both. That the extrinsically driven reward-based gamification can be used to drive intrinsic motivation is visualized as meaningful gamification overlapping reward-based gamification, while the application of gamification to motivate employees is weighted towards meaningful gamification. Fitting the motivation of knowledge workers along the spectrum visualizes the emphasis on intrinsic motivation and the similarities with the needs of self-determination theory that were found in the literature. The parts of knowledge management where gamification can be applied are connected to the knowledge worker motivation, although the literature was vague on how this could be done. Assuring the quality of knowledge is important in both knowledge sharing and knowledge storage/retrieval, showcased by how it straddles both areas.

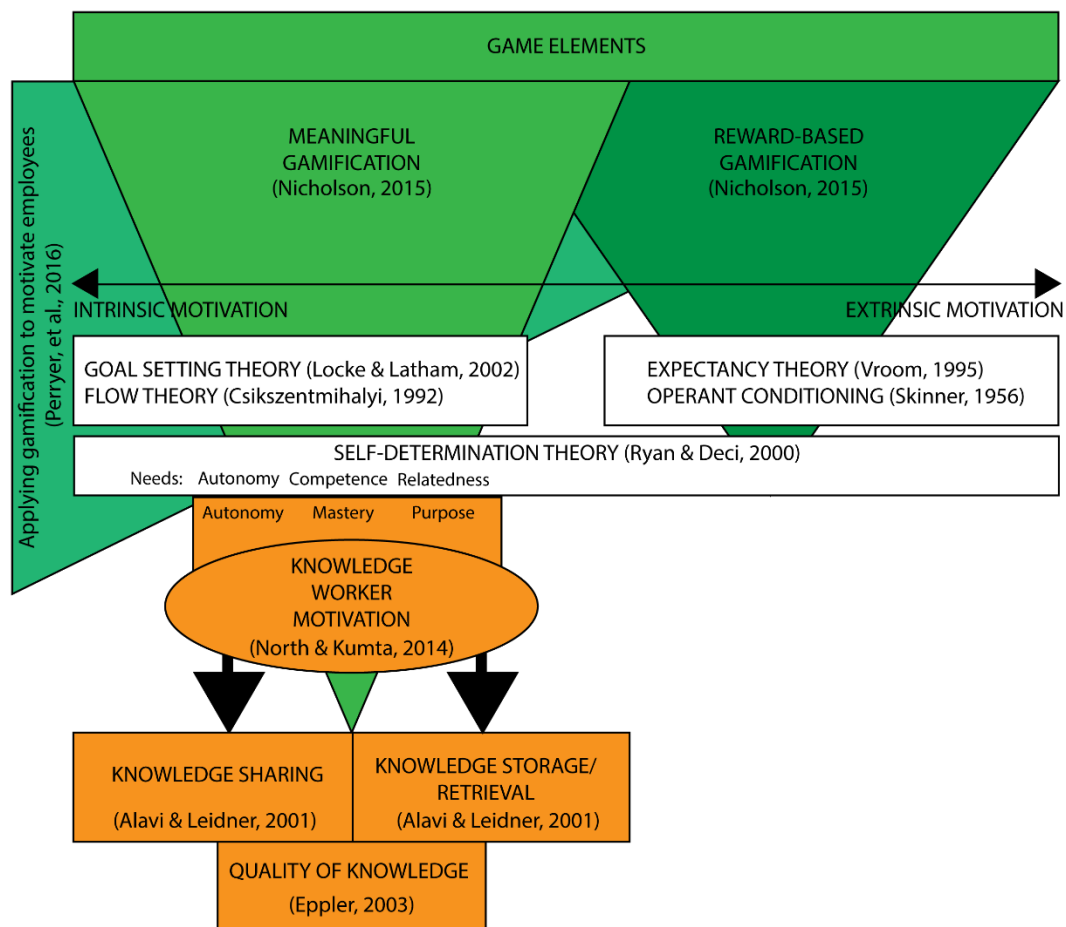


Figure 7: Analysis model

4 Empirics

This chapter gives a short introduction of the current state of Ericsson, and the desired state the organization is seeking to reach. This chapter also includes the relevant empirical findings, both from the group interview and the active data collected at Ericsson, as well as from the interviews conducted with independent consultants. The interview data represents the informants most interesting views and ideas, and is structured around the themes that were identified in the coding process. The interview data is displayed in the form of anonymized sentences and quotes, which was the way the data was coded, grouped according to themes that were identified during the interviews. The sentences are for the most part attributed to at least one informant in the form of their informant ID (for example, KMC#1 is the first knowledge management consultant that was interviewed).

4.1 Current state at Ericsson

The tasks of the engineers in the customer services include solving service requests which are submitted to Ericsson. Through the incoming service requests, the engineers analyze the problem described and try to find solutions through the existing knowledge in databases and through interacting with other engineers who may have faced similar requests. If an engineer in the first line of the request process does not have the ability to solve the request, it is then forwarded to the engineers at the second line, who then handle the request and attempt to find a solution.

Today, the reuse of knowledge objects in databases is far below the target values, where a knowledge object is defined in the thesis as a unit of documented knowledge, as text, pictures or other forms of codified knowledge. This has caused the time spent on solving customer requests to be longer than was intended when the tools for recording and using documented knowledge were implemented. A new way of working with knowledge is therefore necessary, and this new way of working must be engaging for employees on all levels. As a measure to ensure that this improves in the future, the company has created a knowledge management transformation group, whose purpose it is to learn from what exists and steer the customer support towards a new way of working which entails the acquisition, codification, utilization, and curation of knowledge objects. The presence of knowledge objects is obvious in most parts of the organization, which shows that the environment is suitable for the implementation of an application designed for the managing of such objects. The company however lacks the necessary tools to make such an application engaging for the employees, in such a way that the employees are motivated to use it because it is enjoyable and they feel there is a purpose and a value in their actions, instead of being just another chore that must be done.

“Knowledge management has been an obligation as of today, and the tools are not very user-friendly. The tools are not made for the user so the user does knowledge management tasks because they have to. It is being used, but not being used to its full capacity for that reason.” - Group

Apart from the fact that there are currently very few implementations in the systems at Ericsson aimed at keeping worker motivation high through intrinsic motivators, there are issues with how the culture of Ericsson has not fully adopted the fact that Ericsson is a global organization with members throughout the entire world. This has resulted in a lack of a feeling of connection to all the other employees within the organization, and thus the organization has in a way formed knowledge “silos”, which limit the transfer of knowledge between different parts of the organization. The systems in use at Ericsson today are quite complex and structured, which limits the availability of knowledge further. As described by the participants of the group interview, the

depth of knowledge in Ericsson is not an issue, the problem is the availability of that knowledge. The search for knowledge is also impacted by the lack of an automated system regulating the internal databases at Ericsson, resulting in them being full of knowledge objects which are rarely use. This in itself is not a strange occurrence considering the amount of service requests handled every day by engineers at Ericsson. The amounts of data which are entered into the knowledge systems are vast. The problem lies in the fact that these objects lie dormant, and there is for now no automated clearing of these dormant objects.

4.2 Desired state for Ericsson

As a part of the desired state for employees at Ericsson, a change in how tools are used were mentioned during the group interview. One of the points brought up by the engineers was the desire to not need so many different tools to complete their assignments. Today, there is a great amount of programs and applications available to the users, but there is no comprehensive way to understand which application should be used at any given time. The desired state in this area, according to the engineers would be the ability to use a single application for all purposes involving the completion of their assigned tasks. Such an application for the integration of all tools into a single application is currently being developed as a project at Ericsson, but is far from the stage of being ready for implementation. The recommendations of this thesis are meant to be a part of this new all-encompassing tool being developed.

"Most of the time we don't find solutions to service requests just from the program, but from our contacts." - Group

A better implementation of social networks was also brought up as something the engineers wanted in the future. As a part of how the employees solve their tasks, it was mentioned that communication among engineers was a big part of how solutions to problems were found, as opposed to retrieving knowledge from a database. The ease of contacting other users and how the user-to-user knowledge transfer is recorded would help employees in their daily tasks.

The desired state from the perspective of the organization is that the engineers at the first line should have all the knowledge readily available when they need it for them to solve all the requests they receive. This study and the results thereof was created to answer the question of how a gamified application for motivating users to engage in knowledge management activities could be developed and designed and what is important to consider. It was created with the environment and current state of Ericsson in mind as well as the perceived desired state.

4.3 Interview data

In this section the relevant empirical findings are presented according to the themes that were identified during the early stages of the analysis. The different statements are attributed to the different informants, where the individual informant IDs can be found in Table 2 and the group interview is referenced as Group.

4.3.1 Focusing on IT

When applying gamification to motivate employees, multiple informants raised the issues of focusing on the applications and disregarding the human factor. KMC#2 stated that a problem with implementing knowledge management in larger IT firms is that they become too focused on IT-applications and overestimate their ability to solve issues with, for example, knowledge sharing. This was echoed by GC#2, who said that changing culture is likely not possible if there is an over-reliance on IT-applications and gamification, while neglecting other aspects. What can be done with gamification is amplifying the existing desirable parts of an already existing culture to slowly change it in a more favorable direction for the organization (GC#3).

“If you look at where the value or importance in a firm is with regards to knowledge management I would say that 70% is with the people and the culture, while 20% is with the processes and only 10% is with the IT used.” – KMC#2

4.3.2 Organizational support

KMC#2 and GC#3 further stated that knowledge management and gamification applications which impact the existing culture must be implemented carefully and that one way of increasing the likelihood of success is by involving all levels of an organization in the implementation. Mere acceptance of the initiative would allow it to have a chance of succeeding, but if management took an active part in engaging with the application and its use it would increase the chances of successful implementation tremendously (GC#3). By showing the users that they consider the application useful, management highlights the importance of partaking in the initiative (KMC#2). If management views the implementation of an application with indifference or even skepticism, the users themselves will realize this and deem such a system unimportant and would be very reluctant in their participation (KMC#2).

4.3.3 Understand the current environment

Another important aspect to consider, that was raised by KMC#1, KMC#2 and GC#1, is that the environment that the knowledge management and gamification application is introduced to. If the environment is not suitable for the kind of implementation you want or vice versa, the system will most likely not be a success and may even cause more harm than good (KMC#1). Simply deciding that an organization should implement a certain database system or a new platform or tool because it seems to be a good enabler for knowledge management, first you must look at the environment already in place and decide how it would fit into this environment (KMC#2). Creating new tools and interfaces that are similar to what the users already use minimize the risk of learning an entirely new system becoming bottleneck in the implementation (GC#1).

4.3.4 Transparency

KMC#1, KMC#2 and GC#1 also raise the topic of transparency. Being transparent and open when changing the environment of the employees is important, especially if it is such a big change as trying to give the organization a knowledge sharing culture or when implementing a knowledge management strategy (KMC#1). It is important whether it is gamification or knowledge management, because if you try to trick the user into following a certain path you have decided or try to manipulate them into doing the things you want them to do, the chances are that they will realize, in which case the system can have little or even an adverse effect (GC#2).

“I think it is important to be honest and say “Look, it is going to take some time for this to make a difference, I need your help”. – KMC#2

4.3.5 Iterative user-centered design

GC#1 and GC#2 stated that designing a system or process where you would apply gamification to maintain user motivation over a long period of time puts pressure on the organizations ability to evaluate the needs and wants of the users. They further suggested that focusing on the human element in the design process is the most appropriate way to approach such an undertaking. KMC#1 also pointed out that knowing the users is critical when creating a new system, however, understanding what the users want from a system and what they expect is difficult. GC#2 echoed the importance of user-centricity and stated that it is always up to the users if they feel the user experience is good or bad, and for any system to be implemented successfully it must first pass the test of user acceptance. KMC#2 and the group interview further stressed the importance of an iterative process. Continuously evaluating the design of a system focused on user interaction, is an important part of the implementation of such a system (KMC#2). Constant reevaluation of the tools and processes used in any system is a must, and especially so when designing a system which will be used by many people of different competencies and motivations (Group).

KMC#1 also suggested that in order for an implementation of a knowledge management system to be successful, it must be practical, pragmatic and show the user there is value in using the system. While GC#3 stated that the strength of gamification is that you have an incredibly large toolbox to use to tailor the design to include elements that fit the users (GC#3).

Involving the user was another important aspect according to the group interview, not only in evaluating the design of such a system, but in giving iterative feedback in how it is used and implemented must be a foundation in the process. They further suggested that another benefit of involving the actual users is that they can discern flaws in a system that others would miss. GC#2 further highlighted that through feedback from users and constant iteration of the design it is possible to find a system which is suitable for most users. However, implementing something which is received positively by every user is almost impossible. The importance of an iterative implementation process was echoed by GC#3, who stated that there are hardly any instances where you implement a system and it can run in perpetuity without adapting it to how it is used.

4.3.6 Goals and measuring performance

KMC#1 said that in order to ensure that the implementation of an initiative of knowledge management is successful, one must first decide what would be viewed as a successful implementation. If you do not decide on what would be a successful implementation, setting goals to reach success is impossible (KMC#1). According to GC#1, business metrics must always be integrated into the design of implementation whether it would be knowledge management or gamification. Business metrics should always be used in such an implementation to make sure there is a clear purpose of the system to improve organizational competitiveness, which also serves as a way of proving to the user that using the system will be valuable to both the individual

and the firm (GC#1). KMC#1 further stated that having clear definitions of what a successful implementation would be is not important only for the purpose of having clear goals, but also in order to ensure that you can show to the users that what they are doing is important and is showing results. This was echoed by KMC#2, when setting up a strategy for implementation of a new system it is important to connect the metrics to business goals and values to be able to show that using the new system actually has an impact on the competitive advantage of the organization. Generally, the success stories of gamification implementations have been in the area of efficiency gains, probably because that is generally where life is easier, and more quantifiable (KMC#2). However, according to KMC#1, the optimal goal of an implementation of a knowledge management initiative must be to continuously improve the organizations competitiveness, which is a metric that is quite hard to measure.

4.3.7 The use of points

GC#1 highlighted that points always misrepresent actual performance to some extent, quantifying performance and assigning points in such a vague scenario as knowledge management is almost impossible. The use of elements involving the tracking of user statistics or performance indicators was also an issues raised during the group interview, where the informants stated that it will always be a source of unrest and controversy in an organization. GC#2 also voiced concerns regarding the use of points in a system designed for sustainable knowledge management, since these motivators are inherently limited over time. Both GC#1 and GC#3 stated that creating short-term engagement through extrinsic rewards such as points etc. works well for a while, but might in the long-term be detrimental. However, GC#3 suggested that you can use these extrinsic elements from time to time to make it exciting and push up the motivation for a little while and create a form of structure that allows the user to reach intrinsic motivation.

4.3.8 Autonomy

GC#1 stated that one important motivator when talking about long-term engagement is empowerment, sometimes known as autonomy and the freedom to make choices. GC#2 stated that in order to ensure the users keep their motivation, it is imperative that the user is presented with choices and challenges rather than a set list of tasks to perform that gives them little option in choosing how to traverse the path towards the goals the user and the employer have decided.

According to GC#1, autonomy in a scenario of gamified knowledge management could include a system of rewarding participation with the ability to influence greater areas of the process, such as editing and commenting on other users' additions to the knowledge base or tools to show a user's competence through responsibility regarding curating and disseminating knowledge. GC#2 stated that the system must include the freedom of choice in participating in the use of the system as well, since force rarely works in motivating engagement past the point of what you are absolutely required to perform. Forcing someone to perform a task might work short-term, but it will never create a lasting desire to perform well, according to KMC#3. In order for there to be a long-term motivation, there has to be a base desire to perform a task, gamification is not something that will instantly motivate people into doing something for a longer period of time, if they themselves do not deem it worth the effort (GC#1). You can motivate people to do something through rewarding certain behavior, or punishing a certain behavior, but these will not create an intrinsic desire to perform these tasks (GC#1). This is why long-term motivation is so hard to accomplish, and why voluntary participation is such a crucial aspect to any implementation that depend on individual long-term motivation (GC#2). If the user is already doing the task you intend to gamify then the gamification will serve as an additional motivator, but if you try to gamify something that is mandatory and something the user would not choose to do if not being forced, it is hard to say if gamification would have a positive or negative effect (GC#3). Gamification is merely a motivator which could enable users to move in a direction, but as with all other changes, it must be voluntary (KMC#3).

The group interview and GC#3 both stated that games in general polarize people, some hate games and their mechanics, finding them unnecessary or unserious in a work situation while others would find such elements highly intriguing and motivating. They suggested that allowing users a choice of participating would avoid uninterested employees becoming demotivated by being forced to use the application.

4.3.9 Meaning

Another important motivator, according to GC#1, when talking about long-term engagement is meaning or purpose. GC#2 suggested that a good way to create long-term engagement for sharing knowledge is with the integration of social aspects, such as the feeling of teamwork and communal goals. Creating common goals can be accomplished through creating a sense of epic purpose in the work, according to GC#1.

“Your narrative cannot be ‘Hello, dear participant, do this and get points’, it must be more like ‘Hello, dear participant, here are some challenges for you and a story, try to find out what is at the end while increasing your competence’”. – GC#3

According to GC#2, any organization which has created an inherent epic purpose in their business model, for example focusing on environmental issues with the purpose of creating a better world must safeguard this purpose. Using such a purpose is very helpful to motivate users, but it is also a risk if this purpose is not handled with care (GC#2). If the example organization with the epic purpose of furthering environmental issues is proven to not be very environmental-friendly themselves, the epic purpose disappears and would create a huge drop in the motivation of its employees who have used this epic purpose as a source of motivation, and would most likely cause these users to have less motivation than if there had been no epic calling from the start (GC#2).

“If there is a discrepancy between the feel of using the platform and the feeling of engaging with colleagues at work, gamification will not work. There has to be harmony between the virtual culture and the perceived real-life culture.” – GC#2

4.3.10 Community

GC#2 and KMC#3 both suggested the benefits of communities. In most forms of learning there is an aspect of teamwork or teacher-student relationship, which is because we tend to learn faster when we can discuss and solve problems as a group (GC#2). Social influence also acts as one of the strongest forms of motivation, in that people have for the most part a wish to help others and feel empowered when they have the ability to do so (GC#2). Communities are a powerful tool for learning and increasing competence because there is a discussion around the issue and not simply a linear form of learning (KMC#3). Being able to directly communicate through social media channels with the creator of a knowledge object or the owner of a specific product to ask for specific guidance and discuss issues, which would take far longer if going through the standard process of creating a request for help or commenting on a post (KMC#3).

4.3.11 Competence and mastery

GC#1 brought up a third important motivator when talking about long-term engagement, feeling a sense of accomplishment or mastery. GC#2 suggested a similar motivational factor and stated that what you must do in order to create lasting motivation is show the user that through challenges, they are improving and moving forward.

GC#3 also raised that through constantly challenging the user and push them to face harder obstacles one can keep engagement high over a longer period of time. KMC#3 raised an issue with this approach, to achieve long-term motivation the goal is empowering the users to decide among

themselves what they need and how to achieve this, the problem is that usually the users don't really know what they actually need to make their own environment more useful in handling their work. GC#2 suggested that creating engagement loops by dividing the problems in smaller parts which are challenging but not insurmountable, and still so difficult and diverse that they do not become monotonous will allow users to continuously grow and learn. This in turn will create progression loops where the users will try to solve harder and harder problems, creating a hopefully exponential possibility of growth (GC#2).

4.3.12 Competition

KMC#2, GC#2 and the group interview also raised the dangers of competition. A factor which is dangerous when implementing a reward-based system to such actions as knowledge sharing and curating is that competitions foster a mentality of keeping an advantage over others, which in turn would most likely result in people hoarding knowledge for the sake of winning (KMC#2). Unless being clear about what is expected and having good reasons for doing so, implementing mandatory elements of competition could have negative effects on the motivation of some individuals (Group). Using extrinsic motivators like leaderboards and other such elements of competition in a system designed for sustainable knowledge management is hard, and one must be wary of the potential effects on intrinsic motivation (GC#2). The group informants suggested that allowing the users to choose to compete on a collective level allows the users who don't find it motivating to ignore it.

4.3.13 Content management

According to KMC#3, in many cases, somewhere around 20% of users contribute up to 80% of the content, and if you can engage these users in not only content creation but also moderation of each other's content and the curation of data, the strength of such a knowledge database would increase tremendously. For users to be able to moderate the content themselves, and to ensure a smooth content curation overall independent of the system used to moderate content, having the data codified and systemized in a consistent and intuitive way so that even users who are not intimately familiar with the product or process can understand the data is imperative (KMC#3).

The focus of a knowledge database must be on the accessibility and trustworthiness of information, in tandem with the fact that it must be available to every single user at all times (KMC#3). This means that information cannot be divided into silos of information with different departments using different taxonomies and formats for their information (KMC#3). The main point of a similar taxonomy is consistency, information in a database cannot mean different things to different people to such an extent that it is up to the user to interpret the information and apply it to their own area, unless that is the specific purpose of said information (KMC#3). KMC#1 added that the information must be interchangeable between departments and must always be moving between users of different needs, to make sure multiple instances of the same information does not flood the database and impair the search for relevant information (KMC#1).

According to KMC#3, if the process of finding the information is too complicated or counterintuitive causing the search for the information needed to take up a lot of time the effectiveness of knowledge management is severely diminished. If the information found when searching for information you need is in a convoluted format or is in any other way coded in such a way that you first need to understand how to access and make use of the information, the power of said knowledge also critically impairs its usefulness (Group).

4.3.14 Feedback

GC#1 suggested that giving users the power to provide feedback on content in the database will ensure continuous learning and development of the knowledge and how it is used. In giving the users the power to evaluate and influence the content it is important to keep in mind that different users have different views and priorities, which is why the balancing of such feedback options must be carefully considered (GC#1). Designing a structure of the system or interface in such a way that it enables assessment of others as well as self-assessment will not only improve future performance but will also give the users a way to easier see what next step to take in the process (GC#3). When managing the process of making information and knowledge readily available for use by others, having correct and trustworthy information is as crucial to the knowledge management as the availability (KMC#3). Even if knowledge is at your fingertips and you understand it, if it is not consistent in what it entails or is in any other way incorrect in its data or in how it is codified, using said knowledge may even be detrimental to the purpose of finding said knowledge (KMC#3).

5 Analysis and synthesis

In this chapter the empirical data is compared with the theoretical framework, analyzed and synthesized into statements that summarize and reflects the authors' understanding of the topics. The topics analyzed are the application of gamification to motivate employees, meaningful & reward-based gamification, meaningful gamification & knowledge worker motivation, and motivating knowledge sharing, storing, retrieval & quality of knowledge.

5.1 Applying gamification to motivate employees

In this section the theory and empirics are analyzed regarding the use of gamification to motivate employees in knowledge management.

As stated by KMC#2, GC#2 and GC#3 technically focused organizations tend to overly rely on the use of IT as a solution to knowledge management goals. What was inferred from the interviews is that using IT and gamification could help the process of increasing engagement in knowledge management, but there must be a cultural inclination toward participation in knowledge management implementations for these systems to have an effect. Therefore, gamification and the use of IT systems only serve as enablers to further drive the existing engagement. Dale (2014) shares this view and cautions against focusing on aspects of the technology and the mechanics of gamification applications rather than on the people. This is in line with Perryer, et al. (2016)'s holistic and long term view of gamification and North & Kumta (2014) as well as Maier (2007)'s view of knowledge management as more than IT. The following statement is synthesized to reflect that gamification is a tool that should be part of a broader knowledge management initiative.

Summarizing statement: Gamification and IT systems can be used as an enabler and part of a broader knowledge management strategy, but should per what was found not be the sole driving force

Per KMC#2 and GC#3, having support from all levels of an organization is important with regards to the implementation of knowledge management and gamification systems. Securing the support of management is especially important, and involving management in the use of the system greatly increases the chance of it being accepted and successful. By having management support, the risk of failure when implementing gamification can be reduced which, according to Neeli (2015), is important since failure can derail further programs and initiatives. But it is not only the managers who need to engage in the system for it to have a chance for success. If managers are engaged in the application but one's coworkers are not, then you lose the sense of relatedness and social relation needed for intrinsic motivation (Aparicio, et al., 2012). The statement below is synthesized to reflect that support is needed from all parts of the organization and that getting management to use the application is epically important.

Summarizing statement: Securing support for the system on all levels of the organization and engage management in its use is important

As mentioned by KMC#1, KMC#2 and GC#1, matching any new implementation to the existing environment is important. The first part of this is understanding if the system fits into the environment, and if it does, how it can designed too smoothly integrate into the environment. If a

new application requires too much effort to learn or integrate into the existing ways of working, the potential for success diminishes immensely. One potential example of this could be, as stated by Neeli (2015), that mechanics like rewards, statuses, etc., are typically used to indicate the ability of players within the gamified environment, but in the workplace, these gamified mechanics can conflict with organizational roles. In this summarizing statement, the importance of understanding the current environment is highlighted.

Summarizing statement: Understand if and how the system fits in the current environment

As stated by KMC#1, KMC#2 and GC#1, transparency and openness when doing any changes to the working environment is especially important if you are trying to create a cultural change, whether it is with gamification or knowledge management. They also point out that attempting to manipulate employees is ill advised, since it will be detrimental to the organization if the manipulation becomes known. Transparency can perhaps also assuage fears, like the one stated by Gurteen (1999), that if an individual shares knowledge their worth to the company is lessened. Schacht & Maedche (2015) proposed that gamification could add another level of control and pressure as a potential negative effect, which could be avoided by being transparent about why it is being implemented. The following statement is formulated to avoid misunderstandings and the negative effects this can have.

Summarizing statement: Being transparent and sharing knowledge about why and how gamification and knowledge management is implemented helps avoid the system being viewed as a tool of manipulation

According to GC#1, GC#2 and KMC#1, applying gamification to maintain motivation over a longer time puts pressure on the organizations ability to evaluate the needs and wants of the users. Knowing the users and involving them throughout the entire process, from the design to implementation is important, and was mentioned in some way by all the informants contacted. The group informants, GC#2 and GC#3 raised an iterative approach as a critical part of the development and implementation processes. Nicholson (2015) states that a key to building intrinsic motivation is if the application is centered around the user's benefits, indicating that to understand what benefits the use is of great importance. Both North & Kumta (2014) and Schacht & Maedche (2015) state that user-centricity is important for both knowledge management and gamification respectively, which together with the empirics were summarized into the following statement.

Summarizing statement: User-centered design and an iterative development and implementation process that involves the users is important

According to GC#1, KMC#1 and KMC#2 the metrics used in gamification must be connected to performance towards business goals. They further state that although metrics pertaining to knowledge management are hard to quantify a successful implementation must be defined in order to be able to reach success and to show the users that the application is useful. Schacht & Maedche (2015) proposed improvement of quantity instead of quality as a critique of gamification, and the example given by Maier (2007) describes how the wrong measurement in knowledge management caused a flood of low quality content. The summarizing statement is a reminder of measuring the right thing, connecting the metrics with the actual goals of the application.

Summarizing statement: The metrics used in gamification should be connected to performance towards business goals, however in knowledge management the goals can be hard to quantify

Points, according to GC#1, to some extent always misrepresent the actual performance rendering these points. During the group interview, the tracking of user statistics or performance indicators were brought up as a potential source of worry and unrest among employees. Therefore, creating metrics to track which correctly reflect the real contribution of the user, although difficult, is important. Even though individual performance is a useful tool in gamification (Nicholson, 2015), being successful in the gamified system does not necessarily correspond to the equivalent success in the users assigned work tasks, as stated Neeli (2015). With regard to knowledge sharing, as stated by Gurteen (1999) and Cabrera, et al (2007), aligning the personal ambition with the organizational ambition is very important and if the metrics do not reflect the reality of the individual it may create dissonance between these ambitions. This summarizing statement captures the need to measure the right contributions, connecting the metrics to reality.

Summarizing statement: Creating metrics that correctly reflect the reality of individual performance in knowledge management is difficult but important, and the use of performance indicators may have negative effects on the users

5.2 Meaningful & reward-based gamification

In this section, the theory and empirics are compared and synthesized into a statement regarding the overlap between meaningful and reward-based gamification, or intrinsic and extrinsic motivation, and the potential of the latter driving the former.

According to GC#1 and GC#3 using points to drive motivation and creating a short-term engagement works well, but might create negative effects in the long-term. GC#2 mirrors this statement in describing the difficulty of creating lasting motivation through the use of points, since points are inherently limited, and the value of the points will drop over time. However, GC#3, goes on to describe how the use of extrinsic elements can sometimes make something a bit more exciting, while it creates a structure allowing the users to reach intrinsic motivators, but points in themselves can never make user reach intrinsic motivation. Landers, et al. (2015) also state that gamification can utilize both intrinsic motivators and extrinsic rewards. The dangers of replacing intrinsic motivation by making the system about chasing extrinsic rewards like points is something mentioned in the literature (Nicholson, 2015) (Roy, et al., 2015) (Heinzen, et al., 2015) (Schacht & Maedche, 2015), however to what extent there is a danger of completely replacing intrinsic motivation with extrinsic rewards is disputed (Ledford, et al., 2013). This summarizing statement recommends a cautious but practical approach to the issue.

Summarizing statement: Use extrinsic rewards with care to create a structure and to guide the user into being intrinsically motivated, becoming over reliant on extrinsic rewards is dangerous as it may replace intrinsic motivation

5.3 Meaningful gamification & Knowledge worker motivation

The theory and empirics are here compared and synthesized into statements with regard to intrinsically motivating meaningful gamification needs and the intrinsically motivated knowledge workers' needs.

5.3.1 Autonomy

Autonomy, which is sometimes also known as empowerment, is an important factor of long-term motivation as described by GC#1 and GC#2. The use of autonomy in a gamified application boils down to the ability to make choices and be presented with appropriate challenges. Giving users the ability to influence the path taken towards a certain goal and responsibility regarding curation or dissemination of knowledge feeds into this intrinsic need for autonomy. As explained by Maier (2007), knowledge workers require less direct supervision and direction, and are motivated by having a higher degree of freedom. This is further corroborated by North & Kumta (2014), who state that the quest for autonomy which mirrors the need for autonomy of Deci & Ryan (1985)'s self-determination theory, is important to knowledge workers. The following statement raises the user's need for autonomy as a cornerstone of the gamified experience.

Summarizing statement: The users should experience a sense of autonomy when engaging with the system

Although voluntary participation could be attributed to the need for autonomy, it was mentioned and discussed in such detail by KMC#3, GC#1, and GC#3, that it was deemed deserving of a separate statement. According to these participants, forcing an employees to perform a task may work in the short-term, but to create lasting motivation, voluntary participation is key. Voluntary participation can be argued to be the first step to introduce a feeling of autonomy, which is important in gamification since loss of freedom was a potential negative effect of gamification (Schacht & Maedche, 2015). Furthermore, Mitton, et al. (2007) also describe that forcing people to perform activities rarely works, and when it does work it is only for a short period of time and is ineffective. This together with Davenport & Prusak (1998) definition of knowledge sharing as a voluntary act further corroborates the need for voluntary participation. The summarizing statement below clearly marks this as an important consideration that cannot be dismissed.

Summarizing statement: Voluntary participation in the gamified system is important when trying to achieve long term motivation for knowledge management

5.3.2 Purpose and relatedness

Purpose, or meaning, was by GC#1 mentioned as an important motivator in long-term motivation. GC#2 suggested social aspects as a good way of reaching this type of purpose, these aspects would include a feeling of teamwork and communal goals. According to North & Kumta (2014), the need for purpose is important to knowledge workers, and purpose as described by Aparicio, et al. (2012) shares similarities with the need of relatedness of Deci & Ryan (1985)'s self-determination theory. A benefit of gamification identified by Schacht & Maedche (2015) is its use to create group identification and team building, this combined with the sense of common goals a purpose provides is the basis for the following statement.

Summarizing statement: The users should feel related to other users and a sense of being part of a bigger purpose when engaging with the system

Safeguarding an existing epic purpose in an organization is imperative, and creating a sense of this purpose for the employees is important for their motivation, as stated by GC#2. Creating a narrative which serves to challenge the user's skill and creating a compelling story for the user to engage in would give the organization such an epic purpose according to GC#3. The following statement deals with the same sort of dissonance as described in previous statements, but is aimed at the narrative and experience of the system rather than the metrics.

Summarizing statement: Keep the gamified narrative aligned with the business narrative

Social influence, as stated by GC#2, acts as one of the strongest motivators, in part because people wish to help others and feel empowered when they are able to do so, and partly due to teamwork being one of the most important enablers for learning. Using discussions as a tool for comprehension and learning was also mentioned by KMC#3, as a powerful force for any organization to harness. Jayasingam, et al. (2016) say that collaboration is an important part of knowledge work and North & Kumta (2014) suggest that a motivational factor for knowledge workers is a culture of openly sharing information. Jing (2015) however point out that there is an inherent hesitation to share knowledge because fear of criticism, however a big part of knowledge management is evolving and improving knowledge (Maier, 2007). As suggested by Aparicio, et al. (2012), by using groups and messages as well as connections to social networks, blogs and chats can satisfy the need for social relation. This summarizing statement is synthesized to capture the need for users to be recognizable as people and that discussion and collaboration is an important part of knowledge management.

Summarizing statement: Users should be able to identify and interact with other individual users or groups that possess relevant knowledge

5.3.3 Competence and mastery

Accomplishment, or mastery, is per GC#1 one of the core motivators for long-term engagement, and GC#2 suggests using challenges and progressions to show the users that they are improving and moving forward. This is an important part of knowledge worker motivation according to North & Kumta (2014) and shares a similarity to the need for competence of Deci & Ryan (1985)'s self-determination theory and Nicholson (2015)'s meaningful gamification. The following statement highlights the need to create an experience that satisfies this need for competence and mastery.

Summarizing statement: The users should feel that their competence is developing and experience a sense of mastery

GC#3 stated that one way to keep motivation high over a longer period of time is to use increasingly difficult challenges, pushing the user to overcome tougher obstacles continuously. Dividing larger problems into smaller parts and making the user challenge these through creating engagement loops, making the tasks difficult enough to remain interesting but not hard enough to dissuade the user from trying will, according to KMC#3 and GC#2, allow users to grow and learn while keeping their interest. This is corroborated by Locke & Latham (2002) and Vroom (1995), who respectively state that if the goal is unrealistic to the users then they will not be committed

to the goal or take action to reach it. While flow theory states that maintaining a balance between complexity and capability is of utmost importance (Csikszentmihalyi, 1992). If a user feels the task is too simple, it will eventually turn motivation into boredom, likewise if the task is too difficult, it will cause anxiety and pressure to rise in the user which also drops motivation levels (Nicholson, 2015). Landers, et al. (2015) suggest creating small sub-goals within the gamified system allows the user to boost their confidence in their ability to attain the greater goal. The summarizing statement below indicates that the difficulty of the challenges in the application should match the users' competence, while keeping the need for autonomy in mind.

Summarizing statement: Challenges of different levels should be available to the user, allowing them to match their level of competence to the difficulty of the challenge

According to KMC#2 there are dangers to consider when implementing reward-based applications. Actions such as knowledge sharing and curating could be negatively impacted by competition since it could result in the hoarding of knowledge to gain a competitive advantage. GC#2 and the group participants elaborated on this, saying that clarity regarding what is expected and explaining why competition is being used could reduce the negative impact, but careful consideration is necessary. Allowing competition on a group or team-based level could give some users motivation according to the group participants, but to what extent the user group as a whole would enjoy this type of competition is unclear. That excessive internal competition can limit knowledge sharing is echoed by North & Kumta (2014). Aparicio, et al. (2012) state that in order to fulfill the need for competence, or mastery, one must feel challenged, and one way of doing this is through competing with other people through, for example, leaderboards. Competition is not necessarily an intrinsic motivator to all individuals, however it might be possible to use competition to increase the feeling of relatedness in a group. This statement reflects that mandatory competition on an individual level in the case of knowledge management probably is not appropriate, but that competition on a group level can be a useful tool.

Summarizing statement: Avoid competition on an individual level, careful use of competition on group level can be beneficial

5.4 Motivating knowledge sharing, storing, retrieval & quality of knowledge

The theory and empirics are here compared and synthesized into statements with regard to knowledge sharing, storing, retrieving and the quality of knowledge.

According to KMC#3, usually there is a group of people constituting about 20% of the workforce who contribute up to 80% of the content. Engaging these people is extremely important to an organization, and letting them have the freedom to create and moderate content would be very beneficial to the knowledge database of any company. KMC#3 further states that having data codified and systemized in a consistent and intuitive way enables user who are not intimately familiar with the content to evaluate its usefulness and use the knowledge. Empowering the users is an important factor when creating a system which aims for long-term motivation, and interactivity is one of the main elements for a functioning process in a system where information quality is the purpose (Eppler, 2003). He also describes this when listing activities which enable the efficient reuse of knowledge. He calls them validation activities and they include evaluation of the source of the material, as well as indicating the level of credibility and reliability the knowledge object has. The following statement summarizes this need for engaging and empowering the users through database interfacing and management.

Summarizing statement: Engaging and empowering the users in content moderation by creating an intuitive interface increase the usefulness of knowledge databases

Accessibility and trustworthiness of content should according to KMC#3 be the focus of any knowledge database. Therefore, information cannot be divided into silos where different departments use different taxonomies and formats. There must be a consistency to the knowledge gathered, making it trusted enough for direct use by any user of the application. KMC#3 further states that in order to ensure this, users must be empowered to use and interact with all the information available, and they must know how to create knowledge content which follows these quality criteria. The value of having trustworthy information is huge, and if knowledge cannot be trusted, then it is not worth much. One of the principal areas of Eppler's (2003) criteria for quality of information (Table 3) is soundness of knowledge. A problem that could arise from this focus on trustworthiness of content is that it may be an inhibitor to some user who do not feel confident enough in their content to dare share it to the community (Jing, 2015) (Cabrera, et al., 2007). Knowledge sharing can also be negatively affected in the form of too rigid or vague rules for the sharing of information and knowledge (Gurteen, 1999) (Cabrera, et al., 2007). The statement below is a combination of the need to ensure the trustworthiness of knowledge as well as making sure the users understand how to create quality knowledge.

Summarizing statement: The trustworthiness of knowledge must be ensured and the user should understand how to share and store quality knowledge

Any shared knowledge must, per KMC#3, be entered into a common knowledge base which is accessible by all users. This is in part to get away from the mentality of "silos", where different departments in some cases view their knowledge as proprietary. KMC#1 further iterates this by stating that knowledge which is now moving has lost its value to the organization. This together with the previous statement regarding trustworthiness proves that accessibility of knowledge is imperative. As reflected by Eppler (2003)'s criteria of accessibility (see Table 3) and explained by Maier (2007), restricting the accessibility of knowledge or the infrastructure for sharing

knowledge has a negative effect on the value of the knowledge. This is reflected in the following summarizing statement.

Summarizing statement: Accessibility of the system and the knowledge it contains is important

Feedback and self-assessment were by GC#1 and GC#3 discussed as potentially the most important aspect of continuous evolution of employees, and this evolution in turn creates motivation. Giving the users themselves the ability to give others continuous feedback also gives a greater motivation than simply receiving feedback. GC#3 states that giving such feedback also gives the users a way to see what the next part of the process would be. Aparicio, et al. (2012) proposed that feedback as a tool can be used to create a sense of competence while Lan, et al. (2012) and Coll, et al. (2013) stress the need for feedback to ensure the quality of stored knowledge. The last statement highlights the necessity of feedback to ensure quality, and its use as a means of empowering the user.

Summarizing statement: Feedback is a key point in managing knowledge and ensuring quality of content, while allowing users to learn and grow through assessment of themselves and others

6 Results

In this chapter the results of the thesis are presented. The first result presented are the twenty guidelines based on the summarizing statements of the analysis. After the guidelines, the prototypes that were created over the course of the study are presented. This is followed by an overview of the concept of a gamified knowledge management application and more in-depth descriptions of the different parts of the concept. This concept is largely based on and supported by the guidelines.

To answer what can be important to consider when creating a gamification application for increased long-term motivation in knowledge management activities at a knowledge intense workplace, a set of guidelines were formed. The summarizing statements from the analysis and synthesis chapter were used as a base for these guidelines. Some changes were made, mostly in the form of specifying the statements and aligning them more with guidelines for creating an application rather than general statements for what to keep in mind when handling systems. The summarizing statements from the analysis and synthesis chapter were thusly through this process refined into the following guidelines to consider when attempting to develop a gamified application for long-term engagement.

Guideline #1

Gamification and IT applications can be used as an enabler and part of a broader knowledge management strategy, not as the sole driving force

Guideline #2

Secure support for the application on all levels and engage management in its use

Guideline #3

Understand if and how the application fits in the environment

Guideline #4

Being transparent and sharing knowledge about why and how gamification and knowledge management is implemented helps avoid the application being viewed as being a tool of manipulation

Guideline #5

User-centered design and an iterative development and implementation process that involves the users is important

Guideline #6

The metrics used in gamification must be connected to performance towards business goals, however in knowledge management the goals can be hard to quantify

Guideline #7

Creating metrics that correctly reflect the reality of individual performance in knowledge management is difficult but important, and the use of such performance indicators can have negative effects on the users

Guideline #8

Use extrinsic rewards with care to create a structure and to guide the user into being intrinsically motivated, becoming over reliant on extrinsic rewards is dangerous as it may replace intrinsic motivation

Guideline #9

The users should experience a sense of autonomy when engaging with the application

Guideline #10

Voluntary participation in the gamified application is important when trying to achieve long term motivation for knowledge management

Guideline #11

The users should feel related to other users and a sense of being part of a bigger purpose when engaging with the application

Guideline #12

Keep the gamified narrative aligned with the business narrative

Guideline #13

Users should be able to identify and discuss with other users that possess relevant knowledge

Guideline #14

The users should feel that their competence is developing and experience mastery

Guideline #15

Challenges of different levels should be available to the user, allowing them to match their level of competence to the difficulty of the challenge

Guideline #16

Avoid competition on an individual level, careful use of competition on group level can be beneficial

Guideline #17

Engaging and empowering the users in content moderation by creating an intuitive interface increase the usefulness of knowledge databases

Guideline #18

The trustworthiness of knowledge must be ensured and the user should understand how to share and store quality knowledge

Guideline #19

Accessibility of the application and the knowledge it contains is important

Guideline #20

Feedback is a key point in managing knowledge and ensuring quality of content, while allowing users to learn and grow through assessment of themselves and others

6.1 Creation of the application concept

Answering how a gamified knowledge management application for a knowledge intense workplace could be conceptualized, was done with the help of prototype presentations at the organization as well as the guidelines developed. The guidelines were considered and used during the development of the gamified knowledge management application concept and are referred to in the text where they were actively considered.

6.1.1 Prototypes

Three prototypes were designed and presented to the management team at the organization (See Figure 8, Figure 9, Figure 10). The prototypes were created based on the personal gaming experience of the authors, with support from authors' current perspective of the theoretical and empirical data that was gathered throughout the process. In order for the authors to showcase the use of these prototypes, the "mock" application of them on the organization's IT system had to be included. Though the IT merely served as a basis for the audience to better grasp the design, and not to promote the use of IT as a sole driver for motivation (see Guideline #1). The prototyping was a continuous process with many iterations stemming from feedback received at the organization as well as the further exploration of theories and the analysis of empirical data. For the concept to have any kind of future at the organization, the development of it must be backed up by the management of the organization, which was also one of the reasons for demonstrating these mockup prototypes (see Guideline #2). These prototypes served as a foundation for the concept which will be presented in this chapter. The prototypes are not to be confused with visual examples of the concept. The prototypes merely served as a tool for the authors to get feedback on elements which could or should be included in the formulation of a concept.

Prototype 1

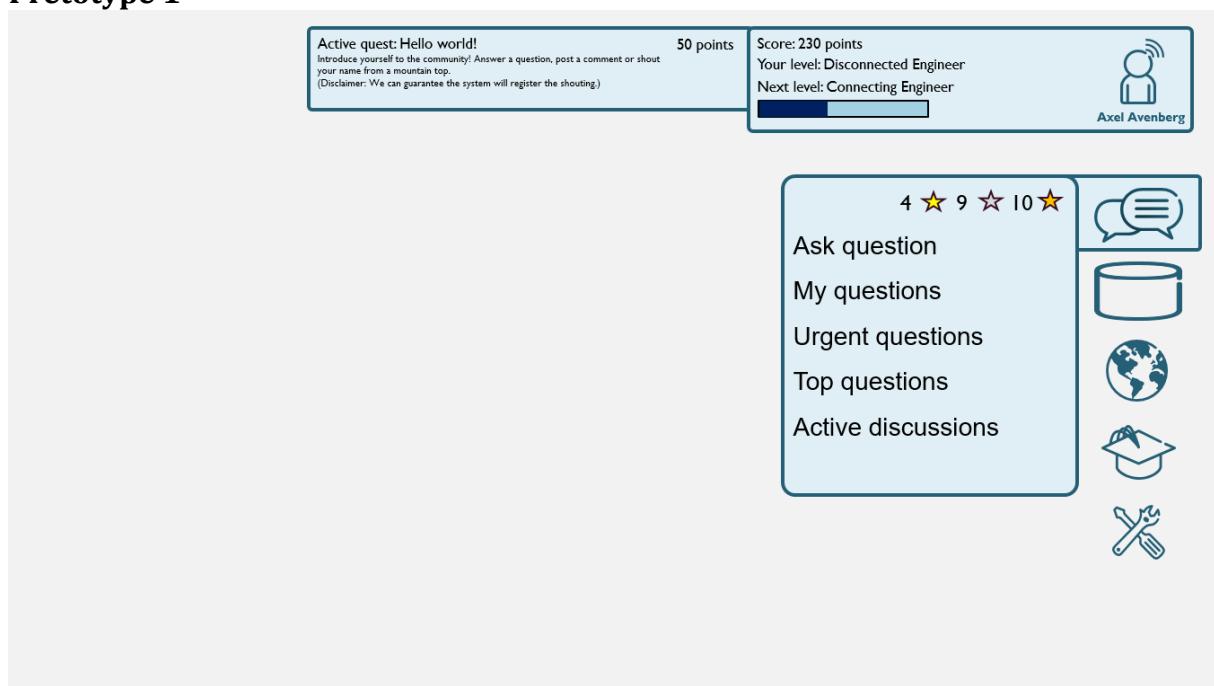


Figure 8: Prototype 1 (Simple game elements such as points, quests and a rating system for knowledge sharing)

Pretotype 2

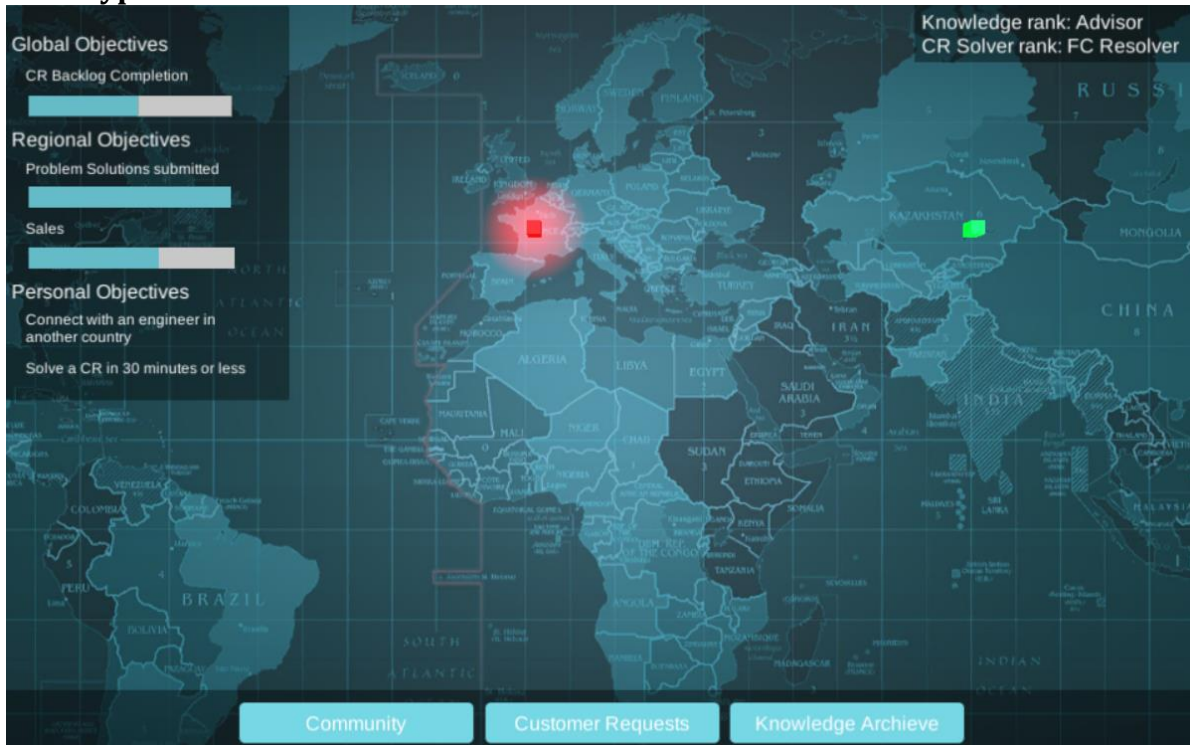


Figure 9: Pretotype 2 (Simple game elements such as ranks, quests and a visualization system for where knowledge is needed)

Pretotype 3

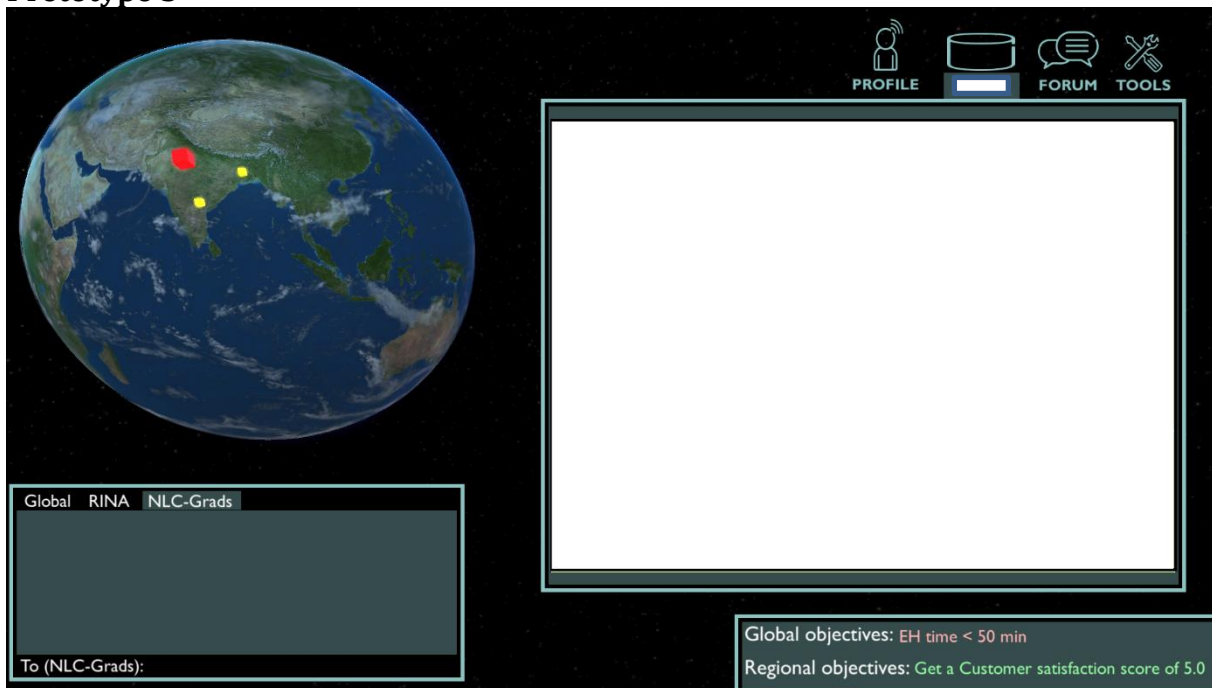


Figure 10: Pretotype 3 (Similar to pretotype 2 but with a profile and chat, the blank area is where an internal document was)

6.1.2 Knowledge health management concept

Overview of concept

The concept was created to answer the question of how a gamified application for motivating users to engage in knowledge management activities could be developed and designed and what is important to consider. It was created as an application of gamification in a system for sharing and managing knowledge objects in a database, and though an IT system was used as a template for what is needed in the design of the concept, the focus will not be on how IT can help answer this question. Instead the focus is on what should be gamified and which elements of gamification that can be used to achieve the goal of increased motivation for knowledge management (see Guideline #1 and Figure 11).

A knowledge object is in the concept defined as a unit of documented knowledge, as text, pictures or other forms of explicit knowledge. The presence of knowledge objects is obvious in most parts of the organization, which shows that the environment is a fitting match for the implementation of a concept such as this, which handles the transfer and management of these knowledge objects (see Guideline #3).

The narrative which is included in the concept is transmitted through verbal and visual cues inside and outside of the system. The narrative and the other elements included in the concept were gathered from the guidelines as described in the analysis and synthesis chapter and evaluated for their usefulness in order to reach an answer to the pertinent research question.

The concept takes an approach to gamification which is leaning more towards intrinsic motivators than most gamification in use today, since the purpose of this concept is to provide insights into which functions and elements would give a user an intrinsic desire to use the application, and through this reach a higher level of motivation which lasts for a longer period of time without the inflation of rewards. Though some extrinsic elements are used in the concept the purpose of these is merely to attract an initial interest in the use of the application, while the concept relies on intrinsic motivators to keep the user engaged over time (see Guideline #8).

The concept consists of a knowledge object attribute which is designed as a health value, and how this object is interacted with based on its health value on how interactions affect the health value. This part of the concept concerns how the users interact with the database and the knowledge stored therein. The concept also contains a user profile and describes how these possible interactions affect the metrics and elements existing in the user profile. It also handles how the user profile interacts with the community of the organization through an impact map which serves to create a feeling of belonging and showing the users how they contribute. The concept also contains elements of group competitions and personal achievements which can be used to guide the use of the application towards achieving business goals, as well as how these impact the user (see Guidelines #12 and #16).

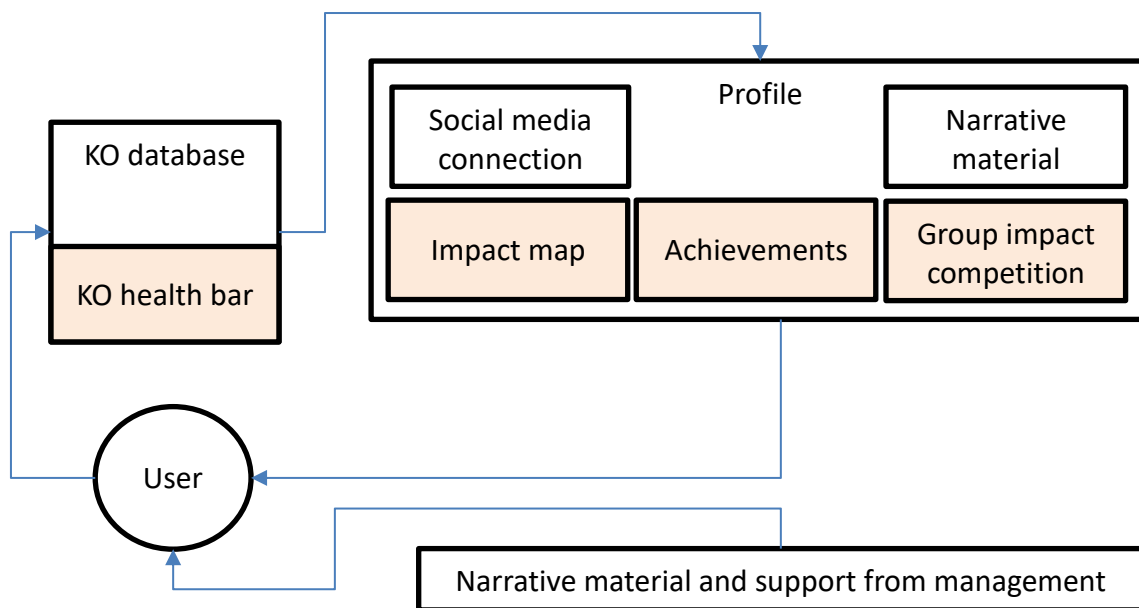


Figure 11: Application overview, orange boxes symbolize where the gamified elements are used

Based on the design guidelines and theory a concept was developed together with parts of the KM transformation team at Ericsson. The concept is based on sharing knowledge in the form of knowledge objects, defined as piece of documented knowledge, and managing them in a database.

Cornerstones of the narrative

There are three cornerstones of the narrative, based on the need for autonomy, competence and purpose. How the concept was designed based on these has a foundation in the current state of knowledge management and the issues within that area of Ericsson, and the problems this concept is aimed at solving.

Mastery and voluntary participation

One of the issues found in the current state of Ericsson is the lack of motivation to use the tools at all, based on the fact that it is another chore which must be accomplished and as the process is designed right now, they have no choice in the matter. After a certain action has been taken, that action must then be entered into a database where it is stored and potentially used by others. Therefore, the first cornerstone of the narrative is connected to the guidelines of mastery and voluntary participation (see Guidelines #10 and #14).

- The application is a tool that employees voluntarily can use to motivate themselves to engage in knowledge management and increase their knowledge sharing skills.

To accomplish this cornerstone of the narrative it is important to somehow relay the information that the use of the application will increase a user's competence. Through the implementation of a visualization of business goals for the organization, the narrative intends to show the user that participation in the use of the application not only increases the user's competence, but that this competence which is developed is of use to the organization. Creating metrics which the user can see in order to evaluate their own performance will also serve to give a feeling of increased competence, when the user can see what has been accomplished (see Guideline #7). These metrics must correctly reflect the contribution of the user for the metrics to hold any value in the eyes of the user, while in order to make sure the metrics do not convey a feeling of the metrics being used

by the organization as performance indicators they must only be visible to the user and cannot contain an element of “quantity over quality”. This is achieved through these metrics not being based on one’s number of contributions but rather on one’s impact on the system.

Purpose and relatedness

The second cornerstone is built upon the fact that even though Ericsson is a global organization present in countries all over the world, there is still a geographical divide between employees. Though internet gives us access to people all over the globe, if there is not a feeling of belonging connecting members of the same organization there will not be a sense of global purpose within the organization and will instead be structured around geographical spots or “silos”. Thus, the second cornerstone is based on the guideline of relatedness and purpose (see Guidelines #11 and #13).

- Employees are a part of a global community that keeps the world connected.

Being part of a global community is visually conveyed through the use of a world map which tracks knowledge objects and where these were created and used. The narrative of being part of a global community should give the user a feeling of serving a greater purpose than just performing their assigned tasks. Interacting with other users from around the globe will give a feeling of relation to all the participants of the system and should create an innate desire to continue interacting with the system to be a contributing part of the community, eventually creating a feeling of belonging to the community. The feeling of belonging is further accentuated through the existence of user profiles, which include one’s contributions as well as the achievements one has earned, both visible and hidden. This profile is connected to social media and can also be used to contact specific users when there is a need.

Autonomy, interaction with others and the trustworthiness of knowledge

In knowledge management and how it is currently in use at Ericsson, the system used is very structured, and it is quite complicated. The search for information is also made harder by the fact that the search parameters are very complex, which is understandable since the objects stored in the knowledge base are quite complex themselves. This structure can be argued as being too rigid, and not very user friendly. What is proposed in the concept is a standardized form of entering new data while the users themselves should feel the ability to impact the content. The third cornerstone is based on these issues and developed through the use of the guidelines of autonomy, being able to identify and discuss with others, as well as the trustworthiness of knowledge (see Guidelines #9, #11 and #18).

- Trust in the employees’ ability to manage knowledge and that they need autonomy to do so efficiently.

Giving users the choice of how to interact with the system is an important part of fulfilling the need for autonomy. Even though it does not provide a direct feeling of motivation to have the choice to participate, in the case where you are forced to participate or in which way you are forced to participate, the intrinsic motivation to do so is severely diminished. To provide the users with a feeling of control over their own fates, voluntary participation is key, but there are other gamification elements which also play their part. One such element is the ability for the users to decide themselves or as a group what is needed and the way in which to accomplish this. This is included in the concept through giving the users the ability to freely interact with all knowledge objects in the database with a number of possible options when managing a knowledge object (see Guideline #17).

Knowledge object health

One big problem in the current state of the databases at Ericsson is that they are full of knowledge that is not being used. This is partly due to the enormous amount of data entered into the database from the numerous service requests handled daily, as well as the fact that there is no automated way in which these knowledge objects are deleted from the databases when no longer deemed relevant. Keeping database objects which are no longer relevant or are outdated will not only flood the database resulting in decreased accessibility but can also impact the users in a negative way, causing them to use this knowledge where it is not applicable (see Guideline #19).

Keeping old knowledge in storage for a longer period of time could also result in an inability for the organization to change and adapt to new information and events. In this concept, upon the creation of a knowledge object, the object is assigned a health value which will follow a decay rate algorithm in order to only keep the useful and up-to-date knowledge objects in the database to make the search for knowledge easier as well as the handling of the database itself.

The health value of a knowledge object is affected by most of the user interactions, including increasing or decreasing the health value as well as either slowing down the rate of decay for objects which are deemed useful and current, or speeding up the rate of decay through the ability to mark it as no longer useful. When an object's health value has decayed to a certain point, it will be flagged for archiving or deletion, and will be reviewed by peers in order to ascertain whether the health value should be increased or if the object should be removed from the database.

The creation of the knowledge object will include different parameters which would make the search for knowledge easier (see Guideline #19). These parameters should be standardized to some extent to further enable availability of the knowledge as well as ensuring that there is some consistency in how the knowledge objects are entered which is supported by (see Guideline #18). Through the use of menus with choices of which category an object should belong and where it could be applied would make the search for knowledge easier where the users will as time goes by learn which parameters to search for when seeking knowledge relevant to a certain task and being able to evaluate the search parameters which could be changed by the users at a later date (see Guideline #5). This would also make the creation of a knowledge object less taxing, if there are a number of relevant categories to choose from instead of coming up with relevant keywords which could be used when searching for that specific knowledge object. The knowledge itself in the knowledge object would be in a visual or textual format depending on what type of knowledge it is, and it can be easily moved to the relevant category of information if the knowledge in the object is deemed as being marked as useful in the wrong category.

User interactions

The first part of designing the knowledge object health concept was deciding which interactions the system would permit. In order to fulfill the need for autonomy in the community as a whole, the users must be permitted to interact with the objects and affect the health of these objects and have a say in how the system is designed (see Guidelines #5 and #19). The actions available for a knowledge object are currently creating, using, editing, commenting, liking or disliking, sharing, archiving, and deleting the object.

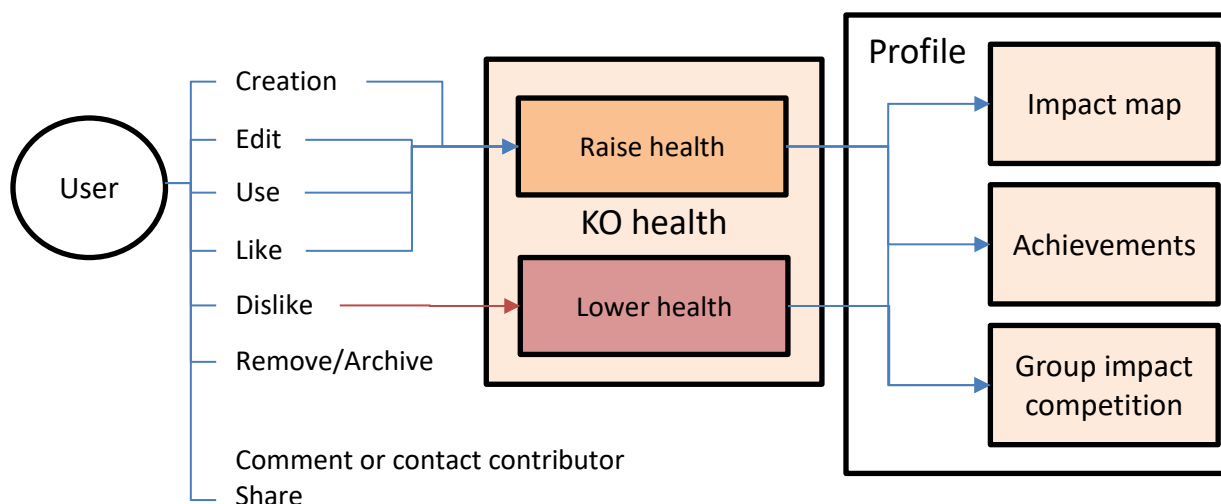


Figure 12: Interaction with knowledge objects (KO) and how this affects knowledge object health and the profile

Positive interactions

As stated earlier, creating a knowledge object will give that object an assigned health value, which could be seen as a positive interaction. Furthermore, editing, using or liking a knowledge object will affect the object's health positively, meaning the health of the object will be given a higher value than before doing one of these actions while for a time. After this action the decay will progress at a slower rate than an object not interacted with, not only serving to keep the database updated, but also giving the users the power to affect the system and decide which content is relevant (see Guideline #17).

When creating and evaluating knowledge objects the user should be reminded of some aspects which are necessary to keep the quality of the knowledge objects high (see Guideline #18). These aspects include evaluating the source and the levels of credibility and reliability of the object in comparison to other sources. Another aspect which is important for the creator or editor is to evaluate the context in which the knowledge is presented and how it would be understood from the perspective of other users. Linking the content, or providing context of the target groups for the knowledge and describing the purpose of the knowledge as well as a background would help in making the knowledge easier to understand for the other users. Using visualization of concepts and listing sources would make the evaluation of the relevancy and trustworthiness of the information easier, while providing a summary of the content would make the search for relevant knowledge faster (see Guideline #19).

Neutral interactions

Sharing and commenting will not cause a change in the health value of the object itself, but will cause an impact which is trackable by the user. Since both of these actions can vary a lot in the significance of the action and will use third party systems such as yammer and e-mail, it was decided that the actions themselves should not result in an effect on the object since it does not necessarily indicate that the action was taken with the purpose of validating or invalidating the object (see Guideline #7).

Negative interactions

Marking an object for archiving or deletion will give the object a lower health while significantly speeding up the rate of decay, until such a time as it is by multiple sources marked for removal, at which point in time it will be removed from the system. Disliking an object will also lower the health value of that object and speed up the decay rate, but will not impact the object as drastically as if it was marked for removal.

When evaluating a knowledge object the user can find that it is of low quality. If there is something of worth, there is an option to indicate the quality of the object as being less than satisfactory. By disliking and selecting one of the opposites of the criteria of information quality, any user can view the knowledge object and see the problem area(s) and take action to improve the knowledge object if they so wish (see Guideline #9). If the information is no longer relevant and there is no point in updating it, then the option to mark the object for removal/archiving should be used (see Guideline #18).

The basis for a negative evaluation of a knowledge object must remain unbiased which is why there will be a need to indicate what the reason for the negative interaction with the object is (see Guidelines #6 and #7). These options will be based on criteria of information quality as well as the trustworthiness of the information. The options for why a user gave a knowledge object a negative indication include the object being deemed as false, inconsistent, obsolete, inaccurate, useless, obscure or incomplete.

It is also important to convey that a knowledge object with a low health value does not necessarily implicate the object as being deemed having one of these faulty attributes, but rather that the object may have simply been lying dormant for a time, which caused the health value to decrease (see Guideline #7). In this case it is imperative that users do not dismiss this object out of hand, but try to evaluate if the knowledge object is still relevant, at which point it should be indicated as such.

Another aspect which is important regarding objects with low health is that they are not a direct indicator of poor performance on the part of the creator, but that the information simply may be outdated or no longer suitable. Through reviewing the objects one has interacted with, if it has received a poor evaluation, the users are meant to learn from their mistakes and gain a better understanding and further their competence in how to create objects which may fulfill the information quality criteria better next time (see Guideline #20).

Knowledge object life cycle

The aim of the system when it is fully operational is to create a life cycle of knowledge objects, where they are continuously checked for relevance, updated and eventually removed when they become useless (see Guideline #18). This life cycle is shown in Figure 13.

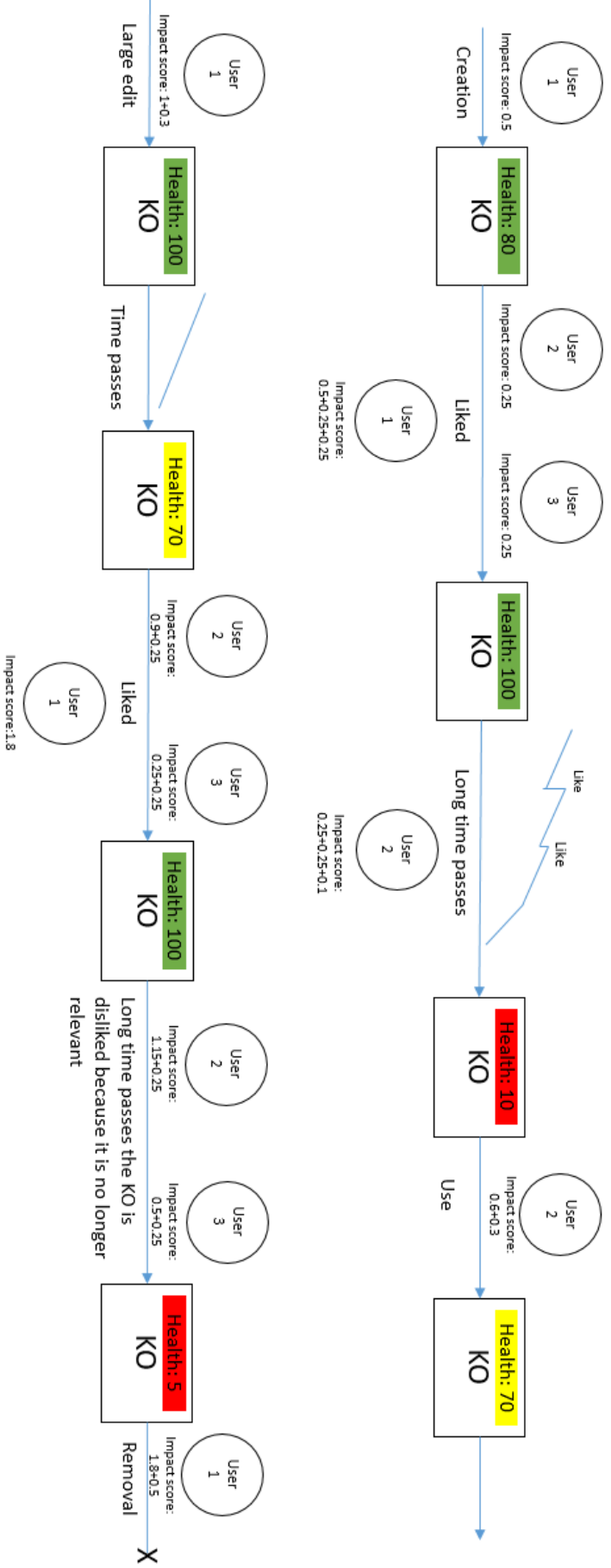


Figure 13: The knowledge object (KO) life cycle as envisioned in the application

Profile

The concept contains a user profile which is an important part of making the users feel as a part of the community, while giving users the possibility of relating to other users and contacting them (see Guidelines #11 and #13). The user profile contains some information about the user which would be visible to all users and is connected to their profile on the intranet and internally used social networks such as Yammer, while the achievements and personal goals will only be visible to the user whose profile it is to avoid the dangerous elements of competition.

User and community impact

Tracking the possible interactions with objects are a good way for users to see their impact on the system as a whole, which gives them a sense of purpose (see Guideline #11). If the users see no results of their actions, and don't know whether their objects have been used or rated, it would quickly diminish any kind of motivation to keep sharing this knowledge. It also serves as a tool for personal development. Through giving the users the ability to edit and comment on objects, any creator of a knowledge object will always be able to go back to their object and look at how it was received, if there were any edits made or any comments which would help them in their creation of the next object, making its reception by the community even better (see Guideline #20). This feeds into the concept of mastery, which is one of the building blocks of long-term motivation as shown in the theoretical research as well as being corroborated by the analysis of empirical data (see Guideline #14).

Tracking the impact on a team or regional level will further serve as a common goal, creating a sense of belonging and communal accomplishment ensuring that the workers keep contributing as a team and creating trust between employees and trust toward the organization. This trust is a fragile thing, and should not be violated under any circumstances, since by doing so the employees will stop sharing for fear of rendering themselves less valuable in the eyes of the organization. Any action from the organization to cut down on employees because the sharing of information reduces the amount of required personnel will result in an abrupt cessation of this sharing culture (see Guideline #4).

By tracking the users' interactions with knowledge objects the system can indicate how they impact the global knowledge base. It also serves as a visualization of their personal development. Based on the guidelines of the dangers of individual competition, an impact score for each individual is calculated, but it is not shown to the user. However, this score can then be combined with other users in a team or region and the aggregated score can be used to compete (see Guidelines #7, #8 and #16).

Impact map

The impact map should be accessible through the user profile and serves to further strengthen the feeling of a global purpose. Usually there is a discrepancy between individual contributions, it is important however to make sure that all users feel that they are contributing. The users who contribute more should of course feel rewarded for such a behavior, but there must be a balance so that the users who contribute less do not feel as though their contributions do not matter (see Guideline #15). Despite the fact that the top contributors share a great amount of knowledge per person, in an organization which employs thousands of knowledge workers, a lot of the knowledge will still be provided by those who contribute less. Motivating the users who share larger quantities is of course the most important point, and making sure they share qualitative knowledge and not just irrelevant knowledge in large quantities.

The impact map will track where the knowledge objects have been interacted with and provide a visual representation of this as a dot on a world map of the geographical position where the latest strong interaction occurred, see Figure 14. The visual representation of the knowledge object will also show where the weaker interactions have occurred as well as where previous strong interactions were located.

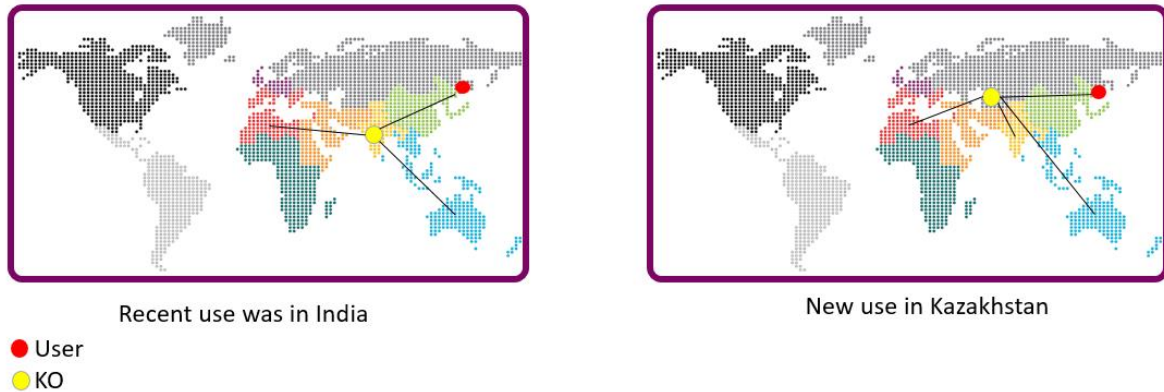


Figure 14: Impact map that showcase how knowledge objects (KO) are used geographically as well as the impact the user has on these knowledge objects

Different interactions have different strength which can be used to avoid cramping the map with too many objects and interactions. The strong interactions include creating, using, and editing a knowledge object as well as marking an object for removal. The weaker interactions include liking, disliking, sharing and commenting on a knowledge object. If there are only a few interactions made with the objects, they are shown as bold connections. As the user becomes more familiar with the system and starts creating, editing and using knowledge objects the weaker interactions become vaguer, and interactions are forgotten after a time.

The user will also be able to choose in which way the impact map should be visualized as well as which knowledge objects should be tracked. The choices include viewing individual objects created by the user as well as viewing all the objects the user has created simultaneously, objects the user has interacted with, and the objects created by the group (see Guidelines #11 and #14).

Achievements

The possibility of receiving personal or communal achievements serve as both a guide in what the user should be doing in order to increase their impact as well as being a source of feeling like an explorer through unlocking hidden achievements (see Guideline #14). The guiding achievements would be clearly visible and having tangible goals, such as interacting with five knowledge objects with low health. Hidden achievements are not known previous to the acquisition or completion of said achievement. These achievements will serve as surprise rewards for users and will consist of achievement which could for example be creating or editing a knowledge object which has been to all continents. This would be done through the use of the global map which tracks the geographical position of where the users interacting with a knowledge object are situated.

Competition

The knowledge object interaction tracking is for personal use only, and will just serve as a tool to evaluate yourself, and your contributions. The impact will be tracked and public in the form of team-based or region-based scoring though, which is a form of competition which is not as clearly

viewed as negative (see Guideline #16). There is however an element of uncertainty and risk when comparing groups as well, since it may lead to a reduced incentive to share knowledge across regional boundaries. This would be true if the scoring was based on pure performance, but in the model designed in this thesis the aim is to solve this through the use of impact mapping instead. The impact variables will not track the accumulated performance of a region with regards to how they perform, rather with how they interact with the system, thereby reducing the risk of knowledge hoarding within teams or regions. Since the goal is to “compete” in activity among the entire organization, the tracking of impact would serve as an incentive to share across boundaries. An example of how the competitive interface could be composed is shown in Figure 15.

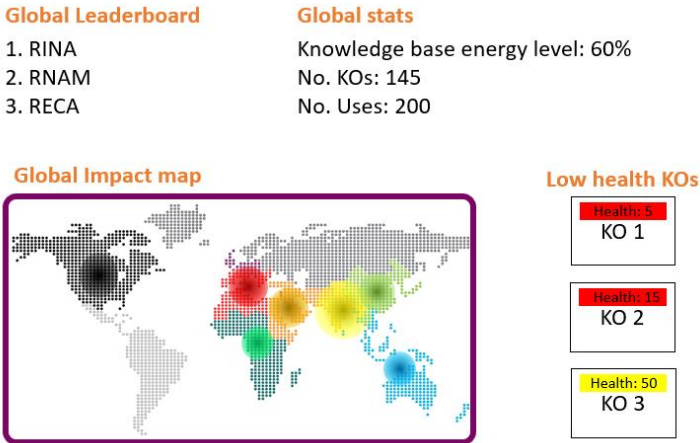


Figure 15: Potential competitive and group view elements

Social aspects

Using a community of knowledge workers to use and monitor a database is not easy, especially in a multi-national organization where employees vary greatly in both mindset and expertise. Communities are however the only way to make a functioning eco-system where outside moderation can be kept at a minimum, and where the flow of information is free to cross boundaries. The way this curation of knowledge objects is handled is however really important, and a lot of effort must be put into how the system for evaluating the knowledge is designed, and should use input from the users on how to design it for the best user experience (see Guidelines #5 and #17).

7 Conclusion, contributions and discussion

The conclusions the authors have drawn are presented in this chapter, as well as the thesis theoretical and practical contributions. The chapter also includes a discussion about the work of the thesis and some points of criticism as well as the reasoning and rationale behind why certain choices were made. The results of the thesis and the consequences of the authors choices of methods and some company limitations are discussed, which is followed by a discussion on the ethics of the subject.

7.1 Conclusion

In this thesis what is important to consider when creating an application of gamification to increase employees' long-term motivation for knowledge management at a knowledge intense workplace has been explored, and an application in a real setting has been conceptualized. The research questions posed to fulfill this purpose were stated as follows:

1. *What can be important to consider when creating a gamification application for increased long-term motivation in knowledge management activities at a knowledge intense workplace?*
2. *How can a gamified knowledge management application for a knowledge intense workplace be conceptualized?*

Twenty guidelines were developed, based on the theoretical framework and the empirics, to answers research question one. These guidelines encapsulate the authors understanding of what is important to consider when creating a gamification application for increased long-term motivation in knowledge management activities at a knowledge intense workplace. Intrinsic motivation and the three basic psychological needs of self-determination theory are predominant features of the guidelines, but they also deal with practical measures that can be taken to increase the chances for a successful implementation as well as important facets of knowledge management that need to be considered.

A gamified knowledge management application for a knowledge intense workplace was conceptualized in the form of the knowledge object health concept, which constitutes the answer to the second research question. The knowledge object health concept was created with the guidelines of research question one in mind, with the goal to facilitate intrinsic motivation in its users. Its defining attributes are the life cycle of knowledge and highlighting of user impact. It can be described as a database that has game elements in the form of health bars, profiles, user impact visualizations, achievements and group competition.

The title of the thesis, "*how to score intrinsically in the game of motivation*", captures the essences of our conclusions about the use of gamification in a setting such as knowledge management and the fulfillment of the purpose of this thesis. When creating an application of gamification to increase employees' long-term motivation for knowledge management at a knowledge intense workplace, the goal is to create an intrinsically motivating activity. This differs from the superficial examples of gamification that are currently the norm, however, it is important to recognize that the same game elements can be utilized to enable different forms of motivation. In order to successfully use gamification in knowledge management, one needs to understand what intrinsic motivation is and how to achieve it through the use of game elements.

7.2 Contributions

The purpose of this master thesis was to explore the area which presented itself in the gap between knowledge management theories and gamification theories. This area was explored with the aim of providing results which would be interesting not only for practical purposes but also for academia. The contributions of the thesis to these two fields and the recommendations for further research will be further discussed in this subchapter.

7.2.1 Practical contributions

The topic of knowledge management has within Ericsson been on the rise for quite some time. The implementation of which is however still not deemed as up to the standards of the knowledge management team where the authors of this thesis have been embedded. During the research and writing of the thesis, the presence of the authors as well as their presentations and inputs have clearly shown a change in how gamification and the possible applications of it within knowledge management is perceived. This change in mindset has not only remained confined to the knowledge management transformation team but has moved further in the organizational structure through presentations for individuals outside the team as well as through the group interviews and discussions with other employees. The presence of the authors during a workshop on the implementation of knowledge management has possibly also contributed to a certain degree of widening the perspective of employees at the organization.

The result of this is hopefully that during the reorganization of Ericsson which is currently underway, the topic of creating an engaging work environment especially in the tasks involving knowledge management and knowledge sharing will get a response slightly more accepting in nature. The full implementation of a concept such as the one presented in this thesis is however only a hopeful vision of the future at Ericsson, but the field of gamification has received and will probably continue receiving more and more managerial support.

The general applicability of the results in this thesis should not be dismissed. Though it was created with an organization in mind and considering the corporate culture present at that organization, the results that were found and their usefulness would probably be similar in any attempt at an application in an adjacent area or industry. This is due to the results being to some extent generalizable and should present no issues with scaling.

7.2.2 Theoretical contributions

The aspects to consider, guidelines and the concept described in this thesis can be considered theoretical contributions. Though a gap in academia was found, and was used as a basis for this thesis, the research conducted and the subsequent report on the topic was never meant to close this gap through the creation of a scientifically viable theory based in fact. This thesis sought to explore the gap and if there was a possibility of it being an interesting area for further researched which has been shown to be true. Though this report could serve as a theoretical basis for further research, the use of the conclusions in this study to generate ideas and paths to follow in the research of this area would be more appropriate. When seeking to further study this area, this report has provided some possibilities which could be tested and evaluated. The results of such testing of the concept and guidelines in this thesis could serve as further validation of the conclusions arrived at in this study.

The research area in this thesis has been narrow, in that the studied context was the use of gamification to motivate long-term engagement in knowledge management, and even more specifically knowledge sharing. However, there are indications that the guidelines and the concept

developed during this thesis could be generalized and applicable to areas other than knowledge management, as long as there is a desire to motivate long-term engagement in a field where the knowledge intensity is a rather predominant marker.

7.2.3 Recommendations for further research

An area which has been identified in the theory used in this study which would need more research is the question of what identifies a knowledge worker. There are some requirements and arguments in the theory for what defines work as being knowledge intense, but since technology and knowledge are in a perpetual state of exponential growth, this concept would need constant reevaluation and new identifying parameters. Another potential area for further research has been identified as the study of how gamification could be used to convey strategies, perform internal communication or to change organizations culture.

The most important recommendation from this thesis is that the area of using gamification for long-term engagement through the heavier reliance on intrinsic motivators, especially when implementing an application for knowledge intense workers is showing tremendous promise, and should be further explored. If this area could be exploited to its fullest potential, the impact that would have on the daily life of working people could be substantial. To test if the guidelines in this study are valid, and if the concept would work in practice would be an interesting line of further study.

7.3 Discussion

7.3.1 About the results

As stated in the report, gamification has historically been used to increase efficiency, which is why there was a gap found in the research concerning motivating for a longer period of time. Though theory in this area was virtually non-existent and the theory in adjoining areas was scarce, the theory that did exist provided, in parallel with the interviews and discussions at the organization, a foundation for the fulfillment of the purpose of this thesis.

Due to the area of gamification being new as a phenomenon although with wide-spread recognition as a viable tool for various efficiency gains, there is not a lot of scientific data on the subject. Most of the research done is on a small scale and done in homogenous environments, which limits the scientific viability. What has been proven is the possibility of using gamification in various situations with a probable positive outcome. Though the research is not conclusive in any way, it shows a high degree of promise, but it needs further study in order to be an empirically proven tool for useful organizational improvement. The theories that gamification theory is built on, mainly motivational psychology and game design element theory have been studied in-depth for quite a while and serve as a good foundation for the gamification theory research and are sources for conclusions that can be drawn in the area of gamification even if the area of gamification in itself has not been studied thoroughly.

Though this study has deemed the targets of the result of this thesis as knowledge workers, the definition of who is a knowledge worker is still vague. The decision that the employees of the organization were labeled as knowledge workers was taken by the authors based on some of the criteria that was stated in the theory of knowledge workers. This is not necessarily a fact however, but it is how the tasks of the employees of the organization were perceived by the authors with regards to complexity and diversity. It can perhaps be argued that this decision was taken lightly, but due to availability issues, the authors were not able to in person see how these employees work and how they solve their tasks which is why the decision was based on information provided by the organization.

Guidelines

The guidelines which were developed in this study have not been tested in practice, and with the theory on the subject being scarce, there is no way as of yet to validate whether these guidelines are actionable. What can be argued is that during the review of literature on the subject, implications for why guidelines such as these would be feasible were found. These implications were further corroborated by the interview subjects resulting in the guidelines being built on theoretical and empirical data, giving them a higher amount of credibility. But in order for the results to be accepted as thoroughly studied, more research on the area is needed, with quantitative testing of the resulting effects of using these guidelines.

Linking these guidelines to the purpose of the study and the question they seek to answer has been done through explaining the guidelines and the data, both empirical and theoretical, leading up to the distillation into these guidelines. How involved these guidelines were in the creation of the concept is up for debate, as there were outside sources weighing in on the creation of the concept, such as the specific system where the concept would be applied, as well as the input from sources in the organization where the concept was created to fit. The guidelines are merely that though, guidelines, and should not be construed as fact or something which absolutely must be followed in order for an application of gamification to be successful. Keeping these guidelines in mind when creating a gamification concept is intended to remind of the usefulness of certain elements and the danger of others in context to the situation they are implemented.

The guidelines have been attempted to be formulated as objectively as possible, with a heavy reliance on other sources than the authors themselves to correctly depict the findings from theory and empirical data. The impact of personal views on any subject is probably unavoidable to some extent, but in the case where the authors have been biased it can be attributed to subconscious acts which were in every possible way attempted to be avoided.

Concept

The concept was designed based on many different aspects, one of which was the previously mentioned perception of the authors. Though the guidelines were attempted to be kept as objective as possible, and the use of these guidelines were kept in mind in every step of the creation of the concept, an aspect of what the authors find esthetically pleasing, and intuitive in the actions available did of course affect the concept. These aspects are however impossible to keep completely objective, since there is no consensus in these areas. Because there is no consensus, all that could be done was to try to make the concept as neutral as possible with regards to being aimed at a large group of diverse users.

The concept contains a decay rate algorithm which was not fully developed and included in this report. This is due to various reasons, one of which is the fact that developing an algorithm that is fully usable with the system at the organization and using the values and inputs from this system would mean that when explaining these calculations and the rationale, organizational security protocols would restrict all the information which could pose a risk to the organization, which would severely impact the value of using this in the report.

An element of competition was included in the concept even though the guidelines state that the implementation of such elements must be done with care. The reasoning behind why the element of competition was included is argued for in the concept chapter. There are however other considerations to keep in mind when doing this which were not included in the guidelines. These considerations include the possibility of cheating or exploiting the system. The reasoning behind why these were not included is that there was not enough conclusive theory and empirical data to make objective statements about the danger of these and especially not about how to avoid them. Intuitively it can be understood that a concept such as the one in this study should seek to

limit the possibility and impact of these as much as possible, but creating a system which is not exploitable in any way is virtually impossible, and the ways to cheat a system are very hard to theorize on and must instead be remedied as the application is being used, when these instances occur.

7.3.2 On method and execution

During the time the authors were embedded in the organization, there was no standardized way in which discussions were recorded or how notes were taken, which leads to a certain inconsistency of the data from organizational sources. This was in part due to the fact that if all the sessions were recorded, there would not be such an atmosphere of free thought, resulting in the gains from being embedded would decrease. The authors varied between taking active or passive part in the discussion as the organization based on the context of the discussion. In some discussions, the authors provided insights in the areas of knowledge management and gamification. A more rigorous and consistent method of writing down notes and insights gained from the discussions afterwards should probably have been followed, which could have provided the study with more reliable and usable data. But since most of these meetings and discussions were unstructured and not previously planned, this would still have been difficult to accomplish.

Company limitations

While the authors were embedded at Ericsson AB the company was in the middle of a reorganization, this resulted in limitations of the company resources available to the authors. This had impacts in various parts of the study, including resources provided for the joint development of the concept. Another effect of the reorganization was that the employees of the organization had more perceived pressure which most likely was a cause for less amounts of available time, which in turn resulted in a decreased possibility of testing our prototypes and ideas on the envisioned users. The prototypes were instead presented to employees on the managing level and were evaluated and discussed based on their previous experiences of the systems in the organization as well as their views on the current implications of these designs based on their perspective as managers.

Interviews

Selecting targets for interviews, and the process of searching for them was not done in a structured way, which could also undermine the validity of why these targets were chosen. The interviewees were found through internet search and through social media, mostly LinkedIn. The search parameters for finding these individuals were “knowledge management”, “gamification”, and “knowledge management gamification”. There were in the eyes of the authors no appropriate interview targets found when searching with the phrase “knowledge management gamification” which is why there were only interviewees from either category. The only respondent who to some extent fit the criteria of belonging to both fields was GC#3 who works with gamified learning applications. This does to some extent fit into knowledge management, but since this thesis is more focused on the field of knowledge sharing, the data from this interview mostly served as a reference for gamification and its applications.

Due to there being an ongoing reorganization while the authors were present at the organization, there was a limitation in the availability of interview subjects, which is why there is only one group discussion included in the empirics. There were actually two group interviews held but due to time constraints of the participants and the fact that the second group interview did not provide any usable material, it was excluded from the report. Why this second interview did not include any actionable data is, partly due to the fact as previously stated, that the subjects did not really have the time or willingness to sit and have a free discussion on topics which would not within any short time period aid them in their work. This resulted in the discussion not having the

atmosphere of free expression that was sought during the group interviews, and the effect of this was that the data from this second group interview is not included.

Another point that can be argued is that the interviews were not extensive enough, merely having six individual interviews and one group interview in the report. Although this criticism is valid, the reason for holding these interviews was to learn as much as possible and to get ideas from the people working in this field in order to further match their views and the theory to the concept ideas that were developed. During these interviews the authors felt that these sources provided ample material for use and felt that including more participants would only give an incremental increase in the useful data. The amount of additional data which could have been provided by a more extensive interview process is impossible to predict, but the authors reached the conclusion that the data gathered was almost at the limit of what was possible to gain with a reasonable amount of time and effort which is why the interviews were deemed as adequate.

7.3.3 On the ethical considerations of gamification

Ethical reflection on gamification as a tool for engagement is mostly based on the use of elements from motivational psychology, where it can be argued that gamification at its core is a tool for manipulation. This is true, though manipulation in itself may not necessarily be a bad thing. There are instances where we manipulate ourselves in order to accomplish certain things, for example listening to music while running could be described as a form of self-manipulation drawing one's attention from the fact that running is a physically exhausting activity. This however is just the authors' own opinions and is perhaps not a scientifically viable example. Though the argument exists that gamification is a form of manipulation, the authors attempted to remedy this by including the guideline of transparency, which is both scientifically and ethically sound.

The ethical considerations of using competition as a tool for increasing engagement are also important, and though there are no elements of individual competition where the users are pitted against each other there are elements of group competitions. These competitive guidelines are however discussed in the study already.

References

- Alavi, M. & Leidner, D., 2001. Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *Management Information Systems Quarterly*, 25(1), pp. 107-136.
- Allen, P., Laurenco, A. & Roberts, L., 2016. Detecting Duplication in Students' Research Data: A Method and Illustration. *Ethics & Behavior*, 26(4), pp. 300-311.
- Anderson, J. & Rainie, L., 2012. *The Future of Gamification*, Washington DC: Pew Research Center.
- Andriotis, N., 2014. *Gamification Survey Results*. [Online] Available at: <https://www.talentlms.com/blog/gamification-survey-results/> [Accessed 05 04 2017].
- Aparicio, A. F., Gutiérrez Vela, F. L., Sánchez, J. L. G. & Montes, J. L. I., 2012. *Analysis and application of gamification*. Elche, Interaccion'.
- Ardichvili, A., Cardozo, R. & Ray, S., 2003. A Theory of Entrepreneurial Opportunity Identification and Development. *Journal of Business Venturing*, 18(1), pp. 105-123.
- Argyris, C. & Schön, D., 1978. *Organizational Learning: A Theory of Action Perspective*. Reading: Addison-Wesley.
- Behnke, K. A., 2015. *Gamification in Introductory Computer Science*, Colorado: ATLAS Institute.
- Blomkvist, P. & Hallin, A., 2015. *Method for engineering students*. 1st ed. Lund: Studentlitteratur.
- Boulet, G., 2012. Gamification: The Latest Buzzword and the Next Fad. *eLearn Magazine*, 2012(12), p. Article 3.
- Brown, T., 2008. Design Thinking. *Harvard Business Review*, pp. 84-92.
- Cabrera, A., Collins, W. & Salgado, J., 2007. Determinants of Individual Engagement in Knowledge Sharing. *The International Journal of Human Resource Management*, 17(2), pp. 245-264.
- Chou, Y.-K., 2017. *A Comprehensive List of 90+ Gamification Cases with ROI Stats*. [Online] Available at: <http://yukaichou.com/gamification-examples/gamification-stats-figures/> [Accessed 24 04 2017].
- Ciaran J, O., 2016. *Creative engineers: Is abductive reasoning encouraged enough in degree project work?*. s.l., Elsevier B.V.
- Cohen, W. M. & Levinthal, D. A., 1990. Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), pp. 128-152.
- Coll, C., José Rochera, M., de Gispert, I. & Díaz-Barriga, F., 2013. Distribution of Feedback Among Teach and Students in Online Collaborative Learning in Small Groups. *Digital Education Review*, Volume 23, pp. 27-46.
- Csikszentmihalyi, M., 1992. *Flow: the psychology of happiness*. London: Rider.

- Dale, S., 2014. Gamification: Making work fun, or making fun of work?. *Business Information Review*, 31(2), pp. 82-90.
- Davenport, T. H. & Prusak, L., 1998. *Working Knowledge: How Organizations Manage What They Know*. Boston: Harvard Business School Press.
- Davenport, T. & Völpe, S., 2001. The Rise of Knowledge Towards Attention Management. *Journal of Knowledge Management*, 5(3), pp. 212-222.
- Deci, E. L. & Ryan, R. M., 1985. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Denscombe, M., 2010. *The Good Research Guide for small-scale social research projects*. Fourth ed. Berkshire: Open University Press.
- Deterding, S., Khaled, R., Dixon, D. & Nacke, L., 2011. From game design elements to gamefulness: defining "gamification". *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, pp. 9-15.
- Deterding, S., Khaled, R., Nacke, L. & Dixon, D., 2011. *From Game Design Elements to Gamefulness: Defining "Gamification"*. Finland., ACM.
- Dijksterhuis, E. & Silvius, G., 2017. The Design Thinking Approach to Projects. *Journal of Modern Project Management*, pp. 32-41.
- Djaouti, D., Alvarez, J. & Jessel, J.-P., 2011. Classifying Serious Games: the G/P/S model. In: P. Felicia, ed. *Handbook of Research on Improving Learning and Motivation through Educational Games: Multidisciplinary Approaches*. Hershey, PA: IGI Global, pp. 118-136.
- Dubois, A. & Gadde, L.-E., 2002. Systematic Combining: An Abductive Approach to Case Research. *Journal of Business Research*, 55(1), pp. 553-560.
- Earl, M., 2001. Knowledge Management Strategies: Toward a Taxonomy. *Journal of Management Information Systems*, 18(1), pp. 215-233.
- Egham, 2011. *Gartner Says By 2015, More Than 50 Percent of Organizations That Manage Innovation Processes Will Gamify Those Processes*. [Online] Available at: <http://www.gartner.com/newsroom/id/1629214> [Accessed 28 03 2017].
- Eppler, M. J., 2003. *Managing Information Quality. Increasing the Value of Information*, Berlin: Springer.
- Ericsson, P. M. a., 2017. [Interview] (February-June 2017).
- Girard, J. P. & Girard, J. L., 2015. Defining knowledge management: Toward an applied compendium. *Online Journal of Applied Knowledge Management*, pp. 1-20.
- Gupta, A. & Govindarajan, V., 2000. Knowledge Flows within Multinational Corporations. *Strategic Management Journal*, 21(4), pp. 473-496.

- Gurteen, D., 1999. Creating a Knowledge Sharing Culture. *Knowledge Management Magazine*, 2(5).
- Haney, D. & Driggers, J., 2009. Knowledge Management. In: R. Watkins & D. Leigh, eds. *Handbook of Improving Performance in the Workplace*. San Fransisco: Pfeiffer; International Society for Performance Improvement, pp. 366-389.
- Hara, N., 2009. *Community of Practice: Fostering Peer-to-Peer Learning and Informal Knowledge Sharing in the Work Place*. s.l.:Springer-Verlag Berlin Heidelberg.
- Heinzen, T. E. et al., 2015. A Parallel Universe: Psychological Science in the Language of Game Design. In: T. Reiners & L. C. Wood, eds. *Gamification in education and business*. New York: Springer International Publishing Switzerland, pp. 133-149.
- Hendriks, P., 2004. *Assessing the Role of Culture in Knowledge Sharing*. Innsbruk, Fifth European Conference in Organization, Knowledge, Learning and Capabilities.
- Ichiishi, T., Neyman, A. & Tauman, Y., 2014. *Game Theory and Applications*. s.l.:Academic Press.
- Jayasingam, S., Govindasamy, M. & Singh, S. K. G., 2016. Instilling affective commitment: insights on what makes knowledge workers want to stay. *Management Research Review*, 39(3), pp. 266-288.
- Jing, H., 2015. *Eliminating Barriers on Knowledge Sharing through Communication in MCC: A Mechanism of Performance-Motivation Control*, Stockholm: Royal Institute of Technology.
- Kirkeby, O. F., 1994. Abduktion. In: H. Andersen, ed. *Vetenskapsteori och Metodlära*. Lund: Studentlitteratur, pp. 143-180.
- Kyoratungye, K., Aduwo, J. R., Mugejjera, E. & Lubega, J., 2009. Knowledge Management Frameworks: A Review of Conceptual Foundations and a KMF for IT-based Organizations. In: *Strengthening the Role of ICT in Development*. Kampala: Fountain Publishers, pp. 35-76.
- Landers, R. N., Bauer, K. N., Callan, R. C. & Armstrong, M. B., 2015. Psychological Theory and the Gamification of Learning. In: T. Reiners & L. C. Wood, eds. *Gamification in education and business*. New York: Springer International Publishing Switzerland, pp. 165-186.
- Lan, Y.-F., Lin, P.-C. & Hung, C.-L., 2012. An Approach to Encouraging and Evaluating Learner's Knowledge Contribution in Web-Based Collaborative Learning. *J. Educational Computing Research*, 47(2), pp. 107-135.
- Lazzaro, N., 2004. *Why We Play Games: Four Keys to More Emotion Without Story*. Oakland, XEODesign.
- Ledford, G. E. J., Gerhart, B. & Fang, M., 2013. Negative Effects of Extrinsic Rewards on Intrinsic Motivation: More Smoke Than Fire. *WorldofWork*, Issue 2, pp. 17-29.
- Lehrer, J., 2012. Groupthink. *New Yorker*, 87(46), pp. 22-27.
- Lieberoth, A., 2015. Shallow Gamification: Testing Psychological Effects of Framing an Activity as a Game. *Games and Culture*, pp. 229-248.

- Liebowitz, J., 2001. Knowledge management and its link to artificial intelligence. *Expert Systems with Applications* 20, pp. 1-6.
- Locke, E. A. & Latham, G. P., 2002. Building a Practically Useful Theory of Goal Setting and Task Motivation. *American Psychologist*, 57(9), pp. 705-717.
- Maier, R., 2007. *Knowledge Management Systems: Information and Communication Technologies for Knowledge Management*. Leipzig: Springer.
- Malhotra, Y. & Galleta, D., 2003. *Role of Commitment and Motivation in Knowledge Management Systems Implementation*. Hawaii, International Conference on System Sciences.
- Marczewski, A., 2017. *48 Gamification Elements, Mechanics and Ideas*. [Online] Available at: <https://www.gamified.uk/2015/02/04/47-gamification-elements-mechanics-and-ideas/>
- McLinden, D., 2017. And Then the Internet Happened: Thoughts on the Future of Concept Mapping. *Evaluation and Program Planning*, Volume 60, pp. 293-300.
- Mitton, C. et al., 2007. Knowledge Transfer and Exchange: Review and Synthesis of the Literature. *The Milbank Quarterly*, pp. 729-768.
- Murgia, M., 2016. *Google's DeepMind AI Makes History by Defeating Go Champion Lee Se-dol*. [Online] Available at: <http://www.telegraph.co.uk/technology/2016/03/09/googles-deepmind-beats-go-champion-in-historic-moment-for-ai/> [Accessed 04 04 2017].
- Nareyek, A., 2001. *Review: Intelligent Agents for Computer Games*. Berlin, Springer.
- Neeli, B. K., 2015. Gamification in the Enterprise: Differences from Consumer Market, Implications, and a Method to Manage Them. In: T. Reiners & L. C. Wood, eds. *Gamification in education and business*. New York: Springer International Publishing Switzerland, pp. 489-511.
- Nicholson, S., 2015. A RECIPE for Meaningful Gamification. In: T. Reiners & L. C. Wood, eds. *Gamification in education and business*. New York: Springer International Publishing Switzerland, pp. 1-20.
- Nonaka, I., 1991. The Knowledge-Creating Company. *Harvard Business Review*, pp. 96-104.
- North, K. & Kumta, G., 2014. *Knowledge Management: Value Creation Through Organizational*. Swizerland: Springer.
- O'Dell, C., Grayson, C. & Ostro, N., 1998. *If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practices*. s.l.:Simon & Schuster.
- Olsson, A. & Olander Roese, M., 2005. *Multi theoretical perspectives in an abductive action research study*. Lund, Lund University.

Orsini, L., 2010. *History of Social Games*. [Online] Available at: <http://kotaku.com/5548105/history-of-social-games> [Accessed 28 03 2017].

Osborn, A., 1948. *Your Creative Power*. New York: Scribner.

Pappas, C., 2017. *7 eLearning Gamification Elements to Get the Most Out of Serious Games*. [Online] Available at: <https://www.docebo.com/2017/01/17/7-gamification-elements-for-elearning-serious-games/>

Paul, P. V., 2016. Knowledge Management using Gamification. *International Journal of Advanced Scientific Research & Development*, 3(1), pp. 35-39.

Perryer, C., Celestine, N. A., Scott-Ladd, B. & Leighton, C., 2016. Enhancing workplace motivation through gamification: Transferrable lessons from pedagogy. *The International Journal of Management Education*, Issue 14, pp. 327-335.

Ravaja, N. et al., 2004. Emotional Response Patterns and Sense of Presence During Video Games: Potential Criterion Variables for Game Design. *NordiCHI*, pp. 339-347.

Roy, v., Roy & Zaman, B., 2015. *Moving beyond the effectiveness of gamification*, Seoul: Gamification Research Network.

Ryan, R. M. & Deci, E. L., 2000. Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, pp. 54-67.

Saunders, M., Lewis, P. & Thornhill, A., 2009. *Research methods for business students*. 5th ed. Harlow: Pearson Education Limited.

Savoia, A., 2011. *Pretotyping.org*. [Online] Available at: http://www.pretotyping.org/uploads/1/4/0/9/14099067/pretotype_it_2nd_pretotype_edition-2.pdf [Accessed 19 05 2017].

Schacht, S. & Maedche, A., 2015. Project Knowledge Management While Simply Playing! Gaming Mechanics in Project Knowledge Management Systems. In: T. Reiners & L. C. Wood, eds. *Gamification in education and business*. New York: Springer International Publishing Switzerland, pp. 593-614.

Schell, J., 2005. Understanding Entertainment: Story and Gameplay are One. *Computers in Entertainment*, 3(1), pp. 6-6.

Shilton, K. & Sayles, S., 2016. "We Aren't All Going to Be on the Same Page About Ethics:" *Ethical Practices and Challenges in Research on Digital and Social Media*. Koloa, IEEE.

Shpakova, A., Macbryde, J. & Dörfler, V., 2016. *The Role(s) of Gamification in Knowledge Management*. Paris, EURAM 2016 (European Academy of Management) Conference.

Silic, M. & Back, A., 2017. *Impact of Gamification on User's Knowledge-Sharing Practices: Relationships between Work Motivation, Performance Expectancy and Work Engagement*. Hawaii, Hawaii International Conference on System Sciences.

Skinner, B. F., 1956. A Case History in Scientific Method. *American Psychologist*, pp. 221-233.

Smith, P. & Vollstedt, R., 1985. On Defining Play: An Empirical Study of the Relationship between Play and Various Play Criteria. *Society for Research in Child Development*, 56(4), pp. 1042-1050.

Stein, E. & Zwass, V., 1995. Actualizing Organizational Memory With Information Systems. *Information Systems Research*, 6(2), pp. 85-117.

Swacha, J., 2015. Gamification in Knowledge Management: Motivating for Knowledge Sharing. *Polish Journal of management studies*, 12(2), pp. 150-160.

Towell, J., 2014. *Video Games Have Become Too Unfocused and Need to Simplify*. [Online] Available at: <http://www.gamesradar.com/video-games-have-become-too-complex-and-need-regress/> [Accessed 04 04 2017].

Trochim, W., 1989. An Introduction to Concept Mapping for Planning and Evaluation. *Evaluation and Program Planning*, 12(1), pp. 1-16.

Valenti, D., 2017. *3 Onboarding Gamification Elements to Consider for Boosting Engagement During Sales Training*. [Online] Available at: <https://elearningindustry.com/3-onboarding-gamification-elements-boosting-engagement-sales-training>

Vassileva, J., 2012. Motivating participation in social computing. *User Model User-Adap Interaction applications: a user modeling perspective*, 22(1), pp. 177-201.

Wienclaw, R. A., 2015. *Interviews .Research Starters: Sociology (Online Edition)*, s.l.: Great Neck Publishing.

Wiles, J. et al., 2016. *Social Cardboard: Pretotyping a Social Ethnodroid in the Wild*. Christchurch, ACM/IEEE International Conference on Human-Robot Interaction.

Vroom, V. H., 1995. *Work and motivation*, San Francisco: Jossey-Bass Inc., Publishers.

Zichermann, G., 2017. *Intrinsic and Extrinsic Motivation in Gamification*. [Online] Available at: <http://www.gamification.co/2011/10/27/intrinsic-and-extrinsic-motivation-in-gamification/>

Appendix A: Interview guides

Interview guide – Group interviews

Introductions, explain what we are doing and ask if we can record, assure of anonymity.

“We are interviewing you because systems that are designed without the actual users’ participation risk being useless. We want to understand your view of km and gamification and to get input for the design of potential solutions. No wrong answers we want to hear everything.”

How familiar are you with the term knowledge management?

What is your opinion of knowledge management?

How is the knowledge management currently working from your perspective?

Have you used a gamified application, what was it?

How do you feel about gamification as a concept?

Do you think gamification can be used to make knowledge management more engaging?

What do you think would be important to keep in mind when applying gamification to knowledge management?

Do you have any ideas or thoughts about knowledge management and gamification that we haven’t spoken about?

Interview guide – KM experts

Introductions.

This is an exploratory study so we don't have all the answers and don't expect you to have them either!

As stated in our earlier e-mail we would like to ask:

Is it ok with you that we record this interview?

Is it ok that we use anonymized quotes from this interview?

Please, give us a brief overview of who you are and what you do?

How can employees be motivated to engage in knowledge management?

How familiar are you with gamification?

How does the actual implementation of km usually happen?

When KM has been implemented, how is engagement for KM maintained?

What are some important factors that must be considered when applying knowledge management in an organization?

How do you think gamification could be used to increase engagement for gamification?

Do you have anything else you would like to talk about that relates to what we have spoken about?

Thank you for taking the time to participate in the interview.

Interview guide –Gamification experts

Introductions.

This is an exploratory study so we don't have all the answers and don't expect you to have them either!

As stated in our earlier e-mail we would like to ask:

Is it ok with you that we record this interview?

Is it ok that we use anonymized quotes from this interview?

How familiar are you with knowledge management?

Please, give us a brief overview of who you are and what you do?

What kind of impact does gamification usually have? Timeline?(Removed after GC#1 interview)

How, in your experience, can gamification be used to increase long-term engagement for continuous work-related activities?

What are some important factors that need to be considered when applying gamification in an organization with the goal to increase long-term engagement?

How does the knowledge intensity of the users work factor in when gamifying an activity?

How can gamification be used with regard to changing organizational culture?(Added after GC#1, KMC#1 and KMC#2 interviews)

How is gamification for something like knowledge management different from other gamification?

Do you have anything else you would like to talk about that relates to what we have spoken about?

Thank you for taking the time to participate in the interview.

Appendix B: Statement of intent

Researchers:

Axel Avenberg final year student from the department of Project, Innovation and Entrepreneurship at Linköping University.

Andreas Sjöblom final year student from the department of Innovation and Technology at Lund University.

Purpose of research

As knowledge is increasingly viewed as a critical organizational resource, the need for proper ways to manage it grow. Effective knowledge management demands efficient knowledge sharing and one of the key barriers for knowledge sharing is the failure to create engaging and motivating ways for employees to participate. Recent research and the commercial success of gamification, the application of game-design elements and game principles in non-game contexts, as a motivational tool show great potential in many areas. Thus, the problem we are researching is how gamification can be applied in knowledge management. The particular area that is studied is how gamification can be used to engage employees in knowledge management at a knowledge intense customer support.

Your contribution

We are exploring this subject and are investigating how it can be done with respect to knowledge intense customer support. By participating in the interview you give us access to expertise and hands-on experience that is of tremendous value when we try to map the current states of these subjects and the possible connections between them. The interview is semi-structured, thirty minutes to an hour in duration and will be carried out in a medium of your preference.

Confidentiality

You are not bound to help us with our research, the purpose of this form is to ensure that you are comfortable participating and has been sufficiently informed about the research. You have the right to withdraw your consent at any time, if you wish to do so. Your name will be kept anonymous, the material you provide is only used for this research and upon completion of the project all data pertaining to your identity will be deleted.

At the time of the interview we will ask you the following questions and comply with your preferences.

- Do you agree to the interview being audio-recorded?
- Are we allowed to use anonymized quotes from the interview?

If you have questions, feel free to contact us at axel@avenberg.se or andreassjblom@gmail.com. The transcription and final report will be provided for your review upon request.

Appendix C: Gamification elements

There are many available gamification elements, basically anything you can think of could be gamified to some extent. Data has been gathered from a few different sources, and compiled to a list of elements that can be, and are currently being, used in different contexts. (Marczewski, 2017) (Valenti, 2017) (Pappas, 2017)

General elements

Tutorials

Instruction makes the beginning of the journey a lot easier if made to be interactive and interesting, and being given a few introductions on how the system works prevents many potentially negative impacts in the use of the system.

Signposting

Everyone needs a little direction every now and then, and signposting the next appropriate actions makes the early stages of using a system much smoother and more enjoyable.

Loss aversion

The fear of losing things can be a powerful motivator, and inserting an element of fear with regards to losing points, achievements and possessions can be used as a strong incentive to have people do things.

Progress / Feedback

Concerning feedback, the need for it is highly individual based on player types, but all users need some measure of progress report or feedback on your status.

Theme

A theme can often give users a sense of something greater than themselves, and it can be anything at all from company values to fantasy creatures. Connecting the theme to the overall narrative can be a powerful tool in giving the users a joyful experience.

Narrative

Telling the users a story, and letting them tell their own can involve people in the system to a much higher degree than simply setting a theme. If the narrative is connected to the theme and users can in some way affect the story, it will strengthen their bond to the system.

Curiosity

Curiosity is a strong force, and if it can be harnessed it will make the users interact more with your system on their own rather than having to be incentivized. Leaving some parts of the story or theme out, making it a mystery, may encourage people to find new directions and initiatives.

Time pressure

Reducing the amount of time given for certain actions can have both positive and negative effects, depending on the balance explained in flow theory, weighing capability against difficulty.

Scarcity

Making something less common or harder to get makes it more desirable.

Schedule elements

Random rewards

Giving out random and unexpected rewards can make people feel delighted and can keep them on their toes.

Fixed rewards schedule

Useful to celebrate milestone events, rewarding for first actions and progression is a powerful tool in keeping motivation at a high level.

Time dependent rewards

Events that happen at specific times, such as birthdays or holidays, which are rewarding for players that are currently there, incentivizes people to spend more time in the community.

Social elements

Teams

Small groups can sometimes be more effective than large networks, and letting people build their own close-knit teams or guilds will increase player participation. Creating opportunities for team-based challenges and rewards also increases social interaction in such an environment.

Social network

Allowing people to connect to one another and interact socially with ease through a social network will make people enjoy spending time with others and increase their willingness to play with others.

Social status

Increasing your visibility through social status may create new opportunities to establish relationships, and at the same time gives a good feeling.

Social discovery

Matching people based on interests and status can help people start their social interactions, and a way to establish and build relationships is integral to any community.

Social pressure

The fear of missing out on things is a powerful motivator, people don't like to be left out. In a social environment this can encourage people to follow the stream, can be discouraging and have a negative impact if expectations are unrealistic.

Competition

Competing with others gives us a way to get instant feedback with how proficient we are compared to others. It can be both a way to receive rewards, and a way to establish new relationships.

Free spirit

Exploration

Make exploration exciting and fun, give the user something new to find! Users exploring on their own will further their usage of the medium if they find it interesting and engaging.

Branching choices

Giving the user some degree of choice is important, they should feel that they can choose a path and influence their destiny. The choices they are presented with must be meaningful to be effective.

Easter eggs

Hiding rewards in places you must explore a bit to find is a good way to foster curiosity and make exploration more fun. The harder they are to find, the more exciting it is to find them!

Unlockable content

Add value to the experience by offering rare or unlockable content that can be used by explorers, linking these to exploration achievements or Easter eggs is a good way for users to display their exploratory prowess.

Creativity tools

Enabling user-created content is a huge opportunity for any game, interface, or platform. Giving users the ability to change and improve content and creating new content will give them a chance to express themselves while keeping the community moving forward without needing very much maintenance.

Customization

Giving people a tool to customize their experience with everything from avatars or profiles to changing the environment or interface lets them express themselves and gives them a feeling of individuality and enables them to feel good about their accomplishments.

Achievements

Challenges

New challenges keep people interested, giving them a chance to use their knowledge to face a problem, overcoming said challenges will give users satisfaction and the secure feeling of having earned their achievements.

Certificates

Certificates differ from general rewards, as certificates are a clear symbol of mastery. They have meaning and carry weight.

New skills

Giving users the opportunity to learn and expand their knowledge is fundamental in any gamified environment. Without learning there is no improvement.

Quests

Fixed goals give the users something to work toward, chain-quests make a user feel incentivized to keep going and gives a clear view of the improvements they have made.

Progression

Levels and other ways of showing progression helps the user map where they are in a system, how well they are faring and is a good way to show them where they should go next.

Boss battles

Usually showing the end of a journey, having epic showdowns where you must use everything you have learnt gives users a chance to shine, and prove that they are deserving of the rewards and achievements they have received so far. If you never have to prove your mettle, all achievements will seem pointless. Boss battles also signify the beginning of a new journey after having achieved victory!

Philanthropy

Purpose

Some only need to know the purpose of doing a task to make them feel satisfaction about doing the task, others need to feel as they are part of something greater than themselves!

Care-taking

Allowing user to take on parental roles can give some people a sense of fulfillment, creating roles for administrating, moderating, curating etc. can make the community self-sustaining.

Access

Giving access to more features and abilities when they have been earned is a good way to give people the means to help others and contribute to the greater good.

Collect & Trade

Many people love collecting things, and if giving the users a way to collect things and trade with others to increase their own collection it will help users build relationships and gives a sense of purpose.

Gifts

Allowing users to give gifts of items or other things to help them achieve their goals, will form an environment of altruism, while the potential for reciprocity can be a strong motivator for cooperation.

Sharing

Some enjoy sharing knowledge only for the reason of helping others, building in a way for people to share knowledge is therefore a huge resource for the community as a whole.

Disruptor

Innovation platform

People categorized as disruptors usually think outside the box. Give the players a way to channel this thinking into innovation.

Voice

Give the people a voice, and let them know it is heard. Change is easier to accept if you feel you have been part of the process or at least have could speak your mind about it. Some things could even be voted on by the community.

Development tools

Letting users modify content and create add-ons has been proven in many cases extremely successful.

Anonymity

Anonymity is a tricky subject, as you want your users to feel they can freely express themselves and feel safe in the environment. At the same time anonymity removes inhibition to some extent and can bring out the worst in people.

Light touch

While rules are important and an integral part of any game environment, enforcing them should be done with a light touch to retain some sense of freedom and playfulness. Keep a watchful eye and listen to the feedback from users.

Anarchy

Sometimes you must shake things up a bit. Consider having events without rules, and see what happens. Sit back and watch the chaos, maybe new ideas for the future will present themselves!

Player

Points

Points and experience are great feedback mechanics, and are used to track progress and unlocking new content. Award points based on desired behavior to create positive reinforcement loops moving the community in the direction you choose.

Prizes

Giving rewards and prizes can be used to foster engagement and promote certain activities, be careful not to “flood the market” as the value of rewards then plummet.

Leaderboards

Using ladders or leaderboards to show how users perform compared to others can for some serve as a great motivator and for others it can be a big disincentive. Use with caution, know your players!

Badges

Achievement rewards in the form of badges serve as another form of feedback and can serve as a great way to show people their value to the community. Be careful not to give them out too easily, users must feel they have earned them to attach value to them.

Virtual economy

Creating a virtual economy and allowing users to purchase things for their points earned in the game can attach greater value to the earnings they have made through the application. Explore the legal ramifications of this, and consider the long-term effects.

Lottery

Games of chance are a way to win rewards with little or no effort. Can add an element of excitement to the experience, but use sparingly so people who win do not gain an unfair advantage, and create rifts in the community.