

Combining a Gamified Civic Engagement Platform with a Digital Game in a Loosely Way to Increase Retention

Renny S. N. Lindberg
Computer Science Department
Vrije Universiteit Brussel
Brussels, Belgium
Renny.Lindberg@vub.be

Jan Maushagen
Computer Science Department
Vrije Universiteit Brussel
Brussels, Belgium
Jan.Maushagen@vub.be

Olga De Troyer
Computer Science Department
Vrije Universiteit Brussel
Brussels, Belgium
Olga.DeTroyer@vub.be

ABSTRACT

In this article we discuss an innovative approach to tackle the retention problem in civic engagement systems, more in particular in the context of care taking of elderly. The proposed solution is to complement a gamified civic engagement platform with an entertainment game but in such a way that the two are only loosely coupled. The civic engagement platform is a location-based card environment that allows to connect people who might be in need of assistance (i.e. elderly) with people willing to spend their time to help (i.e. volunteers). By helping people the volunteers collect cards, which can be used in the game to play. Special is that we do not expect that the volunteers will be the one playing the game. On the contrary, the aim is to create a self-feeding network between two groups of users: on the one hand the volunteers and on the other hand gamers. We hope that the gamers will stimulate the volunteers to collect cards and that in this way we can retain the volunteers for longer periods. Currently, the approach is being implemented for the case of assisting elderly, but the principle is also applicable in other domains of civic engagement. The paper discusses the research goals and problems, the research approach, as well as the current state and future work.

CCS CONCEPTS

- Information systems~Information systems applications
- Software and its engineering~Interactive games
- Software and its engineering~Designing software

KEYWORDS

civic engagement, elderly, gamification, games.

ACM Reference format:

Renny S. N. Linberg, Jan Maushagen and Olga De Troyer. 2019. Combining a Gamified Civic Engagement Platform with a Digital Game in a Loosely Way to Increase Retention.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.
iiWAS2019, December 2–4, 2019, Munich, Germany
© 2019 Association for Computing Machinery.
ACM ISBN 978-1-4503-7179-7/19/12...\$15.00
<https://doi.org/10.1145/3366030.3366117>

In 21st International Conference on Information Integration and Web-based applications (*iiWAS '19*), December 2–4, 2019 Munich, Germany. ACM, New York, USA, 5 pages.

<https://doi.org/10.1145/3366030.3366117>

1 Introduction

The EU 2018 Ageing Report [1] predicts that "The old-age dependency ratio (people aged 65 and above relative to those aged 15 to 64) in the EU is projected to increase by 21.6 percentage points, from 29.6% in 2016 to 51.2% in 2070". This undoubtedly brings with it a heap of new challenges. At the same time in Western Europe the care taking methods have started to shift from institutional care to community care [2]. Due to tightening budgets there has also been a drive to focus more on volunteers to help with the care-taking [3]; programs such as "neighbor-to-neighbor time bank", in which volunteers can earn time credits for their help, have been tested with varying levels of success [4]. Main issue often being finding volunteers and especially retaining them, further on we refer to this issue as the retention problem. This is where our project "Nosville" steps into the limelight.

Our aim is to create a self-feeding network between two groups of users. Namely the aged and what we call the "potential helpers". We hope to achieve this by, on the one hand using a gamified, community based web tool (referred as "helping" tool further on) to first connect people who might be in need of assistance (the elderly) with people willing to spend their time to help (i.e. volunteers), and on the other hand using a game to indirectly stimulate the use of this helping tool. This is illustrated in Figure 1.

The assistance tasks are represented in the helping tool in the form of cards that are collectable to whoever responds and completes the given task. An example of a simple task could be: "Can someone bring me a carton of milk". By performing the task, the helper collects the card. These cards become in turn playable in the aforementioned game. The helper can use the cards himself to play the game or, more importantly, pass them to a friend or relative.

The game is a two-player multiplayer digital card game that makes the cards acquired in the helping tool playable. There is no other connection between the two systems.

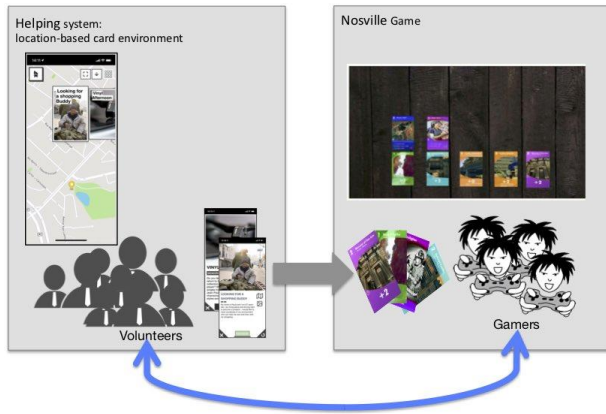


Figure 1: The helping system and the game: a self-feeding network

It should be noted that the game and the helping tool are likely to have a different or in the best case an overlapping target audience. While the card environment of the helping tool is targeting a broad audience of elderly and volunteers, the game is more oriented towards gamers. Our hypothesis is that by loosely coupling these two systems together the players will simulate non-players, such as friends and relatives, to collect cards for them so that they can keep on playing the game, in this way potentially solving the problem of retention, which many systems in the domain of civic engagement suffer from.

1.1 Definitions

This project touches several topics, the most important ones being: gamification, games, and civic engagement. Therefore, we first clarify these topics.

For gamification we have elected to go with Hamari et al.'s definition: "Gamification refers to a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation" [5]. Whenever we are talking about the whole setup (the helping tool and the game) we are considering the game as part of the gamified system (although they are from an implementation and operational point of view two different systems) to avoid dredging up an unnecessary and distracting debate on the nature of gamification versus games.

Civic engagement is another large umbrella term and has had various definitions over the years [6]. We define it as follows: "Activating and stimulating interaction between a group of people within a city district or community".

1.2 Motivation

Our approach requires some justification. Firstly the effectiveness of games and gamification systems in engaging and motivating people has been shown in previous studies, e.g. [5], [7]–[9], though with some cautions worth keeping in mind, such as the novelty effect and the need to give due consideration to the characteristics of the target audience, as this may influence the effectiveness of the gamification techniques used [10].

Secondly, despite we see from a conceptual point of view the game as an integral part in the whole approach we must keep in mind that not everyone likes playing games. By making the game available, but not a requirement for using the main helping system, we will reach also the non-gamers and therefore more potential helpers.

2 Related Work

A number of civic engagement tools, gamified and not, have been created over the years, focusing on different issues, e.g. [11]–[14]. Even Facebook has introduced a feature called "TownHall" to allow citizens to easily contact local, state and federal government representatives [15].

There have also been attempts at creating adaptive personalized versions of gamification platforms to increase the effectiveness [16]–[19]. However, to the best of our knowledge, there are no implementations where the two systems, a gamified system and a game, are used in symbiosis.

3 Research Goals & Questions

Our goals and how we plan on achieving them rise a heap of interesting research questions that have not yet been studied extensively. Firstly, the whole gamified system needs to function well and seamlessly: creating and collecting the assistance cards; transferring the collected cards to the actual gamers and playing with the cards in the game environment. In this context, the major research questions we hope to answer during this project are:

1. *How to create a civic engagement platform appealing and easy to use for a broad audience?* Making the user interface of the helping system usable by an aged person, but not patronizing to a younger user is something we need to take into consideration.
2. In addition, we would like the platform *to stimulate intergenerational interaction*. How to achieve this is a major research challenge.
3. *How to ensure that the game is a game that players can and will keep playing?* Having a plan to make a good game and actually creating a good game is rarely one and the same thing. For this, good principles, as well as iterative development and design are a must.
4. *How to tie in the game with the helping tool in such a way that people who want to use both can do this without extra hassle, and without annoying the users who have no interest in the game?*
5. *How can the elderly be involved in a more dynamic way?* Currently, the elderly are in somewhat passive role within our planned system. Moving on we hope to change this and have them be more dynamically involved. For this, we are considering to provide them means to also create cards and to allow them to contribute to the community by means of digital storytelling, which seems to have a positive effect on the connectedness to others and to themselves [20].

Furthermore, there is the challenge of reaching users, i.e. building a community of trustful helpers, gamers and elderly. Reaching users is related to a problem commonly known as "Catch 22": In order for the system to be popular it needs users, to get users to use the system it needs to be popular.

Note that we are not seeking for answers on research questions that are purely situated in the domain of civic engagement or aging. For those aspects we will rely on existing knowledge.

4 Research & Development Methods

The research and development activities will typically follow an incremental and iterative approach, meaning that components of the system will be designed, prototyped, and evaluated to refine or improve the components, i.e. the Design Science research approach [21] will be followed.

The first evaluations will be with a limited set of users. Final evaluations are planned with a larger audience and over a longer time. Evaluating usability, user experience, game experience, and acceptability has been studied well and different questionnaires and method are available [22]–[24]. Therefore, we will consult the literature to select the most appropriate evaluation methods. However, for measuring the effectiveness of our approach, we may have to develop an own method. Currently, we plan to set up a long-term study to measure the impact on the engagement and retention. We plan to measure this by tracking (with permission) the use of the different components by the different users and studying these results. Furthermore, we plan to use questionnaires and/or interviews, and focus groups for more qualitative analysis.

5 Current Results and Future Work

In this section we will describe into more detail the main parts of our gamified system. Functional prototypes of the two main parts, i.e. the gamified platform and the game, already exist. The gamified web tool is based on another tool developed in our research lab. This tool is since July 2019 under extensive user evaluation. A dedicated version will be created to fit our purposes better. A first iteration of the game will be finished later this September 2019. We are already able to run a demo of the two major systems (the game and the helping tool); connecting them is currently in progress. We aim to have both systems in an operational condition early 2020. Once this is done we can move on to the overall testing and evaluation.

5.1 The Helping Tool

The civic engagement platform, i.e. the helping tool, is based on an existing tool, called TICKLE [25]. TICKLE is a playful location-based card environment in which users can collect cards by performing challenges associated with these cards.

Two screenshots of the tool are given in Figure 2. On the left side of Figure 2, the location-based environment with the collectable cards at the top is shown. The location of the selected card is shown on the map. The user can open the card to see the

task. At the right side of Figure 2, we see this card open. The card is asking for shopping assistance and is already collected by the user. Users can also create cards. In this way they can offer services or ask for assistance.

TICKLE4CivicEngagement will be the customized version of the base platform. In this version, the cards and their creation will be tailored specific towards civic engagement activities. Our specific use-case focuses on bridging aged people of the community with other inhabitants. Therefore, a special effort will be needed to ensure that, at least a part of the system will be usable by digitally illiterate elderly. We plan to create a simplified interface such that also elderly with little to no experience with digital technology can use it. It was shown in the literature that it is feasible to let older people use tablets [26]. We plan to consider also voice input and speech output for this purpose.

The base system also needs to be extended with an intelligent matching system for recommending potential helpers to requestors and the other way around. Also guaranteeing the trustfulness of the participants is an important issue. It should not be possible for people to misuse the system, e.g. to come in contact with vulnerable people for other reasons that helping them.

Our goal is to keep improving the tools in conjunction with the evaluations, with a focus on the bridging of aged people with others. This will also allow us to investigate whether our concept is capable to stimulate intergenerational interaction.

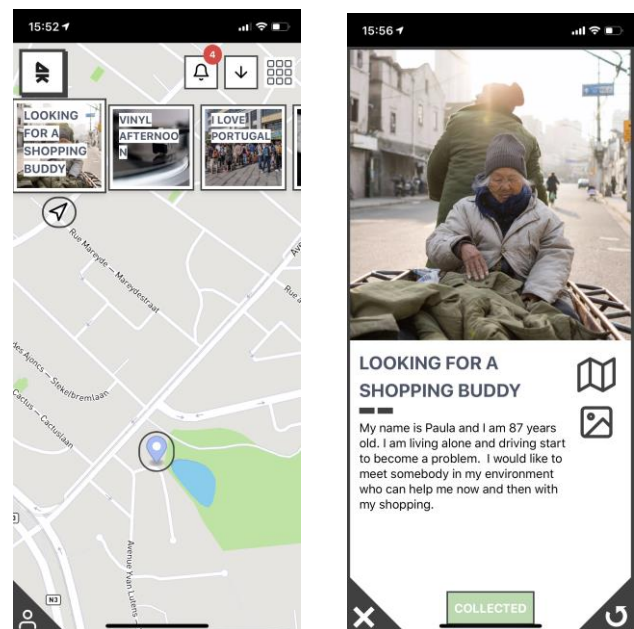


Figure 2: Left: the location-based card environment of the helping tool; Right: an assistance card collected by the user.

5.2 The Game

Our game, currently known as “Nosville”, is developed on the Unity3D game engine. This allows to release the game on mobile phones, desktops and also as a Web version. The game is designed around a simple game design principle: “easy to learn, hard to master” [27]. The “easy to learn” principle was chosen because the game should be playable by a broad range of people, i.e. people with varying game skills and of varying ages. The “hard to master” principle is used to prevent experienced players from dropping out too quickly. An additional requirement for the game was to be relatively short. A single session should ideally be done in roughly 15 minutes. In this way, the game can be played in spare moments and with lots of different opponents, which may also reduce the risk of becoming boring.

Furthermore, we plan to use the principles of the Hooked Model [28] to increase the likelihood that players keep playing the game. This model presents a practical approach to turn the use of a system into a habit. It proposes a cycle through which the user must repeatedly move. A single cycle is composed of four consecutive parts. It starts with a trigger given by the system. Every effective trigger should be followed by an action from the user, which is followed by a reward. The last phase of the cycle, and a very important one, is the investment phase. The concept of investment describes everything that the users voluntarily supply to the system. This includes commitments by means of time and effort, content, social capital (e.g. friends, followers, reputation), and asset (e.g. virtual assets). The purpose of the investment is to increase the likelihood of keeping using the system. The more a user invests in the system, the less likely it is that (s)he will stop using the system. The cards collected, as well as the assets created in the game, the friends made through the game and the reputation build up in the community can all be used for this investment phase.

Because we aim for a broad audience, the basic rules of the game are also quite simple. This also supports the “easy to learn” principle. With their available cards (obtained by collecting cards in the helping tool), players have to build a virtual community. The goal is to build a more valuable community before their opponent does this. They go about this by placing “Location” cards that have varying values. They can also try to remove or decrease their opponent’s community’s total value by placing negative “Character” cards to the opponent’s existing locations, or with negative value “Location” cards. Figure 3 shows the cards of one player.

The “Location” cards represent different aspects of a local community. This is indicated by different colors: green for environments, blue for business, orange for civic service, and purple for culture. In this way, the game also has some pedagogical function and could also be useful in education e.g., for raising awareness for different aspects of a city or for urban planning.



Figure 3: Cards of one player when playing the game

6 Contributions

This research project contributes to the design and development of innovative mobile systems for social goods, as well as to innovative approaches to integrate information systems.

In the context of innovative mobile systems for social goods, we expect to obtain answers to our research questions and a confirmation/rejection of our hypothesis “Gamers will stimulate the community to collect cards, creating a synergy between the two systems and foster more intergeneration interaction.”

Additionally, by elaborating this use case, we expect to obtain general findings on how to couple two independent platforms in order to stimulate each other’s use, but without making them dependent of each other. These findings might also be of interest to other researchers. Moreover, the solution we are looking for on how to exchange resources between the two systems may also be relevant for connecting other platforms that want to exchange resources. In this context, we explore the feasibility of using a third system that allows the exchange of resources without the involvement of a central authority. In this way, users can have full control over their resources, i.e. the collected cards in our use case.

ACKNOWLEDGMENTS

This project is partially supported by an FEDER/EFRO grant.

REFERENCES

- [1] EU Economic and Financial Affairs, “The 2018 ageing report: Economic and budgetary projections for the EU member states (2016–2070),” 2018.
- [2] R. Means, S. Richards, and R. Smith, *Community care. Policy and practice*, 4th ed. Palgrave Macmillan, 2008.
- [3] E. A. Miller, V. Mor, and M. Clark, “Reforming long-term care in the United States: findings from a national survey of specialists,” *Gerontologist*, vol. 50, pp. 238–252, 2009.
- [4] S. Dury, “Dynamics in motivations and reasons to quit in a Care Bank: a qualitative study in Belgium,” *Eur. J. Ageing*, vol. 15, pp. 407–416, 2018.
- [5] J. Hamari, J. Koivisto, and H. Sarsa, “Does Gamification Work?—A Literature Review of Empirical Studies on Gamification,” in *HICSS*, vol. 14, 2014, pp. 3025–3034.
- [6] R. P. Adler and J. Goggin, “What Do We Mean By “Civic Engagement”?”, *J. Transform. Educ.*, vol. 3, no. 3, pp. 236–253, 2005.
- [7] E. A. Boyle, T. M. Connolly, T. Hainey, and J. M. Boyle, “Engagement in digital entertainment games: A systematic review,” *Comput. Human Behav.*, vol. 28, no. 3, pp. 771–780, 2012.

- [8] E. A. Boyle *et al.*, "An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games," *Comput. Educ.*, vol. 94, pp. 178–192, 2016.
- [9] I. Voulgari, V. Komis, and D. G. Sampson, "Learning outcomes and processes in massively multiplayer online games: exploring the perceptions of players," *Educ. Technol. Res. Dev.*, vol. 62, no. 2, pp. 245–270, 2014.
- [10] O. De Troyer, "Towards Effective Serious Games," in *9th International Conference on Virtual Worlds and Games for Serious Applications (VS-Games)*, 2017, pp. 284–289.
- [11] A. Worzi, "MPW Has Mobile App for Citizens to Report Infrastructure Issues," 2017. [Online]. Available: <https://www.liberianobserver.com/news/mpw-mobile-app-for-citizens-report-infrastructure-issues/>. [Accessed: 01-Jul-2019].
- [12] "Mobile-Based App for Better Road Infrastructure Wins the Third CityApp," 2017. [Online]. Available: <https://citynet-ap.org/mobile-based-app-for-better-road-infrastructure-wins-the-third-cityapp/>. [Accessed: 01-Jul-2019].
- [13] "The Noise app," 2019. [Online]. Available: <https://www.thenoiseapp.com/#/>. [Accessed: 01-Jul-2019].
- [14] "Consul: Citizen participation tool," 2019. [Online]. Available: <http://consulproject.org/en/>. [Accessed: 01-Jul-2019].
- [15] S. Perez, "Facebook officially launches "Town Hall" for contacting government reps, adds local election reminders," 2017. [Online]. Available: <https://techcrunch.com/2017/03/27/facebook-officially-launches-town-hall-for-contacting-government-reps-adds-local-election-reminders/>. [Accessed: 01-Jul-2019].
- [16] R. Lindberg and T. H. Laine, "Formative evaluation of an adaptive game for engaging learners of programming concepts in K-12," *Int. J. Serious Games*, vol. 5, no. 3, pp. 3–26, 2018.
- [17] V. Naik and V. Kamat, "Adaptive and gamified learning environment (AGLE)," in *2015 IEEE Seventh International Conference on Technology for Education (T4E)*, 2015, pp. 7–14.
- [18] L. Shi and A. Cristea, "Motivational gamification strategies rooted in self-determination theory for social adaptive e-learning," in *International Conference on Intelligent Tutoring Systems*, 2016, pp. 294–300.
- [19] M. Böckle, J. Novak, and M. Bick, "Towards adaptive gamification: a synthesis of current developments," in *Proceedings of the 25th European Conference on Information Systems (ECIS)*, 2017.
- [20] S. Hausknecht, M. Vanchu-Orosco, and D. Kaufman, "Digitising the wisdom of our elders: connectedness through digital storytelling," *Ageing Soc.*, pp. 1–21, 2018.
- [21] K. Peffers, T. Tuunanen, M. A. Rothenberger, and S. Chatterjee, "A Design Science Research Methodology for Information Systems Research," *Source J. Manag. Inf. Syst.*, vol. 24, no. 3, pp. 45–77, 2007.
- [22] B. Laugwitz, T. Held, and M. Schrepp, "Construction and evaluation of a user experience questionnaire," in *Symposium of the Austrian HCI and Usability Engineering Group (USAB 2008)*, 2008, pp. 63–76.
- [23] W. IJsselstein *et al.*, "Measuring the experience of digital game enjoyment," in *In Proceedings of Measuring Behavior*, 2008, pp. 88–89.
- [24] J. Brooke, "SUS - A quick and dirty usability scale," *Usability Eval. Ind.*, vol. 189, no. 194, pp. 4–7, 1996.
- [25] O. De Troyer, J. Maushagen, R. Lindberg, J. Muls, B. Signer, and K. Lombaerts, "A Playful Mobile Digital Environment to Tackle School Burnout using Micro Learning, Persuasion & Gamification Title," in *IEEE 19th International Conference on Advanced Learning Technologies (ICALT)*, 2019, pp. 81–83.
- [26] S. BAKER, J. WARBURTON, S. HODGKI, and J. PASCAL, "The supportive network: rural disadvantaged older people and ICT," *Ageing Soc.*, vol. 37, no. 6, pp. 1291–1309, 2017.
- [27] H. Desurvire and C. Wiberg, "Game usability heuristics (PLAY) for evaluating and designing better games: The next iteration," in *International conference on online communities and social computing*, 2009, pp. 557–566.
- [28] N. Eyal, *Hooked: How to Build Habit-Forming Products*. London: Penguin Books Ltd., 2014.