

# Gamifying facility service jobs

## - using personnel attitudes and perceptions for designing gamification

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**Abstract:** The effects of gamification have been studied widely for example through education and health. The gamification of different work tasks remains an area where studies have focused mainly on conceptual considerations, that are however often lacking on the empirical evidence. The aim of our project (KISA) is to study how does gamification affect on the facility services jobs - cleaning and maintenance. In general, gamification improves the productivity and workplace well-being. Better motivation is supposed to lead better results and more enjoyable work. This paper briefly describes the process of gamifying facility service jobs from the interviews of the staff to early implementation of the custom-made application. It presents the results of the interviewed personnel (18) in spring 2017 and their perceptions and attitudes on gamification. The derived findings are used to design, create and implement the gamified application in both of the workplaces. 18 Employees participated in the pilot study in spring 2018. The used application is described through Morschheuser et al. (2017) theory of gamification as well as the questionnaire results gathered during the end-interviews of the pilot study.

### 1. Introduction

Gamification has become more and more of a trending topic that has been studied from several viewpoints. It has been seen supporting user engagement and enhancing positive patterns in service use, such as increasing user activity, social interaction, or quality and productivity of actions (Hamari et al. 2014; Hamari 2013). Based on e.g. Hamari et al. research, these desired use patterns are considered to emerge as a result of positive, intrinsically motivating (Ryan & Deci 2000), “gameful” experiences (Huotari & Hamari 2012) brought about by game/motivational affordances implemented into a service. (Hamari, Koivisto & Sarsa 2014) Gamification has been previously implemented for example in work (Arai, Sakamoto & Washizaki, 2014; Fernandes et al., 2012), education (Landers & Landers, 2014; Clark, D. B., Tanner-Smith, E. E. & Killingsworth, S.S. 2015), data-collection (Downes-Le Guin, Baker, Mechling, & Ruyle, 2012), health (Bellotti et al. 2010; Jones, Madden, & Wengreen, 2014), marketing (Hamari, 2013, 2015), and environmental protection (Gustafsson, Katzeff, & Bang, 2009).

According to Sailer, Hense, Mayr & Mandi (2017), game design elements can deliberately be used to modify non-game contexts such as working environments to address motivational mechanisms, especially when well designed and built upon well-established implementation models. (Sailer, Hense, Mayr & Mandi 2017, 378). Gamification primarily aims to increase users' positive motivations towards given activities or use of technology. (Hamari & Koivisto 2015; Huotari & Hamari 2016) It has been suggested that more and more of all organizations will have gamified parts in their processes in the future. (Morschheuser, Werder, Hamari & Abe 2017)

In the project, our hypothesis is that the work the building management and service people do is invisible. When everything works, the workers usually do not get positive feedback from the users of the building. It only becomes visible upon breakdown, the floors are dirty, the temperature is too hot or too cold, lights are out. (Graham & Thrift, 2007). In our study, we claim that gamification can make otherwise invisible work visible, by providing positive feedback to the worker.

## **2. BACKGROUND - Description of the KISA-project**

KISA-project (2017-2018) is funded by the The Finnish Work Environment Fund (TSR). The aim of the project (KISA) is to study how does gamification affect on the facility services jobs – especially in real-estate maintenance and cleaning services. The overall process of this project include work engagement scale test, interviews with the staff, design process of the application based on the interview findings, implementation and pilot phase and finally end-interviews.

In this project we aim to answer following questions:

- How do the employees experience gamification?
- Does gamification increase motivation towards work in respect to real-estate maintenance and cleaning services workers?
- What kind of gamification elements support well-being and productivity in these jobs?

## **3. RESEARCH METHODS AND DATA**

This project operates by the action research framework. In KISA-project the researcher and the organizational actors participated interactively in the research. The approach was adopted since it allows generation of new scientific knowledge from the observation and direct intervention on a specific situation. AR is particularly suitable when a study aims at improving a concrete situation making changes to it (Sullivan, 1998) and, at the same time, expanding scholarly knowledge providing deeper insights into the issues under consideration (e.g. Touboulie and Walker, 2016). Action research involves actively participating in a change situation, often via an existing organization, whilst simultaneously conducting research.

The data of the KiSA research consists of a) semi-structured interviews before the pilot, which was utilized in designing the gamified application, b) the data collected by the application during the pilot and the researcher's observation on the usage of the application, and c) the questionnaire and

semi-structured interviews after the pilot. In this paper we focus on the results on the initial interviews and the end questionnaire.

The initial semi-structured theme interviews took place in both of the workplaces in spring 2017. Two researchers executed the interviews based on the thematic frame of questions that reflected with the previous research on work life research, work life well-being and gamificational aspects. Staff members were interviewed individually and interviews were recorded. One interview took approx. 45 minutes. Interviews were transcribed afterwards and analyzed qualitatively using a thematic analysis. Overall, 18 staff members, 14 from RTK-Palvelu and 4 from Porin palveluliikelaitos, were interviewed. Two of the interviewees were managers. Three of them were male and fifteen were female. The interviewees were selected voluntarily, based on their interest to take part.

The data from the initial interviews were utilized in designing the gamified application. The development process reflects on the Morschheuser et al. (2017) method for designing gamification. This approach is explained in more detail later in chapter 4.

The pilot study (staff members using the gamified application) was implemented in March-April 2018. There were nine voluntary participants from RTK-Palvelu and nine from Porin palveluliikelaitos. The same participants took part on the end interview and filled out the questionnaire. 11 of the interviewees were workers and seven managers. Seven of them were male and 11 were female. The interviewees were selected voluntarily, based on their interest to take part. Most of the participants were different than of the initial interviews. The end interviews are described in more detail in chapter 4.

#### **4. THE DESCRIPTION OF THE APPLICATION THROUGH THE THEORY OF DESIGNING GAMIFICATION**

Morschheuser, Werder, Hamari and Abe have presented a method for designing gamification in their article *How to Gamify? A Method for Designing Gamification* (2017, 1300-1304). Their method bases on literature of gamification design methods and on interviews of professionals. We reflect our gamification process to their seven phases of gamification design.

##### ***Phase 1. Project preparation / August-September 2016***

Experts in the research of Morschheuser et al. recommend to start with the identification of problems that should be addressed and to derive goals that could be used to measure the success of gamification project via gamification (2017, 1300).

In KiSA project the preparation was done when applying for funding in 2016: setting objectives and how to measure them, as well as deciding on budget, duration, project team. The cooperative organizations: RTK-Palvelu (cleaning services) and Porin palveluliikelaitos (real-estate maintenance) were committed to take part in the project. The gamification approach was discussed in this phase and all the organizations shared common interest to pursue the pilot. The Finnish Work Environment Fund admitted the funding and project started in Spring 2017.

##### ***Phase 2. Analysis (of context and users) / March – October 2017***

The analysis phase should include activities that are used to identify the necessary knowledge of the users, processes and the project itself (Morschheuser et al. 2017, 1300).

In KiSA project this phase was executed thoroughly by interviewing the target organizations' employees. The interview data gave the understanding of the target group (user). To characterise the gamified system (context), the following preliminary results were drawn:

**Table 1. Preliminary interview results**

Hypothesis	Results from interviews with workers
Routine work is considered safe (transfer to a new location creates stress)	The content of the work varies a lot. Some workers enjoy the routines and some the variance of the job. In placing the workers, the management has taken the personal needs of the workers into consideration.
There is not much competition among the workers in the same location, and it is considered negative	There is some competition among the workers in the same location, and it is considered negative. The things considered most challenging in work are the working environment, keeping the schedule and keeping up good quality. The atmosphere and the co-workers were seen as both motivating and challenging factor in work.
Managers give feedback regularly	Small group of interviewed workers replied that they get feedback from managers and/or customers. About half of them felt that the feedback is given too seldom. Especially the feedback from the supervisors and positive feedback in general.
In general, the mobile technology is considered as difficult to use	In general, mobile technology was considered difficult to use. However, most of the technology comments regarded the malfunctioning monitoring systems of working hours. Still most workers considered digital applications better than old paper-based methods. A clear majority considered themselves as good technology users.
Collective point systems are preferred over individual points.	Regarding gamification, collective point systems were preferred over individual points. Individual points were seen too competitive. There was a fear of it possible effecting the general atmosphere.
Mindset differences: no background in gaming sometimes leads to the negative attitude towards games and gamification.	No direct connection supporting mindset differences. Interviewees who had no background in gaming and saw themselves as weak technology users were concerned of the (work) time spent on using gamified app.

As a result of our findings, we came to the same conclusion as recommended by Morschheuser et al.: if a focus group proves large/heterogenic, it is recommended to focus on general user needs and motivations. The interviews also gave data related to the context of gamification: the most evident conclusion was that the application needed to be simple, easy and fast to use.

### ***Phase 3. Ideation / August 2016 – January 2017***

Morschheuser et al. (2017, 1301-1302) state that in their interviews with experts, they indicated that creative process like iterative brainstorming is needed to come up with lot of ideas and then consolidating them.

In our research process it is hard to separate the ideation process from other activities. Some ideas of the application were ready already at the project planning state. Throughout the process, ideas were discussed in research group meetings and in meetings with target organization representatives (managers). Ideation was also done while analyzing the interview data and testing and benchmarking other applications. Ideation was closely attached to the design process described next.

#### ***Phase 4. Design / October 2017 – March 2018***

The design phase should produce all relevant info for the implementation: development concept. In this phase rapid development and iterative testing of the idea is the key. (Morschheuser et al. 2017, 1302-1303.)

In line with the theory of Morschheuser et al.(2017, 1303) deciding whether to a) develop with an own team, b) use external developers or c) adapt the design to an existing platform was included on the Phase 5., Implementation. In KiSA project this decision was an important part of ideation and design.

In the project plan (Phase 1) the gamified application was supposed to be developed by our own team. Due to changes in personnel, this became challenging, so we looked for an existing platform that could be adapted for the project. An application called Habitica was tested and many of its features suited our purposes: it was communal, fairly simple to use and rewarding. It had downsides too: it operated only in English language, and had several tabs, actions and pop-up windows that made the user interface a bit confusing. From research point of view the challenge was also how to process and protect all the data. Because of the downsides, Habitica was rejected as a platform. However, the testing period was beneficial for our ideation process and we used many of Habitica's features as ideas on how the gamification could be implemented in our application.

With the experiences of Habitica, we had a relatively clear vision on how the application should work. Based on the interviews of the staff and our own brainstorming sessions, also the content for the application was already at a good stage. At this point, we came across with local AI company HeadAI and benchmarked their applications. After few brainstorming sessions with them we decided to use their already existing platform and have it modified for our purposes, while the content would be designed by our researcher team.

The application development process became a combination of adapting existing platform and using external developers. HeadAI's "One by One" platform that we decided to use is an AI - based interactive questionnaire form. The user interface reminds of Whatsapp or Messenger, but instead of messaging a person, a software robot (bot) is messaging to you, and you have certain answering options to message it back.

The idea for the possible application mechanic came from one of the Habitica's features where: one can give plus or minus to one's habits. For our gamified application, we created these "habits" and "challenges" based on the themes that were discovered from the interview data. Instead of plus and minus, we used variables similar to Likert scale: very often / often / seldom / not at all / does not concern me.

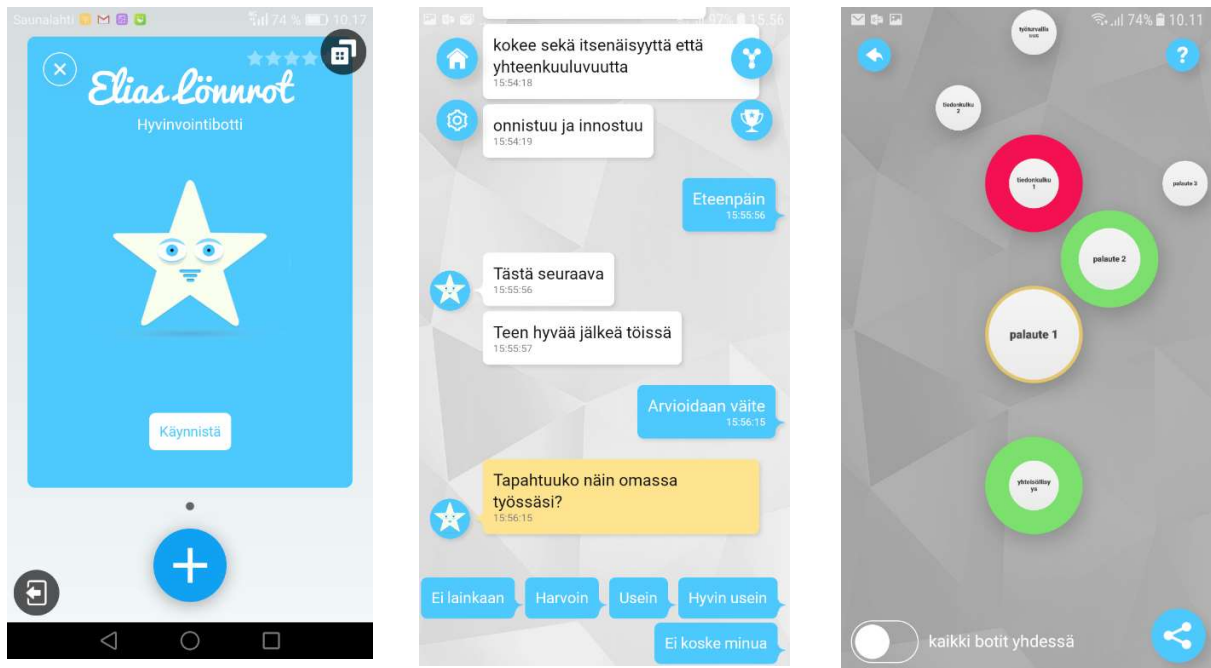
As mentioned before, our conclusion from the interview data was to keep the application simple, easy and fast to use. In addition, communal and rewarding elements were important. One challenge in designing the application was that there was no average working days or tasks for facility services workers. Due to this, it was difficult to come up with claims about work that would apply for everybody. With this, the focus of the application sifted from communal to more individual and from specific work-related tasks to more general user needs. We detected nine important themes from the interview data:

**Table 2. The main themes of the application**

Sense of Community	Feedback	Information Flow
Safety in Work	Work Itself	Working Hours
Customer Experience	Self-Evaluation	Learning

Under these categories we created appropriate claims or challenges. Such as “I will say hello to five customers today” (communality) or “I will have a peaceful coffee break” (working hours) or “I got good feedback from my supervisor” (feedback). Some of the claims guided the worker to activity, some were just statements of how things are.

In addition to the claims and the answering scale, we included a short textual introduction to the beginning of each theme. This, in addition to the bot’s answering mechanics and language, was designed to give a feeling of an actual conversation. In the design process our research team provided most of the texts and HeadAI team put them in place. The evaluation system was thought together in planning meetings. For the visualization of the progress it was decided that gamified features in the platform, such as collecting of trophies and progress map were decided. They were both customized for our purposes. The programming and testing phase took place in January-March 2018. During that time different versions were tested. In the final stage, the application was presented to the target organizations’ representatives and their feedback was taken into consideration. Their involvement in the process, clearly gave them better understanding on what gamification is.



**Figure 1.**

Screenshots from WorkAI application. On the left, “the well-being-bot” named as Elias Lönnrot. In the middle, caption from the conversation with the bot. On the right, the learning map where participants can follow their own progress and/or choose themes.

### ***Phase 5. Implementation / April 2018***

Piloting can be seen as an implementation phase. The concrete results of this phase were testing and deciding the development team (own team/external/existing platform). (Morschheuser et al. 2017, 1303). In KiSA project we concentrated on piloting in this phase.

The pilot study was implemented from 15<sup>th</sup> of March to 8<sup>th</sup> of April 2018. There were nine voluntary participants from RTK-Palvelu (cleaning services) and nine from Porin palveluliikelaitos (real-estate maintenance). Both workers and supervisors attended. The pilot study begun with training sessions for both groups. Training included installing of the application to their work phones, presenting the features and testing the application. For the end of the training, participants created and named their own bots for the application. With that bot they “discussed” during the whole pilot period.

During the pilot study, the WorkAI's bot asked participants questions on daily basis. The facility service workers answered three to four questions from each theme daily: very often / often / seldom / not at all / does not concern me. The questions were tagged with the main theme and the user got badges when advancing in the themes and he/she was also able to follow the progress from a map that visualized the dealt themes. The participants used the application daily/almost daily for a period of 3 weeks (15 work days).

### ***Phase 6. Evaluation / April 2018 – ongoing***

Based on Morschheuser et al. 2017, 1303), the evaluation phase investigates whether gamified application meets the defined objectives. In KiSA project we had different approaches to evaluate the application and the overall process.

During the try-out phase, researcher was observing the use of application in the work environment. Finally, the end-interviews were executed and questionnaires collected. The end-interviews were done in group-settings, in both work places individually. In the beginning of the interview, the participants were asked to fill-in the questionnaire forms. After that, there was an interview based on the thematical areas of WorkAI and the participants were able to speak freely how they had perceived the use of application and its content. Gamification elements were discussed as well. Through the evaluation phase we were able get the overall experiences and opinions towards the pilot study and application. Also, the actual data gathered from the application will be analyzed later on.

### ***Phase 7. Monitoring / not applicable***

Morschheuser et al. (2017, 1303-1304) state that gamification can be seen as a classical software project with clear start and end or as iterative process of design, development, evaluation, monitoring and adaption. Many of the experts interviewed for the paper stated that gamification project should be ongoing and become part of how the organization works.

KiSA is more of a pilot project that has a start and an end. Therefore the monitoring phase is not applicable. If the project would continue or the target organizations would otherwise include gamification approaches in their activities, the monitoring phase would be an essential way to follow the overall process.

## 5. DISCUSSION

Overall the pilot study was executed as planned. There are however few remarks concerning the process. First, the amount of the interviews is rather small so the findings cannot be generalized. However, it is intentional since we are trying to gamify only these two work communities, and work tasks and their description are always unique. We are aiming to find some larger scale findings that can be generalized and used in further attempts to gamify working life. What should one take into consideration and what should one avoid while gamifying working life. We are then aiming to produce best practices through the practical approach within this project.

Second, also the two groups are quite different. There are lots of variety in the participants' background - ICT skills, technology used at work, attitudes towards games etc. The working conditions vary since there are a lot of difference between the two organizations and within them. This can be seen both as a curse and a blessing. It will give more heterogeneous field to work with, which will make the results more diverse. At the same time, it makes the design of the application more challenging.

Third, in respect to the WorkAI, we could have chosen one particular theme area instead of using all of them as a content of the application. We could have concentrated on e.g. safety at work or well-being in order to give more intense and detailed insights to the participants. The AI features of the platform could have been executed more proper. If used more effectively, AI would enable searches for information on certain topics that could be filtered to the application in wanted way. In the future studies concentrating on one theme and seeking the ways of using AI in gamification could produce more beneficial outcomes to the employees.

Also, at this stage, we were only utilizing the data from the interviews as a background for the application. However, facility service jobs already produce lots of sensor-based data, often in the form big data. These could be for example the energy consumption of the buildings, satisfaction of the users of the buildings, cleanliness and the fuel consumption of the work appliances. In the future, this sort of a data could be utilized in gamifying different work tasks. One of the results of the interviews was that technology should not be uneasy. Therefore, the most optimal way to gamify would be to integrate gamified elements to already existing technical systems.

## 6. CONCLUSIONS

In this paper we described the design process of our solution to gamify facility service work tasks. The executed application bases on the pre-interview data and the design process was presented through Morschheuser et al. (2017) theory on designing gamification. We described the main findings of the pre-interviews that were: a) the application for facility service work needed to be simple, easy and fast to use b) communal and rewarding elements were appreciated c) the participants' background and the working conditions varied a lot. This demanded the application to concentrated on the general user needs rather than specific work-related tasks. We detected nine work-related themes from the interview data that we built the WorkAI application on.

Next we reflected these findings and our design process of the gamified application on the 7 phases of Morschheuser et al. (2017) theory. To summarize, majority of the respondents considered the application and its usage easy and well-adopted. The use of WorkAI was also seen as fun and somewhat beneficial. The gamified elements were overall perceived positive and e.g. the collecting of trophies and progress map were seen motivating. The use of WorkAI did not disturb participants'



work routines and the use of application was perceived fluent during the workday. The content of the WorkAI was seen both relevant and irrelevant. Also, some felt working more pleasant with WorkAI and some experienced that WorkAI did not improve their work during the pilot study. Approximately half felt that application had taught something new and other half disagreed. To conclude, the clear majority would like to use similar application with perhaps new thematical areas in the future.

Based on these results, the answers to our research questions are the following: 1) How do the employees experience gamification? The attitudes after the pilot study were positive and the gamified features implemented in the application were positively perceived. Also the use application did not interfere respondents work-routines during the pilot. As a promising result, due to the previous points, the majority would like to use similar solutions in the future. 2) Does gamification increase motivation towards work in respect to real-estate maintenance and cleaning services workers? Half of the respondents felt the use of application motivating, especially through the gamificational elements e.g. collecting of the trophies and progress map. 3) What kind of gamification elements support well-being and productivity in these jobs? Based on our study, the gamified solution needs to be easy to adapt and it should not disturb work routines. Secondly, it should operate on relevant issues and offer new insights on e.g. well-being at the workplace. Thirdly, gamified elements play an important role when motivating respondents to use the solution on daily bases.

To conclude, digitalization is reflecting to almost all areas in our societies. (e.g. Brynjolfsson & McAfee 2011; Mokyr et al. 2015). It creates completely new jobs requiring competence to utilize computers and other digital devices. (e.g. Niemi et al. 2014; Bessen 2015). The future work life will substantially full of young people that are used to play games in everyday life. They are constantly learning digital skills while playing. However, the working life does not necessarily know how to utilize this knowledge. With the help of gamification, these skills can be used to benefit from the already known procedures, way of acting. Through gamification the work tasks can also be more personalized, which can lead to more motivational outcomes. Through the results of this study, we can also estimate how the gamificational application could be modified for further use and what kind of application would be suitable for long-term-use and make suggestions for further research. The overall results of KISA-project can be utilized widely in facility service jobs. It is one of the main intentions of this project is to help make the work more visible and simultaneously to increase the valuation and interest in this field of profession.

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