

Designing Engaging e-Government Services by Combining User-Centered Design and Gamification: A Use-Case

Tuhina Dargan¹ and Florian Evequoz²

¹Department of Design, Indian Institute of Technology, Guwahati, India

²Institute of Business Informatics, University of Applied Sciences, Valais, Switzerland

florian.evequoz@hevs.ch

Abstract: In this case study, we combine the user centered design and the gamification design methodologies to design the eCH-BPM portal, a platform designed to enable public administration of Switzerland to publish and share their business process documentation in BPMN and discuss best practices in introducing Business Process Management (BPM) practices in the administration. The overall goal of the platform is to foster the development of a BPM mindset in the Swiss administration, in order to optimize and modernize the operations and deliver quality services. However, actively sharing process descriptions and template business processes, as well as actively participating in the community of practice for BPM in the public administration requires motivation and engagement on the part of public servants. A key factor in the success of the platform will be its ability to create, retain and expand a critical users' base. To address this issue, we designed the platform using user-centered design and gamification design, developing an original framework to combine both approaches that can be applied to the design of other e-government services. Both user centered design and gamification design, individually, are known to benefit various aspects and types of e-services and applications. Here, we present a unified methodology by combining both methodologies, for the design of e-government applications. We believe that User Centered Design and Gamification design can help improve e-government services, for example, by increasing participation and increasing interest in the service, and following the combined methodology will help us do so. The case study highlights the mistakes made, and the lessons learnt while designing the platform for researchers to further test and build on the proposed methodology. As an example we learnt that virtual rewards, which form the core of the gamification framework have to be meaningful in order to work effectively. Simply using a gamut of badges (virtual rewards) without keeping the user motivations and behavior in mind only leads to building an ineffective system.

Keywords: gamification, user centered design, BPM, process-sharing platform, Switzerland

1. Introduction

Effective e-governance is becoming increasingly important for governments across nations worldwide. The ever-growing use of Information and Communication Technologies (ICT's) in our daily lives has made it all the more feasible for them to make e-governance more effective. But, despite investing humungous amounts on web-based systems, governments often fail to meet user (citizens or government officials) requirements and needs (Baumgarten and Chui, 2009). In addition, the advent of social networking, micro-blogging, and user generated content has changed the way internet works. Users, even in government applications tend to achieve more than just the pragmatic functions that these applications provide, seeking both engagement and satisfaction. Thus two different aspects come into play here - one, the need for creating a usable application and second, an application which is both engaging and pleasurable to use.

Two different methodologies are known to help achieve this: User Centered Design (UCD), which is defined as "a philosophy based on the needs and interests of the user, with an emphasis on making products usable and understandable" (Norman, 2002). In a variety of studies with companies and other organizations, it was observed that user involvement at various steps of the design process had many benefits, like cost reduction, increased user satisfaction, increased user productivity, to cite a few (Kujala, 2003). In short, UCD aims at designing usable and understandable products. It does it by paying attention to human factors by research, and by involving the users at different stages in the design of solutions (user research, user testing, etc.)

The other methodology, known as Gamification is often understood as the "use of game-elements in non-game contexts" (Deterding et al., 2011). A relatively new area of research, Gamification, until now has had a positive influence in a number of non-game contexts, like education (Khan Academy, 2006), healthcare (Fitocracy.com, n.d.) employee engagement, e-commerce etc. by effective use of different game elements, like points and badges. Benefits include increased user participation and loyalty, sustained use of the application etc. However, it is also sometimes criticized, as gamification designers tend to give points for every aspect, focusing on extrinsic motivation, rather than paying attention to the actual user behavior and attitude. It therefore becomes necessary, here too, to make users an integral part of the process. In short, gamification is a persuasive strategy

disguised in game elements that helps people achieve particular tasks in their life (like personal growth) and organizations their business objectives (like engaging marketing experiences).

This article presents the combined methodology in the context of the Swiss Process Sharing platform. We start by presenting selected previous work done in these fields, and go on to describe the generic methodology in detail. We later present the use case, highlighting each step of the described methodology. This is followed by the conclusion section where we discuss the implications of use of such a methodology.

2. Related work

In this section, we separately present selected literature on e-governance and user centered design and e-governance and gamification, and reinforce the need to have a combined methodology.

2.1 User centered design and e-governance

In a research conducted in the Netherlands on an e-government service called PortNL, the authors highlight the tensions that arise between e-governance and user-centered design, like, contradiction in user and government vision, designing for the entire audience. But, despite these tensions, the authors reinforce the adoption of user-centric methods to design the e-government services (Kotamraju and van der Geest, 2012). This vision was also shared by an article published in the Government Information Quarterly, much before the above article, where the need to adopt a user-centered design methodology to meet user needs and requirements was emphasized, mainly identifying three factors while designing the services, namely functionality, usability and accessibility (Bertot and Jaegar, 2006). Another study by the Organization for Economic Co-operation and Development (OECD) provides an in-depth analysis of the current state of e-government and the challenges faced by countries belonging to the group. They highlight the paradigm shift seen in such countries, from adopting a government centric approach to a more user-centric approach, which focuses on social, organizational and institutional factors (Wang, 2009). All in all, even after the problems faced, trends show that the use of user centered approach in various contexts has been on a rise (Mao et al., 2005), and will continue to do so as more sophisticated methods come into existence.

2.2 Gamification and e-governance

One of the main challenges for government services that rely on user's participation is to retain their user base. Users, often, dissatisfied with the service provided, fail to sustain their interest in it. Gamification, here, can act as a key intervention to increase contribution and participation from the user's end. A number of examples, even in the domain of public services have taken inspiration from this newly popular area of research. In an example from Stockholm, the government encouraged safe driving by installing a speed camera where those who obeyed the speed limit, could benefit from a lottery pooled in by money collected from the violators. It was shown that in three days, the traffic speed decreased by 22 percent (Wood, 2013). Another initiative taken by the UK government (Work and Pensions Department) was called Idea Street. It was created as a marketplace where the employees would suggest changes in the workplace and others could trade stock for the ideas they liked. It was supported by game dynamics like points and leaderboards (Wood, 2013). Both ideas were a huge success, and they very vividly explain different human characteristics. While the first one suggests that fun and rewards could get people to change their behavior, the other one suggests that a platform where people are recognized for their ideas could increase user participation and eventual retention.

In a more traditional setting, a gamification model was applied to get a group of welfare recipients to change from one type of welfare payment to another. Based on the constraints identified, a unique process was designed and followed in order to achieve the task (Bista et al, 2014). However, it should be noted that these constraints and problems were identified from a designer's point of view, and no user study was involved. The use of gamification in a variety of public services like maintaining cleanliness, sharing information with others has also been explored, but at the same time it has been argued that not all services can be subjected to gamification (Asquer, 2013)

The most important lesson learnt from this state-of-the art is that a context needs to be established and the user's need identified before applying any gamification model. In view of this, we suggest that combining both methodologies would be very valuable while designing e-government services.

3. Combined methodology

As mentioned above, both methodologies have their respective merits and demerits. An important aspect to consider here is that the fact that these two different methodologies can benefit from each other. For example, one underlying concept behind gamification is the motivation that a user has behind performing a certain action. If the entire model is rewards driven, the internal motivation of the user can be seriously hampered, thus making the situation worse. In light of this, a theory called the Organismic Integration theory talks about creating a gamification model which is meaningful to the users and one which will help in achieving a sustained change in the user's behavior (Nicholson, 2012). The author also talks about two concepts called "Situational relevance" and "Situational Motivational affordance" where he argues that for meaningful gamification the involvement of users and a deep understanding of their background is a necessity.

Before proceeding to the presentation of our combined methodology, it is important to give an overview of a few terms. For example, it has been identified that human desires could fit in six categories, namely, rewards, status, achievement, self-expression, altruism and competition (Bunchball, 2011). These desires are very ubiquitous and can be used very effectively in driving a particular user behavior. Gamification also talks about 4 different types of players - namely killers (they typically like to rule others), achievers (they like the idea of achieving a particular target), socializer (they like to engage with others) and explorers (they typically love to find out new things) (Bartle, 1996).

The proposed methodology can be seen in Figure 1.

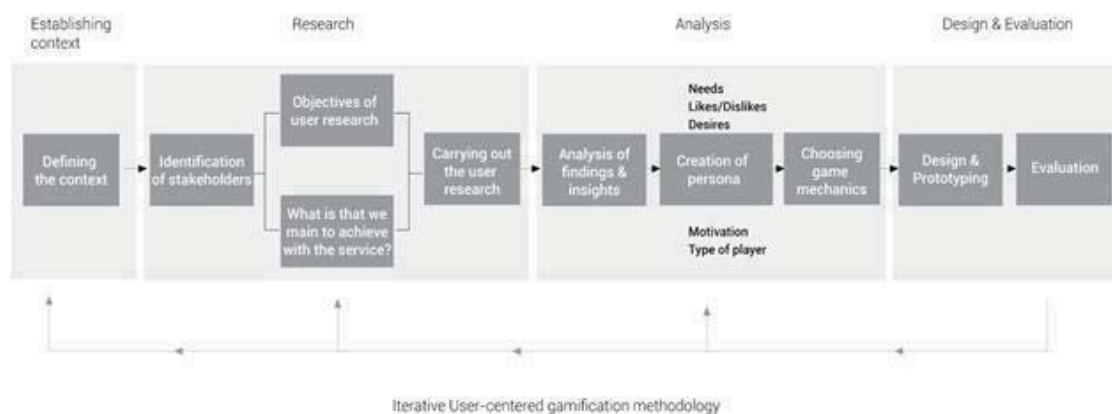


Figure 1: Iterative user-centered gamification methodology

The entire process is divided into four phases - a) establishing context, b) research phase, c) Analysis phase d) Design and Evaluation phase. A number of different research methods have been identified for each phase of any user centered design process (Rohrer, 2014) While, in our methodology, we keep most things open-ended (like choosing the type of user research), we particularly include the making of persona which represent a set of users who possess similar behavioral characteristics. These persona, as described later would be the basis of the choice of game mechanics and the design of the platform. The four phases are described below:

Defining the Context: In this phase, the main step is defining the problem statement.

Research Phase: This typically consists of stakeholder identification, defining the objective of user research and finding out what is that we aim to achieve with the platform. The second part that talks about finding out the exact output of the platform, is really like defining the business and organizational objectives. It can be, for example, to achieve active contribution from members of a community, or in a more general context, to lose weight. These combined together help us identify the needs and motivations of our users while carrying out the user research. User research could be carried out in a variety of methods and can vary depending upon the context (Rohrer, 2014)

Analysis Phase: In this phase, the findings from the research phase are analyzed and clustered to make the different persona. These should include the needs, likes/dislikes, desires, motivation and the type of player the persona is. This would form the basis of the game mechanics that we later choose.

Design and Evaluation Phase: In this phase, with all the necessary material in hand (i.e the needs of the users and also the game mechanics chosen), features of the application are decided, followed by making the information architecture which includes the entire navigation, the wireframes which form the skeleton of the application followed by the visual design.

In the next section, we present how we used this combined methodology for designing a particular e-government service in Switzerland.

4. Swiss process exchange platform: Presenting the use-case

4.1 Background of the project

The government of Switzerland figured that in order to implement cross-level organization through electronic procedures, they needed to understand each other's way of handling administrative procedures. Switzerland being a federal state, with responsibilities at diverse levels of the administration, has no centralized overview of administrative procedures. Therefore process documentation in a common language is required. The eCH association (ech.ch, 2012), which has a mission of providing standards for e-government in general and process documentation in particular, has already set aside a range of standards with BPMN 2.0 as the language for process description. Also, harmonization of processes is seen as a way to reduce the complexity and administration cost as majority of the administrative entities in Switzerland follow common missions and provide similar services. Thus, in order to support the implementation of Business Process Management (BPM) and harmonization of processes, the federal government and conference of cantonal governments, and the eCH association, support the creation of the Swiss-wide process sharing platform. It will allow different public administrations to share their processes, be informed about the latest work in the BPM in alignment with the public sector and connect the various actors in the field. It aims to sustain on the standards set by the eCH association and by community contribution and collaboration.

In summary, the eCH-BPM platform is seen as way to foster the development of a BPM mindset in the Swiss administration with the larger goal being the optimization and modernization of operations and the delivery of quality services. However, actively sharing process descriptions and template business processes, participation and contribution in the community, requires motivation and engagement in the part of public servants. A key factor in the success of the platform will be its ability to create, retain and expand a critical users' base.

The project started in 2011. An initial beta-version of the platform was released by the end of 2013, mainly providing some example processes in the process repository and general information about the project. The first official release will be published online in early 2015. The work we present below was done in 2014 and is planned to be integrated in future releases of the platform.

4.2 Applying the methodology

4.2.1 Establishing the context

With the aim of creating a process-sharing platform, we familiarized ourselves with the context, and defined our problem statement. A minimal literature study was also done to find out other similar platforms. We found that a similar initiative (Prozessbibliothek.de, n.d.) had taken place in Germany, which had seemingly failed to elicit adequate user response. We analyzed the platform for the features it currently provided and then proceeded to the research phase. Here we present the problem statement:

Problem Statement: To design a platform which would help various public administrations of Switzerland to document and share their business processes with each other and build a community around them, which collaborates and fosters the development of a BPM mindset in the Swiss administration.

4.2.2 Research phase

We then identified the various stakeholders that would directly or indirectly affect the design of the platform. The stakeholders identified were a) people of the public administrations who would use the platform, b) private partners who could be potential sponsors, c) academic institutions interested in the use of BPM by the public administration for research purposes.

The next step was to identify the objectives of user research and to define exactly what we aimed to achieve from the platform:

Objectives of User research: a) To understand documentation and sharing of business processes at the various levels of government, b) To gain insights into the current methods of electronic documentation of business processes, in particular the aims, likes, dislikes, and frustrations of the user, c) To find out about the current ways of communication between the various levels of government in context of BPM and the reason for communication, d) To understand about the methods employed by people in the public administrations to update their knowledge in BPM.

What is it that we aim to achieve from the platform: a) To get people to join the platform, b) To get people to upload their business processes and fill in relevant meta-data c) Increase the use of business processes that have been already uploaded on the platform, d) Increase customer participation on the platform's discussions boards, e) Ubiquitous use of eCH standards.

It is important to note here that the above two steps go hand in hand. We then went on to recruit users for our qualitative user research. The entire user research was conducted in two phases, first with seven users (Hunacek, 2013, Fauquex, 2013) and later on with three more users. This was done in collaboration with two master students, who followed a part of the methodology as part of their thesis. Semi-structured qualitative interviews were conducted face-to-face in which the questions were kept open-ended, with an aim to understand the mental model of the user and these interviews went on for typically an hour. The questionnaire was prepared based on both objectives of user research and what we aim to achieve with the platform. These interviews were recorded and later transcribed for analysis.

The research phase revealed a number of interesting insights that helped us create personas and take adequate decisions to support the design of the platform. A few insights are discussed below:

1) There is no common language for documentation of business processes in the public administrations. Even within one public administration, multiple languages are used according to the convenience of the managers. This often leads to frustration on part of the people in charge of modeling processes (e.g. business analysts, process owners) who need to use multiple languages. This insight reinforced the need for a common language among public administrations. User Statement: *"It's difficult because for every process there's a different manager, and each manager has a different way of working. They work with different tools, and there are no universal guidelines followed here"*

2) It was observed that users are often curious about knowing the reason behind modeling a process and if it was successful in its implementation. Thus, these two features were included in the meta-data of a given process. User Statement: *"I'd like to know more about what happened after a process is executed- how satisfied were people with the process, how cost-efficient was the process, was it a success or was it disastrous"*

3) It was observed that process owners often like to consult each other while making processes, but there is no platform that provides way for such collaboration. They often rely on personal contacts in case they need to discuss their work. Thus, the eCH-BPM platform was seen as a way to facilitate collaboration of such a level with forum like features incorporated in it where users are free to ask questions, give answers and discuss about the work.

User Statement: *"I contact other public administrations, like Geneva (I've my friends and colleagues there) for benchmarking. It's always good to see how other public administrations work"*

4.2.3 Analysis phase

Once the interviews were analyzed, we identified a set of behavioral variables (for example, the current position, technology orientation etc.), to which we mapped the characteristics of our users to create personas. We present our personas here, and later while choosing the game mechanics provide supporting statements from the qualitative user interviews. A persona we came up with can be seen in Figure 2.



Figure 2: Example persona

Choosing game mechanics: A number of game mechanics were thought of and incorporated in the system, an overview of which can be seen below. User statements that we gathered from the user interviews also support some of the decisions.

Badge system: (Both temporary badges and permanent badges)

- Member badge (Permanent badge) - It would encourage people to join the platform and in addition would serve as an introduction to the entire gamification system.
- eCH certification badge (Permanent badge) - This badge was introduced in order to increase trust among users. This badge would ensure that a given process is up to the eCH standards. *User statement: "I'm not sure if the processes I see online are right, or in fact up to standards"*
- Maximum number of eCH certified processes (within a public administration and across public administrations)(Temporary badge) - This badge was aimed to satisfy the desire of recognition of people and encourage healthy competition between people and between public administrations.
- Most upvoted question (Temporary badge) - This was to ensure contribution in the forum or community
- Most upvoted answer (Temporary badge) - This was to ensure contribution in the forum or community *User Statement: "I would like my experience to be used by others, I want to help create an awareness of BPM in different public administrations"*
- Most liked processes (Temporary badge) - This was again to bring recognition for the work of the public servants.
- Maximum number of services covered from the eCH-BPM standard. (Temporary badge) Progress bar: All of the processes require users to fill in meta-data which could prove as a tedious task for some people. In order to motivate people to complete the form, a progress bar was introduced. In addition to this, long tasks if broken down into small pieces, become more achievable, we divided the form into smaller parts to make it easier for the user to fill it.

Chat feature: An important thing that came up in the user research was the fact that most people in the public administrations were new to BPM and its implementation. It was noted that users would want to talk to people

who've been or currently are in a position similar to theirs. Thus, apart from an active community, we also provided a private chat feature. This is also a typical trait for the 'socializer' personality type.

4.2.4 Design and evaluation phase

The persona was created and relevant game mechanics were used in this phase for the design of the website. The information architecture of the website was made, followed by wireframes and the visual design. A prototype of the platform's design is shown below in Figure 3, displaying a few features incorporated based on our findings from the research phase.

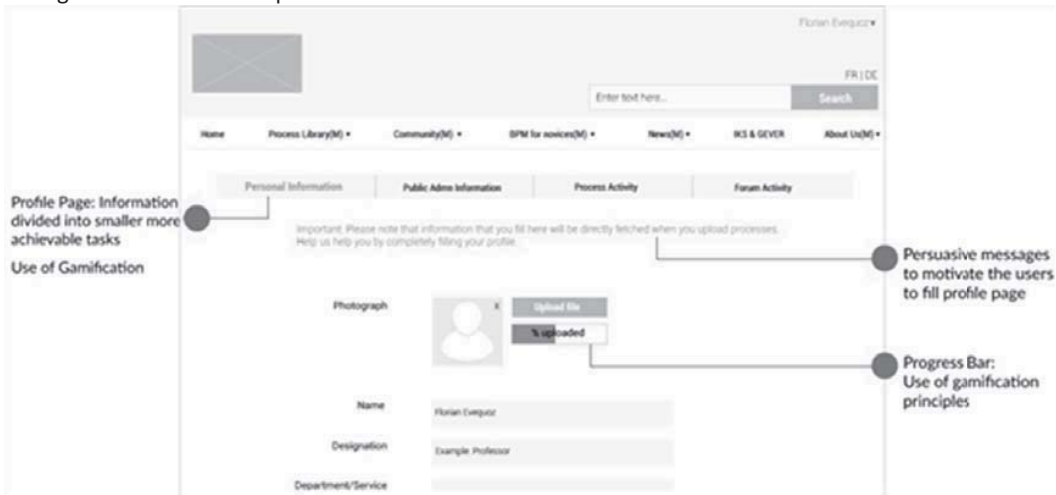


Figure 3: Screen shot of the web page

The website is under development currently, and we plan to proceed with its evaluation with our potential users, once the development is done. The platform is being developed on top of the Drupal Content Management System (Drupal.org, 2001) and uses an API to a Signavio Process Repository (Signavio.com, 2009) to manage the process library part. A detailed discussion on the technical implementation of the website is beyond the scope of this article. Although, we are yet to evaluate, we believe our experience with the project, which we discuss in the next section, could prove valuable to the research community.

4.2.5 Problems faced and lessons learnt

The sheer nature of the project taught us a lot about how public administrations work and we describe our experiences from the project.

First of all, because of the various disparate stakeholders involved, we realized that it was difficult to address the needs of all of them simultaneously. This was mainly because of the gap in vision between the various stakeholders involved. For example, the private companies involved in the making of the platform aimed for faster results and this sometimes proved to be a hindrance in following the methodology.

Secondly, one known problem in e-governance is the fact that while designing services and applications, the entire population needs to be addressed. Thus, this methodology has for now, been proposed for G2G services because addressing the entire population is a difficult task. For a country like Switzerland, the diversity in population is still less, and an approach like this can easily be taken advantage of. But for other countries, it can serve as a starting point for a more citizen-centered approach. The involvement of government officials in such a technique can help them realize the importance of a user-centric approach, helping in achieving the larger goal of understanding the perspective of disparate users and thus following a more citizen centered approach to e-governance.

Thirdly, during the user research, it was observed that some public administrations would have the tendency to give the responsibility of uploading business processes to one or two representatives. Although, this would solve the purpose of having a business process repository, it would have hampered the larger goal of having an active community. Hence, apart from creating a competition-based environment between public administrations, we also found it necessary to create one within a public administration. Also, while choosing game mechanics, we

identified the need to have a continuous activity loop. This leads us to introduce the system of temporary badges that would be awarded to different members every week. But, this posed another interesting problem - which was the need to have someone who would take care of the badge system from the backend. The entire process in turn, helped us realize the importance of choosing meaningful and relevant game mechanics, those which not only make the experience interesting, but which also cater to needs of the users.

Finally, another interesting observation that came up in the user research was the perception that public services are supposed to be "serious". This could pose to be a rather difficult thing to address, but we believe that an evaluation with real users can help us fill the gap. Also, we acknowledge that this process needs to be an iterative one, in which we continuously evolve the platform to make it more usable and engaging.

5. Conclusions and future work

In this paper, we have presented an original framework combining two well-known methodologies, namely, user centered Design Methodology and Gamification Design methodology, in order to design both a usable and engaging e-government service. This service was designed to serve as a platform for sharing business processes between public administrations of Switzerland, and establish a community around it and in turn foster the development of a BPM mindset in them. To the best of our knowledge, this is the first time gamification and user centered design have been combined in a government service, for a purpose like ours. The original aim was to design a usable and engaging application, and in turn set an example in the Swiss community to start the use of methodologies like these for the design of such applications. However, due to our inability to conduct evaluation at the current stage of the project, we cannot comment on the success of this methodology. But, at the same time, following this methodology gave us clear-cut objectives to stick to, giving us a direction the entire time. Identifying the objectives of user research, and defining what we aimed to achieve from the platform, really helped us identify the motivations that our users will have, in order to use a platform like ours. This was eventually translated in the design by choosing relevant game mechanics. In the future, we aim to study the effectiveness of the proposed methodology with a formal evaluation technique and real users. Once established, this could serve as a starting point for creating not only usable e-government services, but also services that are fun and pleasurable to use.

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