Open Badges – Experiences from a game development skills open badge co-creation process

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Abstract: Both the game industry and game education have developed enormously during the past ten years in Finland. However, the skills and competences needed for employment in a game company are only partially provided by the formal education. Instead, many skills are learned in an informal way outside educational programmes, and the current educational system fails to identify and to recognize these skills. Additionally, the competences of graduates from the formal education are not sufficiently communicated to the potential employers. Open badges are introduced as a promising solution to this challenge. Our research questions are: 1) How the project management skills and competences of game development bachelor's degree students can be identified and acknowledged with digital badges? 2) How the project management badges can be co-created and collaboratively designed? Our research approach was qualitative, and for the development of the open badge we chose to utilise service design. Service design methodology enables analysing and understanding the needs of the users. In addition, service design promotes a participatory mind-set, where users are seen as partners and active co-creators. Furthermore, service design enables agile project work including prototyping, testing and iterating. In this paper we report a case study and collaborative development process of an open badge in the field of project management skills in game development. Our observations highlight the significant role of project management skills, e.g. teamwork skills, in the game business in addition to the software engineering skills, and the importance of the capability to identify those skills at bachelor level in order to improve the employability of the game development students. Further, we discuss the benefits of the collaborative model of designing project management badges with the help of service design methods.

Keywords: open badges, service design, teamwork skills, co-creation, collaborative design, recognition of skills, game education

1. Introduction

During the past decade the small game firms in Finland have grown significantly to form an industry of their own. At the same time, the education in the game field has grown rapidly both on the vocational and university levels. However, the competences needed and required for being successfully employed by a game firm may not completely match the educational programmes offered by the universities and vocational schools (Taipale-Lehto & Vepsäläinen, 2016). Often the talented game developers learn important skills outside the formal education, but the outcomes of this informal learning are not fully recognized or even identified by the formal educational institutions. Another challenge is that the competences produced through the formal education are not sufficiently communicated to the game firms, which causes that the graduates face challenges in finding an employment. These challenges of recognizing and communicating the competences are tackled by the RDI project "Chips for Game Skills" that aims to develop open badges related to selected central skills and competences in the game field.

Our research questions are: 1) How can the project management skills and competences of game development bachelor's degree students be identified and acknowledged with digital badges? 2) How can the project management badges be co-created and collaboratively designed?

In our paper we present the development and reflections on collaborative Open Badge design related to game development skills. A teamwork badge was developed focusing on the identification of the future competences and skills needs in the game industry and development of the education to facilitate the employment opportunities for the students in the game companies. The goal was to create a digital open badge system to communicate the skills and competences achieved by the students that make them more employable. In this paper we focus on creating of the contents of the teamwork open badge and its

collaborative design process. The design project was carried out as a part of ESR-funded RDI project "Chips for Game Skills". Bachelor's students in project management in a university of applied sciences designed and developed a teamwork badge as a learning project in which the university lecturers acted as instructors. The goals of the RDI project are to create a digital open badge system to increase the learners' motivation and engagement (Abramovich, Schunn & Higashi, 2013) and to communicate the skills and competences achieved by the students that make them more employable. In addition, the goal is to organize game competition and networking events to intensify the dialogue and collaboration among employers, educators, and students in the field. In this paper we focus on the creation of the teamwork open badge and its collaborative design process.

The rest of the paper is organized as follows. In the next section, the theoretical framework is presented. In section 3, the implementation of the case study and development project are described. In section 4, the findings and results of the study are presented, followed by conclusions and discussion in section 5.

2. Open badges and service design

We approached the phenomenon of developing open badges with the help of concepts and theories from two distinctive fields. First, we looked at the concept of open badges developed within the educational sciences. Second, we utilized the service design concepts and methods for directing the development process of the open badge.

Open Badges are digital credentials that visually demonstrate the competences, skills or abilities of the badge owner in specific fields. There is a strong need in our information society to recognize and demonstrate all the informal learning that happens through work, hobbies, volunteering and various other activities in our lives. The purpose of the open badges is to make the skills and competences of a person visible for others, which means that the badges should be designed visually interesting and in terms of content informative enough. As parties that issue the badges, and thus identify and acknowledge the skills and competences, could act different organizations, such as learning institutions, companies or societies. The badges can demonstrate both the hard skills, such C++ coding, and the soft skills like communication. (Brauer & Ruhalahti, 2014.)

Digital open badges were originally created as a part of massive online courses (MOOC). They consist of an icon and the following metadata: badge name, description, criteria, issuer, evidence and date issued, and can be linked e.g. to the Curriculum Vitae or LinkedIn, Facebook or Twitter or work portfolio in changing combinations. Open badges are issued also e.g. to document a person's participation in a single educational activity, to promote different diplomas or official certificates and accreditations, or to show community involvement (Brauer & Ruhalahti, 2014), but in this case, we focus on badges that demonstrate a badge earner's skills and competences that are valuable for game field employers and can be shared for employment, and also offer a possibility to create an evolving picture of a person's lifelong learning. In our R&D project, the open badge creation process helps to raise the quality of education, match education to industry needs and create more industry-ready graduates.

As employers are searching for specific skills to fit their business needs, the weaknesses of the traditional systems are e.g. that diplomas lack transparency and granularity and present an incomplete picture of a person's skills as they don't include learning outside classes. The problem is also that grades are subjective and don't necessarily give an idea of a performance of a learner. In addition, new learning providers challenge the status quo, as students are finding flexible alternatives to on-campus course delivery from different learning providers, but struggle with how to articulate their newly acquired skills in verified and trusted ways to employers. As learners take advantage of the many options available to them, they are more frequently acquiring skills and knowledge from multiple providers. Learners need an authoritative, verified and validated central repository to collect their competencies and achievements in order to be in control of their own qualifications. They need to be able to manage, group and stack them, and choose which qualifications to share for specific opportunities. (Acclaim 2013.)

Competency-based criteria that map learning to job requirements provide more understandable information for employers evaluating candidates. But also the open badge system is facing some challenges e.g. with identity, verification, ongoing validation and management that should be tackled by issuing universities and other issuing organizations (Acclaim 2013). The impact of badges on learners' motivation should also be

critically examined. Anyway, the research shows that the way badges are designed and how they are interpreted by the learner effect the motivation (Biles, Plass & Homer 2015). In gamification this means supporting learners' inner motivation by including in the system both "minor basic badges", content-based mastery badges and quantity-based badges that summarize levels (Brauer, Korhonen, & Siklander 2017). As simple gamified elements could work e.g. leaderboards, team spirit actions and awards (Deterding 2012). The digital open badge system could lead to gamification of studies to a greater extent, as well as the possibility to acknowledge larger learning unities.

Service design has been introduced as a methodology and a process for enabling customer-centered development and co-creation. (e.g., Stickdorn et al., 2018; Yu & Sangiorgi, 2018; Andreassen et al., 2016; Miettinen, 2011) The idea of service design is to enable collaborative development based on deep customer insight and collaboration and interaction between various stakeholders. Often the service design process progresses according to the so called double diamond (Design Council, 2018) that is formed by two stages; first, the problem space in which the problem at hand should be defined, and second, the solution space in which the potential solutions to the problem will be ideated and developed. The idea of service design is to work iteratively so that several iterations of data collection, idea creation, and prototype testing would follow each other. This iterative way of working aims to include the developing understanding into the development process and to minimize risk of failure as the ideas are tested continuously. Service design also aims to enable value co-creation for the customer through involving the customer in the design process.

We chose service design as the methodology of development when creating the open badge, because we considered extremely important to understand the needs of the users and have participatory mind-set, where users are seen as partners and active co-creators. In addition, in our opinion, service design fits for agile project work including prototyping, testing and iterating. The detailed descriptions of the utilized service design methods are presented in the next section, the case study.

3. The case study

In this paper we describe the iterative development of the open badge as a learning project. The teamwork badge creation process was initiated with two questions: a) What kind of person is an excellent team player in the game development team, and b) how this person can demonstrate these skills and competences? The project management skills and competences needs in the game industry were defined using different research and service design methods and tools in the collaboration between business and game development bachelor students. The project manager of the "Chips for Game Skills" RDI project from Metropolia UAS, a startup entrepreneur focusing on badge development and two instructors were also involved in the teamwork badge development.

Our research approach was action research (Costello, 2003) as we at the same time developed the subject that was studied. The research focused on a single case (Yin, 2012), and the utilized methods as well as the collected data were qualitative (Silverman, 2013). The qualitative methods were chosen, as the quality of the data was prioritized over the quantity, which meant that the small amount of data was collected in order to answer the questions "why" and "what kind of" and interpreted by the researchers. When using qualitative methods, the data can be examined as observations of one single or several cases and interpreted in the context they have been produced. In our case, the data was collected by the bachelor business students in two peer-to-peer (P2P) projects as part of their project work during the semester 2017 and spring 2018. The data collected in 2017 was utilized as background information in the open badge design process in spring 2018. The student teams were guided by two teacher-lecturers, who acted as instructors in the project teams. The data was collected mostly at Metropolia UAS game development bachelor student teams. The methods are explained in more detail in the following chapters.

In the creation of teamwork badges service design processes and methods were utilized as a development methodology (Schneider & Stickdorn, 2010). In order to understand the work life needs in game industry, an overview of competences and skills needs in the game industry based on several sources, e.g. Taipale-Lehto & Vepsäläinen's "Report on competences and skills needs in the games industry" (2016), was produced. The qualitative data was classified according to the repeated themes in different competence categories. The qualitative data was also produced in excel according to the intensity rules set by the student team. The team

gave points (-1, 1, +2) to the categories including specific competence needs using the following criteria: the competence need will not be relevant in the future, remains the same, or grows in the future.

In order to identify different parties that might have interest in skills and competences of game development student teams, a stakeholder map was created. Before creating the stakeholder map, the overall picture of the project and the relations between different stakeholders was formed with the help of CoCo Tool Kit, a design game developed for promoting service design projects (Laurea, 2018). After the overview of competences and stakeholder map creation, a game development teacher interview was performed in order to understand better the game development education and open badges as a solution to the need to identify the game development students' skills and competencies.

Affinity diagrams (Beyer & Holtzblatt, 1999) were created when analysing the collected data. The affinity diagram is a visualized way of analysing and thematising the contents of a data set. At the first stage of affinity diagram creation, three game development bachelor student teams were interviewed as groups by business bachelor students about their experiences and development needs regarding project work. The interviews were recorded and transcribed after which each member of the interviewer team wrote freely all his or her observations on post it notes. Observations were divided into different categories, such as team roles, stages of project work, communication, project planning and project management. The most critical development targets were selected based on the affinity diagram.

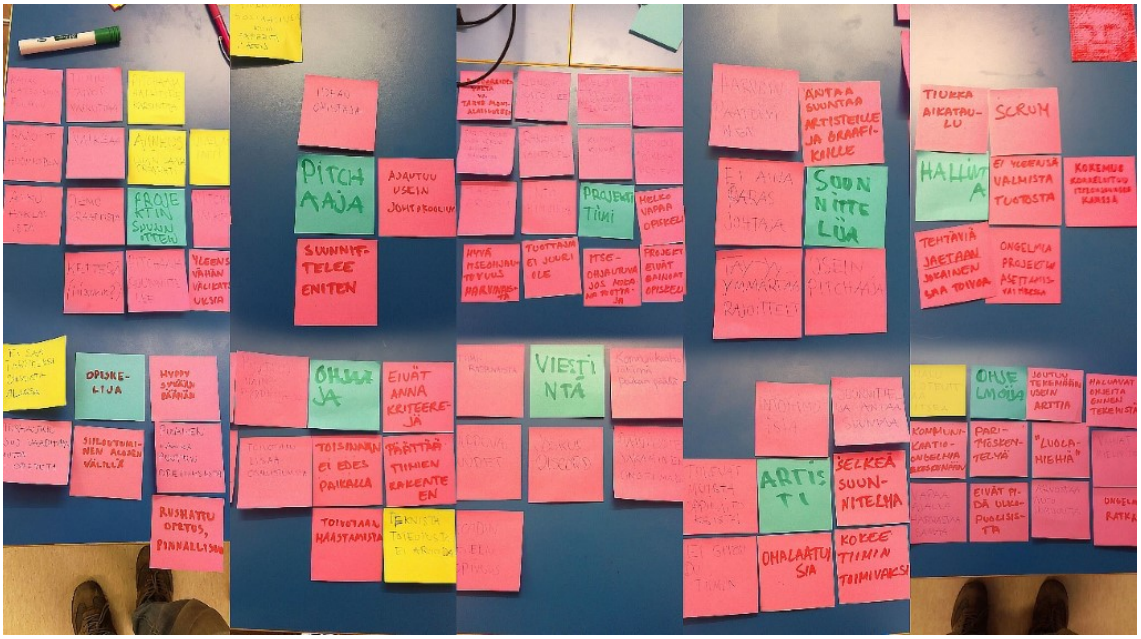

Figure 1. Affinity diagram's 1st draft visualised in post it notes

After a group interview and observation of game development student teams, user archetypes, i.e. personas (Miettinen, 2011; Nielsen, 2012), were built The idea of creating and using personas is to integrate the user information into a visualized form and to form an understanding of the user and his/her needs and requirements related to the service of product that is being developed. In this case, user archetypes were created according to the team roles: programmer, artist and designer. Personality traits, opinions, preferences etc. of the representatives of different roles were listed and persona cards created utilizing storytelling. The idea of storytelling is to support and inspire the service design process by providing different types of user information. For example, fictive stories of a customer journey can be created to illustrate an imagined service, and users may also tell real-life stories about their service experiences. In addition stories can be utilized for coming up with new service ideas and for identifying users' opinions and attitudes. (Kankainen et al. 2012)

Two service design workshops for prototype creation were organized. The idea of utilizing collaborative workshops was to bring together various actors with rich background knowledge to create new ideas and

knowledge together. The goal of prototyping was to give the design ideas a concrete form and to enable communicating and testing the ideas (Blomkvist & Holmlid, 2010). In the first service design workshop the analysis of user archetypes was introduced to the lecturers by a bachelor business student team. The archetypes analysis acted as a starting point to the workshop, where the task was to identify the main communication problems and structural challenges in the game development teams and to find creative solutions to them. The suggested solutions were visualized using Lego blocks and mini-figures. After the workshop, a service design probe (Mattelmäki, 2006; Hulkko et al., 2004) was implemented using WhatsApp to further identify the competence needs of the game design students. The objective and contents of the second service design workshop is described below in the order that the actions were implemented.

Figure 2. The suggested game development student team organisation, roles and responsibilities visualised in lego blocks

Gaming industry job advertisements were also analysed in order to clarify the picture of the current competence requirements in the field. The analysis of job advertisements of Finnish game companies, such as Rovio, Supercell, Nextgames and Housemarque, highlighted the importance of job applicants to have “excellent communication skills in English”, “ability to explain complex things in a simple way”, “ability to receive and give feedback” and “clear understanding and appreciation of schedules and milestones”. In his blog post, head of Neogames, a non-profit game industry organization also pointed out the relevance of teamwork skills and competences, as the game field is not only about the technology, but also humans forming a community.

In the second service design workshop the participants were first given an introductory lecture by a Principal lecturer on design thinking, co-creation and co-design. After this orientation phase, the students were divided into teams and assigned tasks. This time, the teams consisted of bachelor and master students. The teams focused on different aspects of the identification of project management competencies of game development students: design of project management open badges, a local game competition, a gamified project management e-coaching concept and a game development team producer path. The task was to create initial prototypes to be worked further in the next project cycle iterations.

An open badge brainstorming workshop was organized by the project manager of “Chips for Game Skills” RDI project. A start-up entrepreneur focusing on badge development, one bachelor business student team and two instructors were also involved in the teamwork badge development workshop. First, the open badge specialist gave an introductory lecture on digital open badges, and then the participants were divided into groups for discussions and writing ideas on the flipchart. The objective of the workshop was to find answers to two questions: What are a good team player’s competences in the game development team? How can he demonstrate his teamwork skills and competences with the help of a digital open badge? As a result the development team introduced for future iterations the 1st draft of the teamwork open badge, which is presented in the Findings and results chapter.

A team review workshop was organized to the game development bachelor students during the teamwork coaching afternoon. The game teams' target was to develop the game from idea to Bit1 Game Awards and publication or a publication plan at minimum. In the first ice breaker task of the workshop, the students were asked to define their own roles in the game development team utilizing roleplay roles such as tank, support and damage dealer. After that others commented if they see the person's role in the game team the same way. Second warm up task was to list personally three most important factors that make a great team on the post it notes, and then share the opinions in the team. With the help of specific process in stages, the actual task was to ultimately find three development targets that needs to be improved during the ongoing game development project in order to reach the goals and objectives of the project. The teams were also asked to draft an action plan how to implement the changes, monitor the process and report the influences of the actions at the end of the game project in one minute videos via WhatsApp. The findings in the workshop and videos supported the badge prototyping as described in the next chapter.

Additionally, at the pitching stage of the game development projects, some business students were selected to participate in the teams to work as chief marketing officers, CMOs or producers, which has given some useful information for the identification of the project management skills and competences, especially teamwork skills, for the open badge creation. In the project, the CMOs focused on pitching and branding the game, while the producer's role was to support the team in team building, communication, project management, especially scheduling, and business planning. The producer's role was defined on the basis of the results of the interviews performed by the business students to game development students and teacher-specialists at the pre-study stage of the project. The observations and experiences were utilised in the Teamwork skills digital open badge prototype in the way described below in the following chapter.

4. Findings of the case study

Our research questions were: 1) How the project management skills and competences of game development bachelor's degree students can be identified and acknowledged with digital badges? 2) How the project management badges can be co-created and collaboratively designed? We collected qualitative data with multiple methods (interviews, design probe, etc.) in order to answer our questions. When developing the open badges, service design methods were also utilized, e.g. facilitated workshop and prototyping. As the result, we were able to answer the research questions and to develop the concrete outcome, the open badge prototype.

If we focus on the skills and competences that can be considered as a part of project management skills and competences, an overview of competences and skills needs in the game industry highlighted the following competences: internal management, including communication skills, peer management skills and team leadership skills. Prioritization and scheduling skills, agile methods management skills, organizational skills and project management skills were also listed on the top 20 list.

The analysis of the teacher interview pointed out a few challenges in the game development teams. The projects lack systematic structure, they are implemented more like group works. The other targets that should be developed are peer management, scheduling and communication skills. The share of the vision was also experienced challenging, as well as team building. Regarding the digital open badges the interviewee was of the opinion that there should be several open badges covering the competences mentioned in the overview of the competences created by bachelor business students (see the chapter above). In his opinion, several levels should exist in badges. The criteria for the badges and credibility of submitting organizations were emphasized as critical points by him. He also stated that the industry pays much attention to the demos and portfolios.

The affinity diagram creation work showed us the following results. Long-term project planning and milestones should be paid more attention. In some game teams, dropouts and lack of producers complicate the team work. Some teams communicate only when they work together with the game at the university premises or some other location. In addition, the sharing of updates between the team members was noticed to be problematic in game teams.

Persona cards gave us some understanding about the different archetypes in the game teams. Programmers were acknowledged to appreciate feedback from qualified professionals, they wish to express themselves in a creative way, they are not especially willing to escape from the comfort zone, they are passionate about gaming and self-oriented. They were analysed to be like "cavemen" with whom the communication is

sometimes problematic. Sometimes they forget about restrictions and limits and try to “reach the moon in the sky”. Artists, in many cases, come outside to the game projects which sometimes make them poorly connected and committed to the work. They are treated like subcontractors in the team. They are passionate about their own work, but don’t seem to care for other team members’ work. Artists are not very much self-oriented and need guidance and clear goals and objectives in projects. They might disappear in the middle of the project. Designers own the project and have formed the original idea of the product with which they deal with passion. Designers are programmers that have pitched the idea. They are not capable of taking time or personnel resource limits into account. They need peer and instructor feedback. Designer can be a programmer, peer manager, innovator, designer and an artist at the same time.

The main target of the both service design workshops was to nourish creativity and collaboration, as well as facilitate innovation, which resulted in innovative prototyping. In the first workshop, the students formed a suggestion of the future organisation of the project work in the game development teams in order to make the team members to collaborate for a common goal. Team roles and division of the tasks and responsibilities in the team were highlighted. The probe confirmed the results from the interviews.

The Bachelor level business student acting as a producer in the team gave a possibility to observe teamwork skills and competences of game developer students, as well to test teamwork open badge ideas and receive valuable feedback on the topic, especially the needs for support of game developer students in project management, teamwork skills and business planning. In this project, the business students learned more about how game development teams function, and at the same time they had a great opportunity to bring their own business, marketing and project management competences into the game development teams.

Another student acting as a producer was supported by a team of business students, who focused on analysing and reporting the observations and experiences together with the producer, on co-creation of teamwork digital open badger, on development of the producer path for the future, as well as on co-designing the project management and teamwork coaching for the game developer students The team was responsible for the creation of the criteria for the submission of the digital teamwork open badges, and a guidebook for the future producers and CMOs.

The team review workshop and related video assignments pointed out project planning skills, time management skills, teamwork skills, taking responsibility, commitment to the teamwork, communication skills and delegation skills as major development targets. Most of the teams reflected that especially communication inside the team should be improved. As stated above, in game industry job ads, excellent communication skills are highlighted in companies like Supercell, Rovio, Housemarque and Next games. For better communication the student teams found very concrete solutions like - We started using Discord almost every day. – We implemented Monday meetings and open discussions on the playability and direction of the game.

The digital open badge prototype is presented in Figure 3.

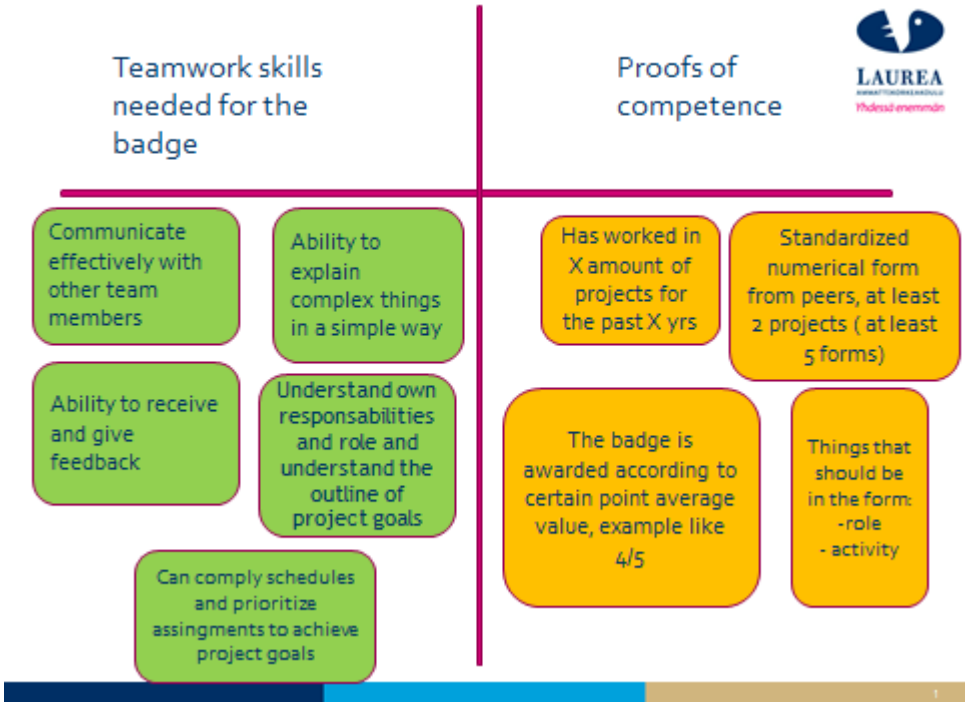

Figure 3. Teamwork skills digital open badge prototype No1

Evaluation criteria for proofs of competence were also created. Each statement is evaluated from one to five, where value one is the lowest and five the highest grade. The proposed statements are: 1. Results are achieved according to the team agreement and targets. 2. Communication skills are on professional level. 3. Respects other team members. 4. Able to give and receive feedback. 5. Follows schedules. 6. Realistic and flexible in self-management. 7. Participates actively in teamwork. 8. Quality of work is excellent.

After the second iteration cycle, the teamwork badge was revised according to the feedback received from the representatives of the game educators and open badge specialists. Team player: Communication and feedback: Effective communication with other team members, ability to explain complex things in a simple way, and ability to give and receive feedback. Roles and responsibilities: Understanding of own responsibilities and roles in the team, understanding of the outlines of the project goals, and ability to compile schedules and prioritize assignments to achieve the project goals. Requirements for receiving the badge are: Has worked in at least two project teams during last two years, has received a minimum average score of 3/5 from fellow team members. Things asked in the form (evaluation criteria from one to five): 1. Results are achieved according to the team agreement and targets. 2. Communication skills are on professional level. 3. Respects other team members. 4. able to give and receive feedback. 5. Follows schedules. 6. Realistic and flexible in self-management. 7. Participates actively in teamwork. 8. Quality of work is excellent.

5. Conclusions and discussion

At the current stage of the “Chips for Game Skills” RDI project, a prototype of a teamwork badge is presented as an intermediary result. As a next step, the prototype will be further developed in the open badge workshops together with the representatives of the game industry. The target of the future development is also to expand the co-creation of the badges to cover more areas of project management than just teamwork skills in order to visualize the learning path of content and activities (Ahb, Pellicone & Butler, 2014).

The benefits of the collaborative model of design of project management badges include the better understanding of the user or stakeholder needs and requirements, and the context where the badges would be utilized. In order to enable value creation to the users, the designed service, which in this case is the badge, must be fitted in the everyday context of the users (Heinonen & Strandvik, 2015), i.e., the students and companies in the game industry. Through the service design process and methods we aimed at designing a

solution that would take into account the users' needs and also the various participants' understandings. The multiple method that we applied during the development process ensured that the design of the badge incorporated as much ideas and user insight as possible.

During the collaboration and service design processes we reached also the goal to try to understand the gap between the expectations of the game industry regarding the project management skills of job applicants and the current stage of the existing skills and competences of the graduating game development students. With the help of the depictions of personas in the game development project teams we noticed that one of the biggest challenges is how to motivate the sole players to focus on the improvement of their social and interpersonal skills during the bachelor studies in order to be more employable. In addition, according to our observations, the roles and responsibilities in the game development student teams need to be clarified. Some additional focus could be allocated also to the peer leadership in the teams and project management processes.

Our findings support the arguments of Taipale-Lehto & Vepsäläinen (2016) and show that in many cases getting a job in the games industry requires excellent interpersonal and teamwork skills, as making games is stated to be all about working under pressure, deadlines and time constraints in a highly collaborative, interdisciplinary and iterative environment, and getting along with people who have different skill sets and who have different ways of seeing the world. Clear understanding and appreciation of schedules and milestones are valued, as well as excellent communication skills and abilities to accept constructive feedback and to listen. These findings correspond to the findings of Haas & Mortensen (2016) and Pentland (2012) and were utilized in designing the criteria for the teamwork badge.

Further interaction with the game industry and research is required in order to get the feedback from the game companies regarding the digital badges as a possible way to acknowledge project management skills of the persons applying for jobs in the game industry. A question arises, whether they would be approved as a part of CV in the field where demos are the key to getting game companies' attention. We consider this information to be critical for the future development of the digital project management badges. The relation between badges and different project management certificates issued by project management institutions should also be further investigated. Additionally, some of the international institutions have already started submitting digital badges as a possibility to showcase achievements and competencies in a more visual way than certificates. The system of open badges of project management institutions could be benchmarked.

It has to be noticed that this paper reports a single case study (Yin, 2012), and the findings presented here are not generalizable as such. Further research is required in order to produce more general conclusions on the relevance of open badges in the context of game industry.

References

Abramovich, S., Schunn, C., & Higashi, R. M. (2013) Are badges useful in education? It depends upon the type of badge and expertise of learner. *Educational Technology Research and Development*, 61, 217-232.

Acclaim. (2013). Open badges for higher education. Retrieved from http://www.pearsonlearningsolutions.com/blog/wp-content/uploads/2013/12/Open-Badges-for-Higher-Education.pdf. Google Scholar.

Ahb, J., Pellicone, A., & Butler, B.S. (2014). Open badges for education: What are the implications at the intersection of open systems and badging? Research in learning technologies.

Andreassen, T., Kristensson, P., Lervik-Olsen, L., Parasuraman, A., McColl-Kennedy, J., Edvardsson, B. & Colurcio, M. (2016) Linking service design to value creation and service research, *Journal of Service Management*, Vol. 27 Issue: 1, pp.21-29

Beyer, H. & Holtzblatt, K. (1998). *Contextual Design: Defining Customer-Centered Systems*. San Francisco: Morgan Kaufmann.

Berner, A-S., Laaksolahti, H. & Kopola, R. (toim.). Maa, jossa kaikki rakastavat oppimista. *Sitran Uusi koulutus – foorumi*. Helsinki. 2015. [in Finnish]

Biles, M., Plass, J., & Homer, B. D. (2015). Good badges, evil badges? An empirical inquiry into the impact of digital badge design on goal orientation and learning. Report on 2013-2014 HASTAC Digital Media and Learning Research Grant Competition. Retrieved from http://create.nyu.edu/wordpress/wp-content/uploads/2015/02/HASTAC-Report-Badges-and-Learning-CREATE.pdf. Google Scholar

Blomkvist, J. & Holmlid, S. (2010). Service Prototyping According to Service Design Practitioners. *ServDes.2010 ExChanging Knowledge*, Linköping 1-3 December 2010.
Brauer, S., Korhonen, A-M. & Siklander, P. (2017). Online Scaffolding in Digital Open Badge-Driven Learning in Professional Development. Manuscript submitted for publication.
Brauer, S. & Ruhalahti, S. (2014). Osoita osaamisesi osaamismerkein [Show your competences with digital badges]. In A.-M. Korhonen and S. Ruhalahti, eds, Oppimisen digiagentit. HAMKin e-julkaisuja 40/2014. pp. 87-92. Available from https://publications.theseus.fi/bitstream/handle/10024/85417/HAMK_Oppimisen_digiagentit_ekirja.pdf
Costello, P.J.M. (2003) *Action research*. London: Continuum.
Design Council (2018) *The Double Diamond.* https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond [Page visited 06.05.2018]
Deterding, S. (2012). Gamification: designing for motivation. interactions, 19,(4), pp.14– 17.
Glover, I., & Latif, F. (2013). Investigating perceptions and potential of open badges in formal higher education. In ED-MEDIA 2013: *World Conference on Educational Multimedia, Hypermedia and Telecommunications* (Vol. 2013, No. 1, pp. 1398-1402).
Haas, M. & Mortensen, M. (2016) The Secrets of Great Teamwork. *Harward Business Review*. June 2016 Issue. https://hbr.org/2016/06/the-secrets-of-great-teamwork
Hulkko, S., Mattelmäki, T., Virtanen, K. & Keinonen, T. (2004) *NordiCHI '04 Proceedings of the third Nordic conference on Human-computer interaction,* pp. 43-51.
Kankainen, A., Vaajakallio, K., Kantola, V. & Mattelmäki, T. (2012) Storytelling Group – a co-design method for service design. *Behaviour & Information Technology,* 01 March 2012, Vol.31(3), pp. 221-230.
Laurea (2018) CoCo Tool Kit. https://www.laurea.fi/en/projects/coco-tool-kit/coco-tool-kit-in-general [Page visited 06.05.2018]
Mattelmäki, T. (2006) *Design probes*. Publication Series of the University of Art and Design Helsinki A, 69/2006.
Miettinen, S. (toim.). (2011), *Palvelumuotoilu - uusia menetelmiä käyttäjätiedon hankintaan ja hyödyntämiseen*. Helsinki: Teknologiainfo Teknova Oy. [in Finnish]
Nielsen, L. (2012) *Personas - User Focused Design.* Springer Science & Business Media.
Pentland, A. (2012) The New Science of Building Great Teams. *Harward Business Review*. April 2012 Issue. https://hbr.org/2012/04/the-new-science-of-building-great-teams
Schneider, J. & Stickdorn, M. (2010) *This is service design thinking: basics - tools – cases.* Amsterdam: BIS Publishers.
Silverman, D. (2013) *Doing qualitative research.* 4th ed. Los Angeles, CA: Sage.
Stickdorn, M.,.Adam, L., Hormess, M.E. & Schneider, J. (2018) *This is service design doing : applying service design thinking in the real world : a practitioner's handbook*. O'Reilly Media, Inc.
Taipale-Lehto, U. & Vepsäläinen, J. (2016) Report on competences and skills needs in the game industry. The *Finnish National Board of Education*. Publications 2016:4.
http://www.oph.fi/download/175342_report_on_competences_and_skills_needs_in_the_games_industry.pdf
Yin. R.K. (2012) *Applications of case study research.* 3rd ed. Thousand Oaks, CA: Sage.
Yu, E. & Sangiorgi, D. (2018) Service Design as an Approach to Implement the Value Cocreation Perspective in New Service Development. *Journal of Service Research,* 2018, Vol. 21(1) 40-58.