

# An automated repository of user engagement methods and tools for digital social innovation projects

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Bachelor's Thesis

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## Abstract

Social innovation is a term that is increasingly used and many different definitions are given. Social innovation projects are mainly carried out by organizations whose primary purposes are social. User engagement is constructed out of user involvement, which is defined as a psychological state of users towards an organisation or project and user participation. User participation is explained as behaviour of users that is perceived during the development stage of a system. User engagement refers to either one of these definitions, or both. For a social innovation project, user engagement is a critical factor. If users are not participating proactively in the project, the possibility of the project failing can rise. Therefore, it is important that the right methods are applied to increase the user engagement within such a project. In order to increase user engagement within a social innovation project, the right methods have to be selected in order to do so. The process of selecting the right methods is a challenging task. A repository containing different methods can support in the decision making task of choosing the right method. A comprehensive repository of methods and tools to increase user engagement is not available. The main goal is to build a repository of methods and tools in order to increase user engagement within ICT-based social innovation projects, that is detailed to an operational level and usable enough to be exploited by project managers. A prototype of an automated repository is created with twenty-three methods to increase user engagement as content, and can be exploited by project managers.

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# 1 Introduction

Social innovation is a term that is increasingly used and a lot of different definitions are given. Mulgan, Tucker, Ali, and Sanders (2007) define social innovation as "new ideas that work". They state that social innovation involves the reaching of social goals with new ideas. However, this definition is very broad. They also define a more specified definition of social innovation. They state that social innovation is based on innovative activities. These activities are driven by the goal of finding a social need. Social innovation projects are mainly carried out by organizations whose primary purposes are social (Mulgan et al., 2007). This definition makes the distinction clear between social innovations and business innovations, which are mostly driven by the maximalization of profit. That is not the case with social innovation projects, which are driven by the welfare of communities instead of commercial goals (Dawson & Daniel, 2010).

Heiskala (2007) defines social innovation as "changes in the cultural, normative or regulative structures of the society which enhance its collective power resources and improve its economic and social performance." Within social innovation projects, the starting point is a need that is not in line with an idea of how this need could be satisfied. These needs could be matched with possibilities. These possibilities could be on the domain of ICT (Mulgan et al., 2007).

The research of Hwang and Thorn (1999) states that user engagement is constructed out of user involvement, which is defined as a psychological state of users toward an organisation or project (Kappelman & McLean, 1991), and user participation. User participation is explained as behaviour of users that is perceived during the development stage of a system (Barki & Hartwick, 1989). User engagement refers to either one of these definitions, or both.

Lehmann, Lalmas, Yom-Tov, and Dupret (2012) define user engagement as the quality of the user experience. A greater focus is placed on the positive factors of an interaction. In this research, the term user engagement is specifically used in combination with a web application. In the current society the attention of a user is very valuable. Therefore, technology providers or providers of social innovation projects have to design engaging experiences in order to capture the attention of the user. In order to do so, people's needs and expectations have to be formulated. The paper of Goldbach and Gözl (2015) states that there is still much uncertainty in these factors, which results in a difficulty in engaging users.

For a social innovation project, user engagement is a critical factor. If users are not participating proactively in the project (depending on the project), the possibility of the project failing can rise. Therefore, it is important that the right methods are applied to increase the user engagement within such a project.

A MSc. thesis (Kampanos, 2016) has been written about the problems related to user engagement in social innovation ICT projects. Additional to this research, a prototype for an online repository system has been created to assist project owners to select methods to increase user engagement in their projects. Within this MSc. thesis, twenty-four different ways to increase user engagement are defined. These twenty-four methods are implemented in the online repository prototype.

## 1.1 Problem Statement

In order to increase user engagement within a social innovation project, the right methods have to be selected in order to do so. The process of selecting the right methods is difficult. A comprehensive repository of methods and tools to increase user engagement is not available. A prototype repository is designed by Kampanos (2016) after conducting research on this domain in his MSc. thesis. However, the level of detailed information for each method is low. Also the usability of the repository is low. Thus the following problem statement is formed:

*A comprehensive repository of methods and tools to increase user engagement is not available, and the the usability and the level of detailed information of the existing prototype repository is low.*

## 1.2 Main Goal

The main goal is to build a repository of methods and tools in order to increase user engagement within ICT-based social innovation projects, that is detailed to an operational level and usable enough to be exploited by project managers. As mentioned earlier, in the MSc. thesis of Kampanos (2016) twenty-four methods to increase user engagement are defined. These different ways came up after conducting a literature research. The different methods are included in the online repository that is build as a prototype, but the information for each method could be improved after conducting a more in-depth research. In this way, more insights can be gained in the different ways to increase user engagement in social innovation projects. As mentioned by Kampanos (2016), "having all these data would enable the automated repository to provide more information to the users, by providing a page with all the extra information for each one of the ways for increasing user engagement."

## 1.3 Research Questions

In order to conduct a more in-depth research on the different methods for increasing user engagement, four research questions are defined. The research questions that are defined below are in line with the different tasks from the design cycle and the framework of design science of Wieringa (2014). The research questions are treated in three chapters. The research questions are stated as following:

1. *How can user engagement methods be properly specified?*
2. *Which requirements should a repository include?*
3. *What are potential improvement in the existing prototype of the repository?*
4. *I am going to implement a repository of methods to increase user engagement in ICT-based social innovation projects.*

The first research question is composed in order to gain information about the different methods that are found in the MSc. thesis of Kampanos (2016). A systematic literature review will be conducted and a template will be created. This template will contain project



conditions that will be used in the online repository. With such a template for every method the form of the information will be equal. The project conditions will be stated and information will be collected about these different methods for every condition. Also for every method where enough information is available, a process-deliverable diagram (PDD) (van de Weerd & Brinkkemper, 2009) will be created with the guidelines for that specific method. In that manner, every method is visualized in a consistent manner. Two methods that are found by Kampanos (2016) are combined into one, because the nature of those two methods were the same.

In order to find out which requirements a repository should include, the second research question is formulated. Semi-structured interviews with managers of social innovation projects will be conducted in order to find these requirements.

As a result of the MSc. thesis of Kampanos (2016), a prototype of a repository is created. This prototype is basic and has limited information about every method. The third research question is formulated in order to find potential improvements in the mentioned prototype. This will be done by conducting a literature review. Also, the prototype will be mentioned in the semi-structured interviews, in order to gain some feedback on the prototype. In this way requirements engineering can be carried out in line with the expectations of potential users. The first, second and third research question fall under the task of *problem investigation* of the design cycle, which will be discussed in section 2.1.1.

The fourth research question is formulated as a sentence instead of a question. For this research question a new prototype of an online repository will be created and the process of building the repository will be explained. The fourth research question falls under the task of *treatment design* of the design cycle, explained in section 2.1.1.

The treatment validation is not carried out in this research due to time restrictions.

## 2 Method

In this section the method for this research is explained. The research will be conducted based on design science and the design cycle proposed by Wieringa (2014).

### 2.1 Design Science

This thesis can be classified as a design science project. A design science project is defined by Wieringa (2014) as a project that designs and investigates specific artefacts or instruments in context. These artefacts are created in order to deal with a specific problem statement. The term artefact is taken very broad. Organisations, business processes, methods, techniques, and even conceptual structures can be delineated as artefacts, provided that they are used in the right context. Wieringa (2014) defines design science problems as improvement problems, meaning that the specific problem has a context in which a problem occurs. In order to solve this context-based problems, improvement goals are stated. In order to state these improvement goals, first the context needs to be understood. After the exact understanding of the context, the problem statement can be properly stated. An artefact or instrument that is created is not directly solving the problem of the specific project problem. The interaction between such an artefact or instrument and the context in which the problem occurs is the essential factor that grants the ability to solve the problem. This is called the treatment in design science.

#### 2.1.1 The Design Cycle

The design cycle is a framework in order to conduct a research in design science. The cycle consists of five tasks: problem investigation, treatment design, treatment validation, treatment implementation, and implementation evaluation. The first three tasks will be covered in this research (problem investigation, treatment design, and treatment validation). These tasks will now be discussed and it will be explained how these are carried out in this research.

##### **Problem Investigation**

The problem investigation has the goal to gain more information about the problem statement and its context. It is key to learn more about the problem before the design process starts. Wieringa (2014) states that there is a difference in an instrument design goal and an artefact design goal. It is concluded that the goal of this thesis is classified as an instrument design goal. In order to solve the problem (an absence of a convenient way to obtain information about engaging user engagement methods), an instrument (an online repository of user engagement methods) is designed. In order to conduct the problem investigation phase the first, second, and third research questions are defined, mentioned in section 1.3. After all the needed information is gathered about the domain specific problem, a treatment design can be created.

##### **Treatment Design**

As mentioned above, a treatment can be explained as the interaction between an artefact or instrument and the problem context. This task has the goal to create an artefact or instrument as a solution for the problem. First, the outline for the implementation must

be designed and after that the actual instrument will be created (Wieringa, 2014), which is in line with the fourth research question.

### Treatment Validation

The validation of a treatment is the process of confirming that the goals of the stakeholders are met, and that the implemented treatment is effective and efficient in use. Within the design cycle, the validation process is carried out before the treatment is implemented. During this process the results of the interaction between the problem and the prototype of an artefact or instrument are evaluated. If this validation is successful, the prototype can be implemented. If the validation is not successful in its entirety, the prototype can be improved in order to reach the desired result.

In figure 1 a PDD Model of the research method is shown. The treatment validation is not visualised in this figure, since this part is not conducted in this research due to time restrictions.

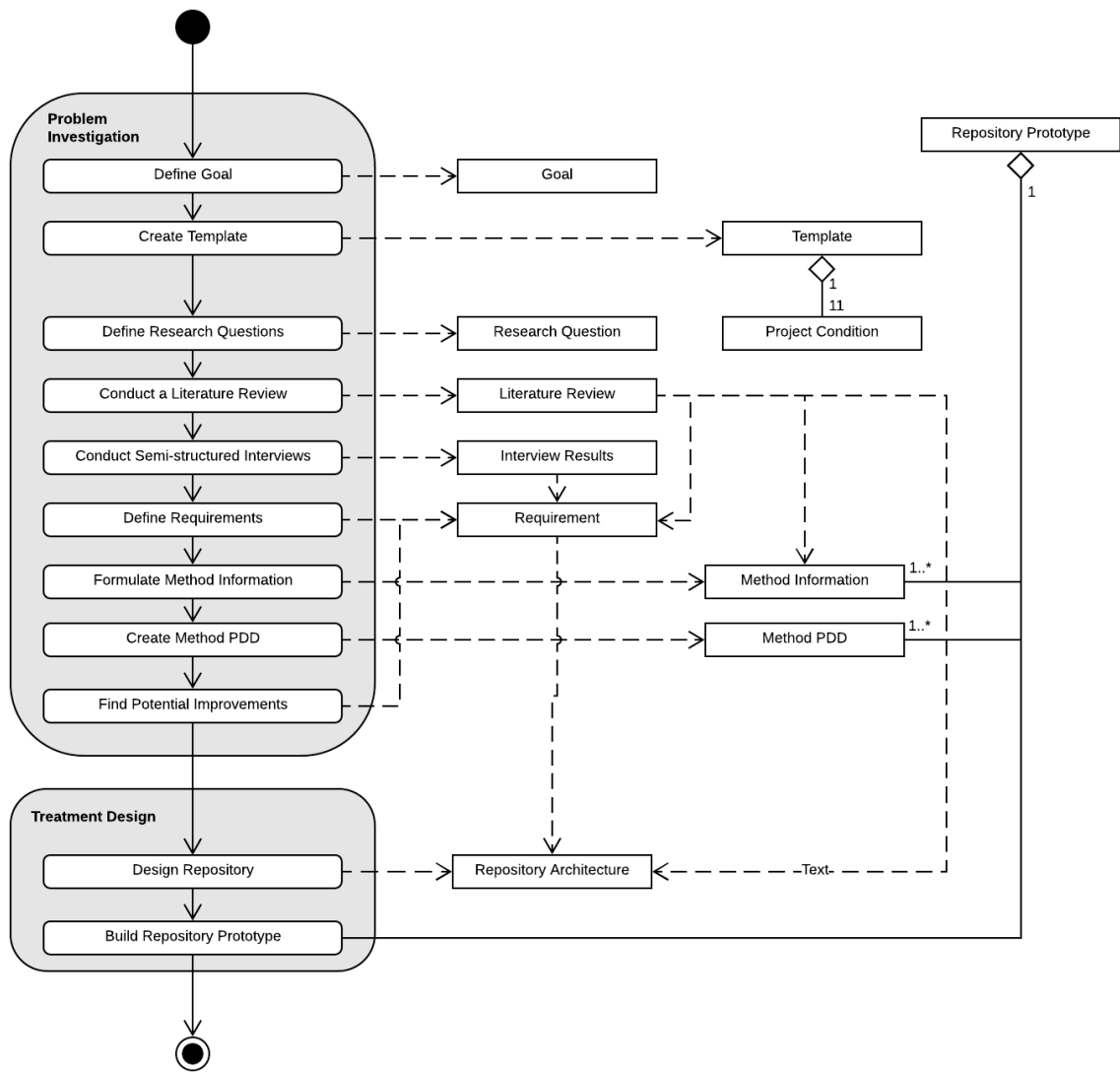


Figure 1: PDD Model of the Research Method

## 3 Specifying user engagement methods

A method is defined as “an approach to perform a systems development project, based on a specific way of thinking, consisting of directions and rules, structured in a systematic way in development activities with corresponding development products (Brinkkemper, 1996)”. Therefore, the methods of increasing user engagement should be defined in this way of thinking. First, the approach to perform the method has to be explained, substantiated with literature. The method should be structured in a systematic way. Therefore, a PDD model will be used in order to structure every step in the process.

As mentioned earlier, twenty-three methods are found that can increase user engagement within social innovation projects. For some methods there is a lot of information available, and for some methods the literature that can be found is limited. In order to achieve the goal of creating a convenient repository, the goal is to document all the methods in the same manner. Therefore, the classification of Kampanos (2016) in five different project categories is used. Also, for every method the same conditions are researched. In that way a the repository can be build with an active filter.

In this section, the results of a literature review will be discussed. First the template that is created for the systematic review is elaborated on, in combination with the conditions for which the literature is searched. Next, for all the twenty-three methods the found literature is documented in a structured manner.

### 3.1 Template

In order to document every method in the same way a template is created. This template contains subjects that can be applied to every method that is found. It is chosen to create a template for the literature review of the methods, in order to create a consistent database of information about the different methods. In this way, a systematic literature review can be conducted, and the information for every method will be equal. Also, by using a template the chance of missing information is decreased. With the use of this template, a filtering system is created.

#### 3.1.1 Conditions

The template that is created contains eleven different conditions. As mentioned before, the template is used to create a consistent database of information about the different methods. The different conditions are used in order to deduce the same type of information for every method. With the same type of information for every method it is possible to create a filtering system, which is used in the eventual repository. Some conditions are based upon the results of the interviews that are performed for this research, which are discussed in section 4.1.1. Other conditions are based upon the information that is found in the literature. Next to that, also some basic information is displayed for every method (e.g. Name, Method Category, Description, etc.). The different conditions are elaborated on below.

#### **Name**

First, the name of the method will be stated. The names of the methods are formulated by Kampanos (2016), and are used in this thesis.

### **Description**

For every method a description is given. In this description general information will be given about the specific goal of the method, the best practices of the method will be discussed, and (if found in literature) the guidelines on how to implement will be included.

### **Project Category**

The different methods that are found are divided over five different categories (Kampanos, 2016). The different categories will now be discussed and explained.

#### ***Online Communities***

There is a group of methods that specifically focusses on communities, and online communities in general. The creation of online communities is proven to be a difficult assignment. When the creation of online communities is successful, it is also desired to have a level of contribution or engagement from that community with respect to the concerned project (Niragira & Adeyeye, 2013).

#### ***Motivational Factors***

Motivational factors refer to methods that motivate users of the concerned project to change their behaviour towards the project (Kampanos, 2016).

#### ***Gamification***

Robson, Plangger, Kietzmann, McCarthy, and Pitt (2015) define gamification as "the application of lessons from the gaming domain to change behaviour in non-game situations". Gamification is often used as a way to control behaviour and increase loyalty and engagement (Robson et al., 2015). Since the term gained popularity in 2010 it has been one of the most used methods within a lot of projects that were in need of user engagement. Gamification also has the advantage that users will not discard the use of the project in the long term (Lin, 2014). The methods that are documented with respect to this category are game elements that use gamification in projects. Therefore, the methods that are described within this category are only usable if they are used within a gamified environment. If such an environment is not available in the current project, this environment needs to be build. Also, the older the target audience is, the more difficult they experience the use of gamified platforms (Koivisto & Hamari, 2014). Because of that argumentation it can be concluded that a young target audience is most suited for using gamification in projects.

#### ***Social Layer***

The study of Baghaei et al. (2009) shows that the addition of a social layer to a project can have an increase in user engagement as a result. For example, research shows that if persons see that others are successful in a task, they are more motivated to also contribute to or execute that task. They have the feeling that they are also competent to fulfil the task if others can do it too (Schunk, 1991).

#### ***Overcoming Technology Barriers***

Kampanos (2016) mentions that in social innovation projects there is often little to no relation with IT, because the problem or the solution of the project may involve persons

that have no affinity with IT. Therefore, if this is the case it is advised to ”combine low and high-tech platforms to promote engagement among the users (Kampanos, 2016)”.

### **PDD Model**

For every method where enough information is available, a PDD model is created. This model contains the guidelines and steps that need to be taken in order to conduct and implement the method into a social innovation project. Not for every method a PDD model is available, because not for every method specific guidelines or steps in order to execute the method is available in literature.

### **Examples of Implementation**

If examples of the implementation of the specific methods are available, they are shown in the repository in order to make a method visual for the user. Images of other projects that already implemented the method are shown. With the use of examples the user can have a better idea of the method.

### **Maximum Number of Users**

With this condition the maximum number of users that a social innovation project can have is indicated. Some methods are more suited for projects that have a high amount of users than other projects, and some methods are only suited better for a project that has a low number of users.

### **Age of Users**

Not every method is suited for audiences with the same age. Some methods may fit better for a target audience with a lower age or vice versa. In the repository this condition is documented as a range, meaning that a method can be applicable for a project with users between the age of X and Y. Almost every method that is discussed in this research concerns the use of technology. Elder persons might be reluctant to use technology, or have less affiliation with technology (Hough & Kobylanski, 2009). Therefore, the methods that are described might not be suited for a target audience filled with elder people.

### **Project Size**

The condition *project size* is documented as a condition because some methods are not created with the intention to help a project of a large or international scale. However, some methods are applicable for projects that are active globally. In the filter of the repository this condition is split up in three boolean variables (i.e. a condition that can be true or false). The three options that are available in the repository are a *local*, *national*, and *global* scale.

### **Time of Implementation**

This condition states the time it takes to implement the method into the specific project. The time it costs to maintain the method in the project is not taken into account for this condition. In the repository this condition can have three values: *long*, *medium*, and *short*. The amount of steps that need to be taken in order to fully implement a method is used as a guideline to make the division in one of the three values mentioned.

### **Costs**

The last condition states what the costs are that are paired with the method. Some methods are costly to implement and this condition plays a large role in the decision making process of the project manager in choosing the right method. With this condition only the direct costs for the implementation of the method are taken into account. Maintenance costs and indirect costs are not included. For example, the costs for hiring staff is not taken into account in this filter condition. If for example a direct investment in software is needed, direct costs are involved. In the repository a boolean is used for this condition. The question that is asked is: "Are there any direct costs for this method?", which can be answered by *true* or *false*.

### **Complexity of Implementation**

The complexity of implementation is mentioned in the repository. This condition is not explained in a textual form in this thesis, because the complexity of a method is simply based on the amount of steps that need to be taken in order to fulfil the method.

## 3.2 User Engagement Methods

In this section the twenty-three different methods to achieve an increase in user engagement are documented. The methods are ordered on the five different project categories.

### 3.2.1 Engage boundary spanners of the targeted communities

Method Category: <i>Online Communities</i>
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For a social innovation project, it is of great importance to transmit information from and to different parties. This information can be extracted from communities in order to improve the quality of the information within the project. In order to do so, user engagement needs to be high. With one or several persons that fulfil boundary roles, organisations are able to consult these persons that are well connected to external information areas. With boundary spanning, users are more involved in the project process, which motivates to be more engaged (Tushman, 1977). The term boundary spanner is referring to persons that link an organization's internal network with external networks or sources of information. The goal of a boundary spanner is to bridge the gaps between two parties. Boundaries are in the way of linking the networks, and these boundaries are taken away by boundary spanners. A boundary spanner can share and explain an innovation to a targeted audience (Tushman, 1977).

Friedman and Podolny (1992) state that boundary spanning can be viewed at two different levels: individually and organizationally. At the individual level, boundary spanners are persons that have the responsibility for the interaction with actors that are not part of their own organization. On an organizational level, boundary spanners are actively interacting with external agents in different types of relationships.

A boundary spanner can be identified as a person or a group of persons that has great social skills, with a goal to learn about an organisation and its employees, and how it interacts with other organisations and its environments. In that way, different perceptions, cultures, and philosophies can be found (Williams, 2002). Williams (2002) also states that boundary management can be a challenging task. A boundary spanner needs to have the capability to reduce or even remedy possible disagreements, in order to create trust between both parties. On the other hand, boundaries must be maintained so that possible complications of one party will not interfere with affairs of the other party. Tushman (1977) states that the formulation of effective communication channels between both parties is a critical component in the process of boundary spanning. Trust plays a large role in the relation between organisations. One of the biggest boundaries against the professional relation or collaboration between organisations is the lack of trust (Webb, 1991). In figure 2 the process is visualised in a schematic manner.

Boundary spanning creates the opportunity to be more engaged with the user, by being more on the same page. If boundaries are taken down, more trust will be created and a better workflow will follow. The lower the boundaries, the better the relationship. The quality of the knowledge that is being exchanged depends on the quality and the durability of the relationship.

Williams (2002) defines four steps that need to be taken in order to pursue this goal:

1. Building sustainable relationships



2. Managing through influencing and negotiation
3. Managing complexity and interdependencies
4. Managing roles, accountabilities and motivations

There are also remarks for this method. Too many boundary roles within an organisation may be inefficient (Tushman, 1977). Also, the number of boundary roles that are used within a specific work area should be adapted to the information processing needs. Different work areas might need boundary roles with different characteristics or backgrounds (Whitley & Frost, 1971).

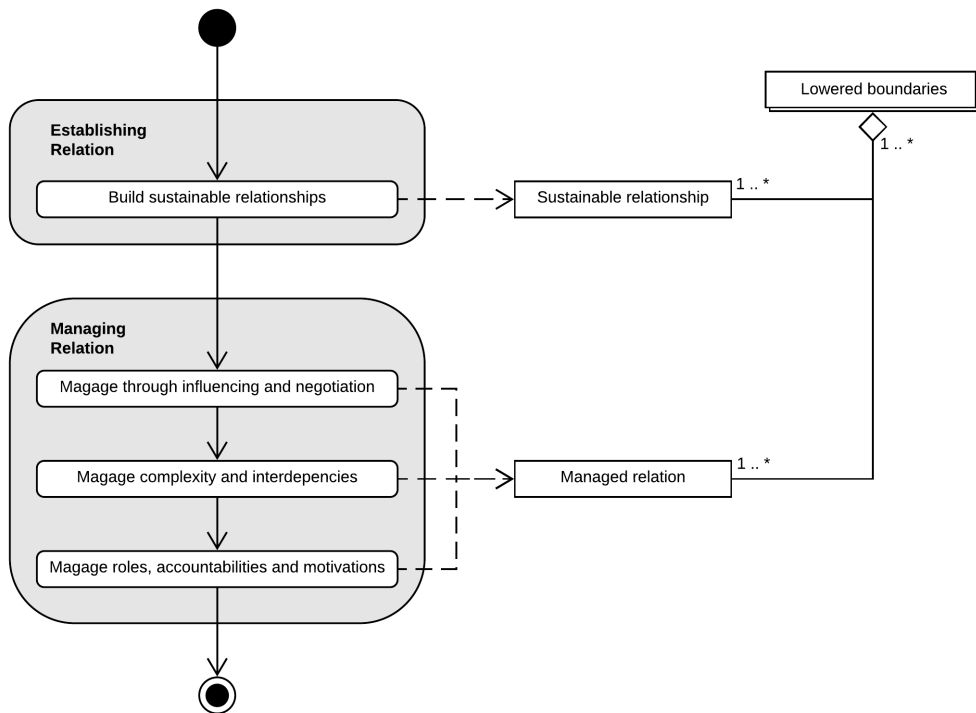


Figure 2: PDD Model of the method: Engage boundary spanners of the targeted communities

### Maximum number of users

This method is not only applicable for projects that have a restricted number of users. Boundary spanning can be conducted within every organisation, focused on a big community or just a specific target audience.

### Age of users

The age of the user of the project is not relevant for this method to be successful. As stated above, boundary spanners are persons that have the responsibility for the interaction with actors that are not part of their own organization. Who these actors outside of the organisation are and which age group they represent differ per project and need to be defined as the target audience.

### **Project Size**

Boundary spanning can be conducted on a local, national, or global level, depending on the structure of the relevant project. If this method is applied to a big project, it could be necessary to assign more boundary roles.

### **Time of implementation**

A specific time of implementation cannot be stated for this method. Boundary spanning is an ongoing process. As mentioned above and as can also be seen in the PDD Model below, the first step is to build sustainable relationships. Thereafter, these relationships need to be managed and maintained. This is a process that needs to be carried out in order to maintain user engagement. Therefore, this method is defined to take a long time to implement.

### **Costs**

This method does not require a direct investment. However, for this method boundary roles need to be assigned. This means that an employee within the organisation of the project needs to focus on the role of boundary spanning. This may lead to the hiring of new employees or retraining current employees, which could both lead to organisational costs.

## **3.2.2 Involve users in creating the online communities**

Method Category: <i>Online Communities</i>
--

With involving users in creating communities is meant that users need to be engaged with for example inviting other persons to the community. Another option is to give users the opportunity to structure the community according to their own needs. This will give users more involvement in the community. An example of this could be that users have the ability to create subgroups and naming the groups (Kampanos, 2016). Lin (2014) states that users feel a greater sense of a group goal if they are more involved in the creating process of the community that is combined with the application or project.

According to Hashagen (2002), participation or involvement in communities can be differentiated over different approaches. Community mobilisation / empowerment is one of these approaches. This approach states that the whole community has authority for management of services. One of these management tasks should be the creation of online communities. This method is suitable for projects that aim to have, or already have one or multiple online communities.

### **Maximum number of users**

There is no maximum number of users of the project for this method to be successful. If a community is small when this method is applied, there is a lot of growth potential. With an already large community, more users will have the opportunity to create and shape the already existing or new communities. Therefore, when this method is applied the growth of community of the project will increase exponential.

### **Age of users**

This method does not require the target audience of the project to be of a specific age

range. Although the method might be more suitable for a younger audience. There are still barriers for elderly people when connecting with online communities. An example is that elderly persons might have difficulties with reading small letters on web pages (Nimrod, 2009).

### Project Size

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale. The internet lowers or completely removes boundaries that are created by time and distance (Kim, 2000). This is the reason to create an online community in the first place.

### Time of implementation

The time of implementation of this method is short. An online platform needs to be created in order for an online community to be established. If this platform already exists, the only thing that needs to be done is give the users authorisation to create the communities itself.

### Costs

For this method no direct costs are involved. However, some costs can come up with the hiring of staff in order to carry out changes into the current system or project.

### Example of Implementation

In figure 3 a screenshot of the page containing a list of Subreddits is shown (Reddit, 2018). This is not a social innovation project, but visualises the specific method in a good manner. Reddit is an online forum, which allows its users to create their own subfora.

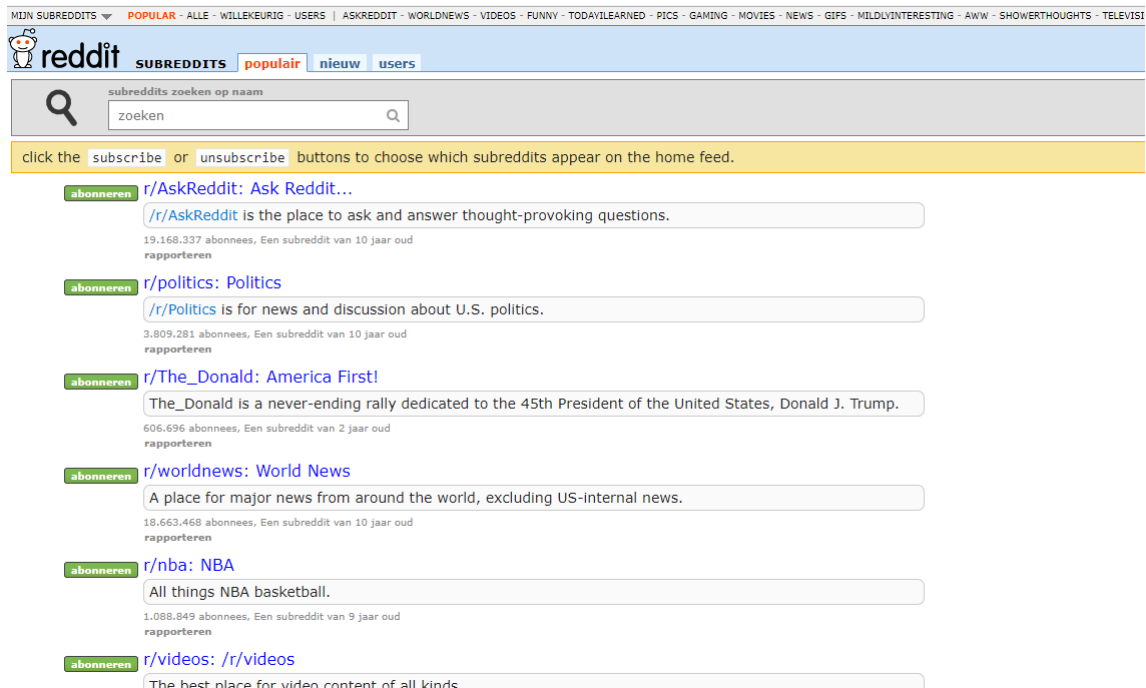


Figure 3: Implementation example: List of Subreddits

### 3.2.3 Engage users on the media platform they are already using

Method Category: *Online Communities*

Users should be given the opportunity to use a media platform that is already used by the concerned community. If for example, a Facebook page is already used to connect with one another and it works well, users should not be forced to use another media platform. With the example of Facebook there already is a sense of community where users are able to report problems or contact the organisation. Trying to educate or convince the user to switch may cause problems (Vila, 2014).

This is a fairly easy process to implement in a project, because of the fact that nothing new has to be created. There are already existing communities which can be connected to the project by implementing the community into the project, instead of the other way around. Relation building is the backbone of online communities. The steps in order to conduct this method are based on the process mentioned by Vila (2014). First contacts with the user need to be established. Next, the needs of the user need to be defined. Key is to find one or multiple media platforms that the user is already using. After that the (mobile) project application needs to be prepared and adapted to the structure of the media platform. Finally, the media platform needs to be implemented in the project. In most cases this is a fairly easy process. If for example Facebook needs to be integrated in a mobile project application, a Facebook software development kit (SDK) can be installed (Krivak, 2008). In figure 4 a model is shown that visualises this method.

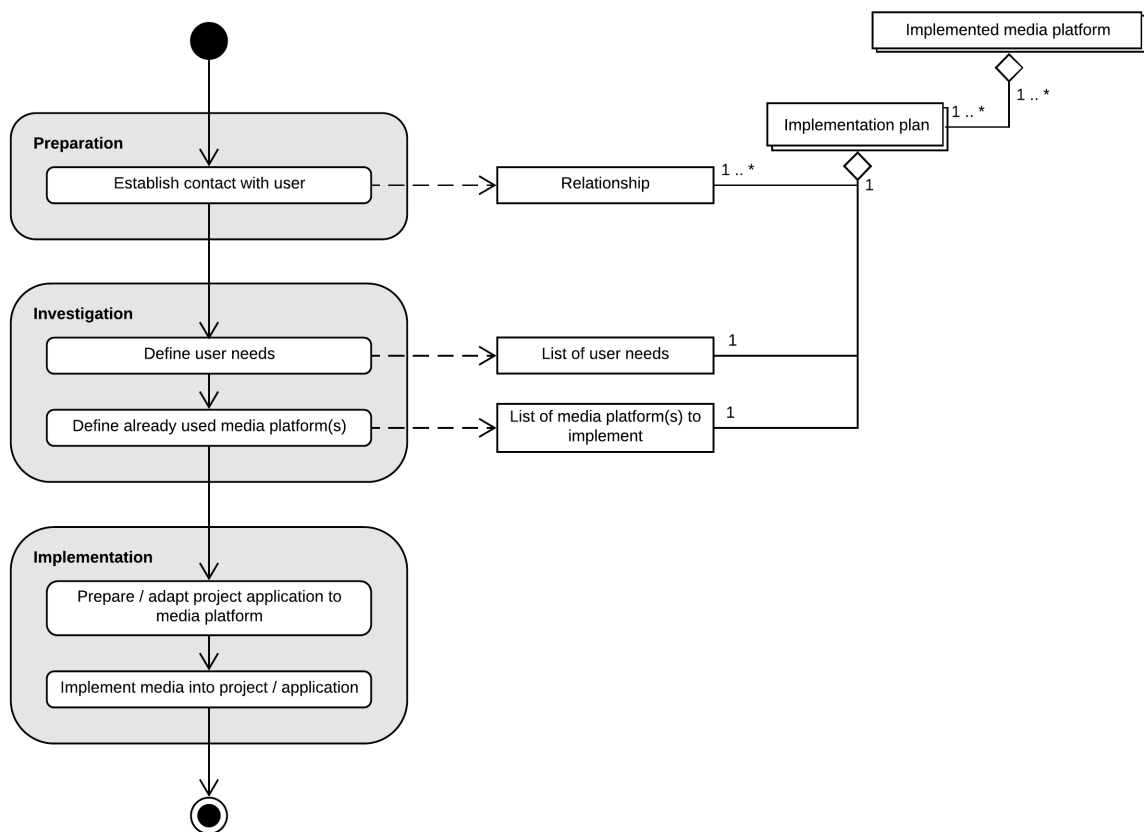


Figure 4: PDD Model of the method: Engage users on the media platform they are already using

**Maximum number of users**

This method does not have a maximum number of users for the method to be successful. No information about this subject is found in the literature.

**Age of users**

This method does not require the target audience of the project to be of a specific age range. Although the method might be more suitable for a younger audience. There are still barriers for elderly people when connecting with online communities. An example is that elderly persons might have difficulties with reading small letters on web pages (Nimrod, 2009).

**Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale. Media platforms are used all over the world. Depending on the project, communities might represent an actual community in a certain area.

**Time of implementation**

The time of implementation of this method is considered medium, because an investigation needs to be conducted before the media platform can be implemented.

## Costs

For this method no explicit costs are found. As stated before, nothing needs to be created. Only some time may be needed in order to create and manage relations.

## Example of Implementation

In figure 5 a screenshot of the Facebook page of the social innovation project FixMyStreet (*FixMyStreet Facebook*, 2018) is used. This page gives users of the project the opportunity to engage with the project in a way they are familiar with: the social network site Facebook.

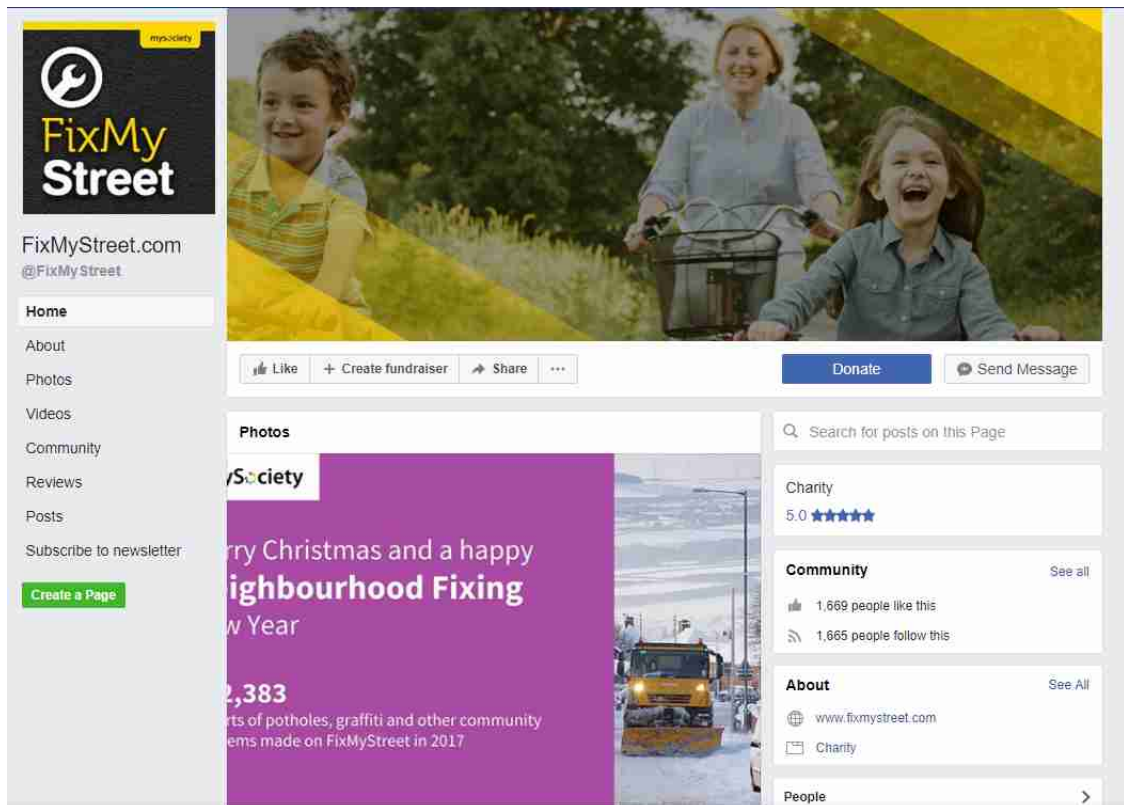


Figure 5: Implementation example: Facebook page of the FixMyStreet organisation

### 3.2.4 Provide analytics to the users

Method Category: *Motivational Factors*

The use of analytics has the potential to have a very high impact on user engagement. Providing analytics to the users where is referred to the usage of the product or application, may increase motivation and incentive to use or engage with the project. Users are interested to discover things about themselves (Emerson, 2011).

The study of Goldbach and Gölz (2015) states that users are interested in evaluating their own performance. This can be done by gaining feedback. The study also shows that users are more motivated when they receive insights about themselves or the cause they are participating in.

There are different ways in how information could be shown with the goal to provide feedback. Some target audiences of projects may have the need for rather simplified and already analysed data, whereas target audiences of other projects have a preference for more-detailed data. In this way an opportunity is created for the user to analyse the data himself. Therefore, a project should provide customised options for each of those target groups (Goldbach & Gözl, 2015). Another option is to do research on the target audience beforehand, to provide analytics or data in a way that suits the specific user best. In figure 6 the steps that need to be taken in order to conduct this message are shown.

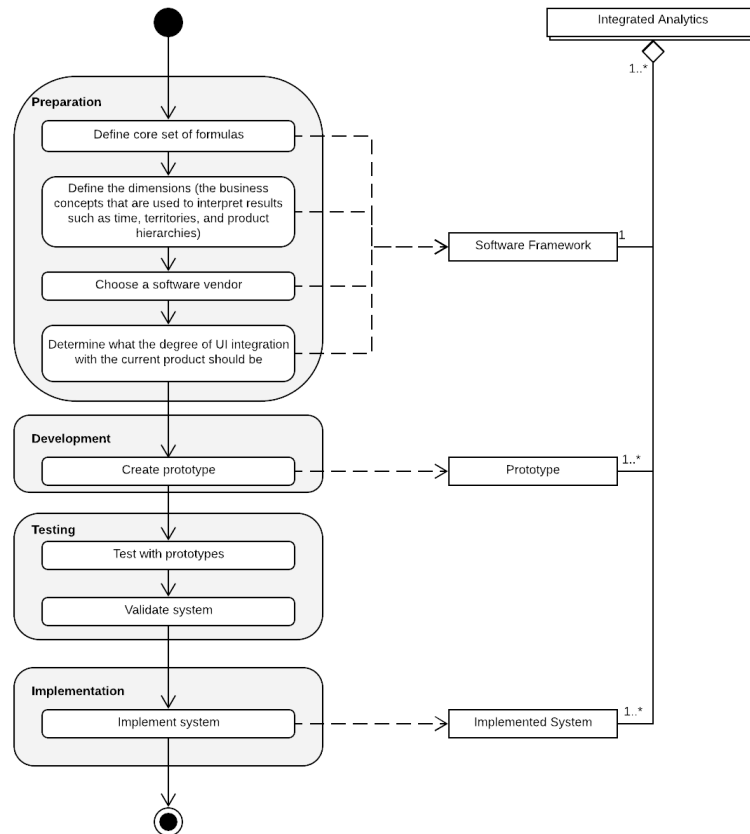


Figure 6: PDD Model of the method: Provide analytics to the users

### Maximum number of users

For this method there is no limit in the number of users. The research of Pipino, Lee, and Wang (2002) states that the believability in data increases if there are more data points available.

### Age of users

The study of Goldbach and Gözl (2015) states that some users may have a preference for information in text form, instead of information visualised in a graphical manner. Mostly elderly people have more difficulty in understanding graphical information, because they are not that familiar with new infographic information. Users that are successful on the internet have skills for searching, navigating, sorting, filtering, and utilizing information. These skills are not present with older adults (Cresci, Yarandi, & Morrell, 2010). The

conclusion can be drawn that graphical analytics are not well suited for elder users. Therefore, in the repository the range until the age of 60 is used.

### **Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale. It is proven that data is found to be more believable if it is consistent with other values of the same data (Prat & Madnick, 2008). This means that if there are data points available on a global scale, data might be more believable for the user.

### **Time of implementation**

No explicit literature is available on the time of implementation for this method. The time that is needed to implement is heavily depending on the type of data that is collected, and the way that this data is collected. First a method for the data collection process needs to be applied, and after that the data can be visualised in the project. Because both steps could take a long time to carry out, the time of implementation for this method is considered to be *long*.

### **Costs**

The process of data collection can be costly. However, the amount of costs is heavily dependent on the type of data that needs to be collected. The type of data in its place is again dependent on the type of project. Since this thesis is focussing on social innovation projects, in most cases data is collected by user input. For this to be successful, user engagement is an important factor. Therefore, costs will be higher for projects if there is little to no user engagement active in the project. If there is already some user engagement and the need is to develop this trend, the costs for this method will be lower.

### **Example of Implementation**

In figure 7 a dashboard of Fitbit is shown (Cotgreave, 2016). This is not a social innovation project, but visualises a good way of providing analytics to users.



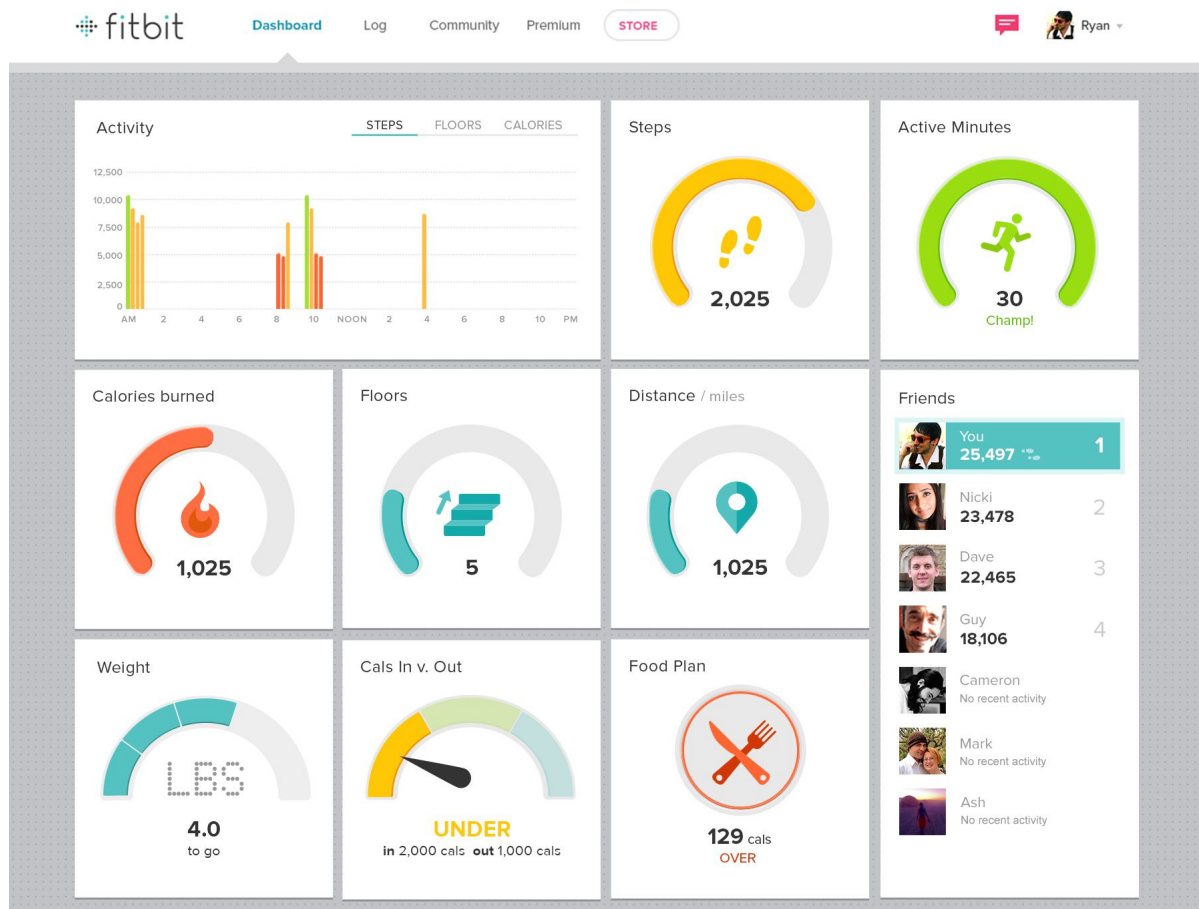


Figure 7: Implementation example: Fitbit Dashboard

### 3.2.5 Maximize control on the ICT project for the user

Method Category: *Motivational Factors*

A social innovation project may have a very sophisticated product in order to carry out the innovative goals of the concerned project. If a system is complex there is a probability that the user experiences a lower sense of satisfaction. A product that is difficult in use might lead to a poorer perceived sense of control (O'Brien & Gunay, 2014). If the user is given the ability to control the platform (or part of the platform), user satisfaction and thus user engagement will increase. This can be done by introducing a profile page, giving the ability to control the privacy settings, and giving options to customize the interface (Goldbach & Gözl, 2015).

#### Maximum number of users

The method of maximizing control can be implemented no matter how many users are using the product of the social innovation project.

#### Age of users

Also the age of the users does not have an influence on the implementation of this method.

**Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

**Time of implementation**

The time of implementation for this method is considered to be *long*. If there are currently no options in the system available that let the users have more control, it can take a lot of time to design and develop a new system. Research and development is an iterative process and can be very time consuming. However, if there is already a platform for users where they have the ability to interact with each other, the implementation of this method may take less time. Again, the time of implementation is very dependent on the concerned project.

**Costs**

Next to the time it takes to design and develop a system that creates the ability for users to have more control, there are no direct costs involved with this method.

**3.2.6 Provide monetary rewards/discounts**

Method Category: <i>Motivational Factors</i>
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Monetary rewards or discounts are rarely given within social innovation projects. As mentioned earlier, social innovation is motivated by the goal of meeting a social need. Maximization of profit is not a common goal in social innovation projects. An option to counter this problem is providing virtual economic rewards such as virtual currency or discounts (Lee et al., 2013). It is proven that monetary rewards can increase the motivation of users (Goldbach & Götz, 2015). In order to fulfil this method, a platform has to be available where the rewards can be given. In figure 8 the PDD of this method is shown.

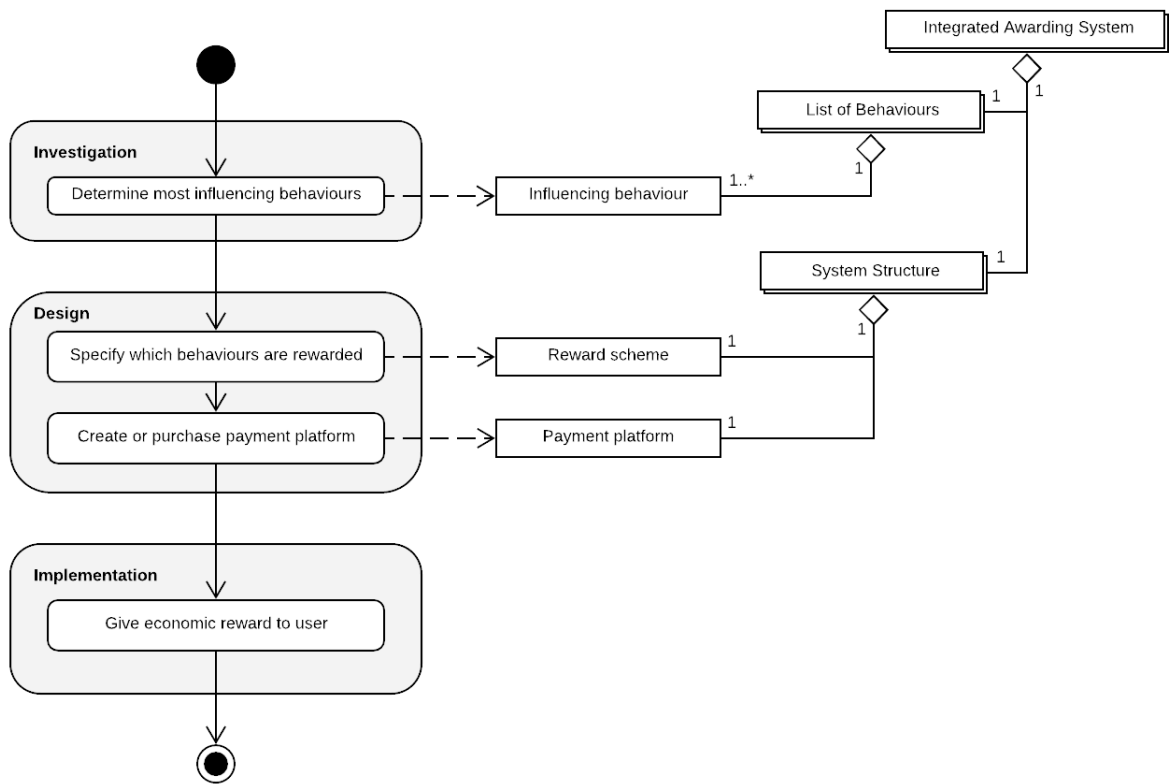


Figure 8: PDD Model of the method: Provide monetary rewards/discounts

**Maximum number of users**

There is no maximum amount of users for this method to be successful. However, it has to be considered that the more users are active, the higher the costs will be.

**Age of users**

There is no specific range of ages found in the literature that is required for this method to be successful.

**Project Size**

Whether the scale of the project is influencing the success of this method is heavily dependent on the nature of the concerned social innovation project, and the nature of the rewards that are given. As mentioned earlier, also virtual currency or discounts can be given instead of financial rewards. For example, if the project is only active on a local scale, there is an option to give discounts that are only applicable in that location. To conclude, all the three the scales (local,national, and global) are possible in combination with this method, but research has to be conducted before the method is actually effective for the concerned project.

**Time of implementation**

Assuming that there is no platform for the providing of rewards available yet, the time of implementation for this method is considered to be *medium*. The steps that need

to be taken are the creation of a platform where rewards are given. Optionally, the implementation of a payment processor is also a requirement for this method to work.

### Costs

The method of providing monetary rewards or discounts does bring direct costs. If financial rewards are given to users, the sum of these rewards are directly turned into costs. If monetary rewards are given on the concerned platform, also a payment processor has to be implemented on the tool, which can be very costly.

### Example of Implementation

MyOV is a project that stimulates users to travel by train in off peak hours. If users are traveling during these hours, they can earn points, with which they are able to purchase rewards. Figure 9 shows a part of the rewards that can be earned.

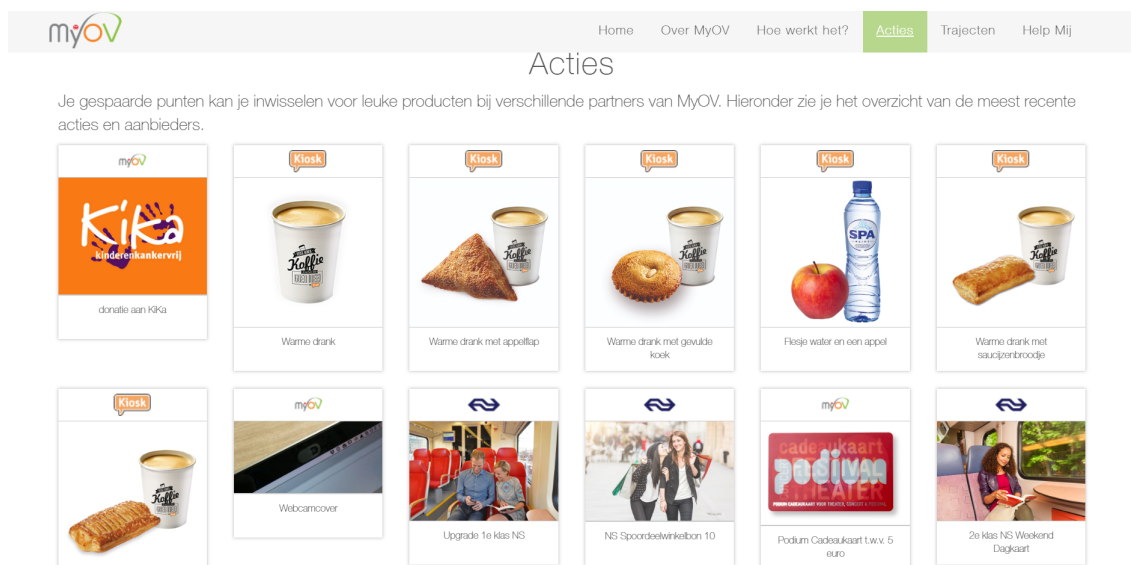


Figure 9: Implementation example: Rewards within the MyOV project

### 3.2.7 Give responsibilities to the users

Method Category: *Motivational Factors*

If users of a project are given responsibilities, their motivation to use the project is likely to rise (Goldbach & Gözl, 2015). This study also shows that if users are given responsibilities, they are trying to do their best in order to let the project develop further. In their study an example is given. It states that a person with a higher responsibility will talk with other persons about the project, because he feels a greater obligation towards the project to let it be as efficient as possible. This means that a result of this method will be an increase of mouth-to-mouth advertisements. Also, if users are given more responsibilities within the project environment, the relationship between the user and the organisation will also improve, resulting in a better reputation (Yoon, Gürhan-Canli, & Schwarz, 2006). However, the study of Strahilevitz (2003) states that if organisations are being seen as unethical, this method will have a contradicting effect. Applying this method

in a project or organisation can be done in different ways. Users could be assigned to roles as moderators or administrators within a platform. Another way to give responsibilities is for example to let users approve or deny new members on a platform on a social level (Kampanos, 2016).

#### **Maximum number of users**

No specific maximum of users has been found in literature for this method. However, if a project has a large number of users, and all those users have been given more responsibilities, the platform could become very chaotic. Nonetheless if, within a bigger project, only a part of the community is given more responsibilities in the form of roles as moderators for example, there is no maximum on the amount of users for a project.

#### **Age of users**

No literature has been found on the age of users on responsibility as a motivational factor. Therefore, no age range is defined for this method.

#### **Project Size**

This method can be carried out for projects that operate on a local, national, or global scale. No difference in sizes of projects for this method are found in literature.

#### **Time of implementation**

In order to execute this method, first a way needs to be found in order to give users responsibilities. A case study has to be carried out in order to find out what the best way is for a specific project. If a solution has been found, this needs to be applied. In most cases no big changes on the already existing platform have to be made. Therefore, the time it takes to implement this method is considered to be short.

#### **Costs**

Next to the time it takes to carry out research and the development of the function on a platform to create more responsibilities, no direct costs are involved for this project. The costs for research are heavily dependent on the type of social innovation project.

### **3.2.8 Set goals and achievements**

Method Category: <i>Motivational Factors</i>
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This method is about motivation by setting goals and acquire achievements. If specific goals are set, this can stimulate the user to be more active on a platform (Goldbach & Gölz, 2015). Den Ouden (2011) states that it is of importance to let people set their own goals, instead of assigning them directly to the user. The study argues that users are more committed to reach that specific goal if it is set by the user itself. So implementing a function for users to set goals for themselves will motivate to engage in the project. Furthermore, the study of Farzan et al. (2008) mentions that a more challenging and short-term goal has a greater chance of motivating user engagement than ambiguous long-term goals.

A study by Beenen et al. (2004) shows that users are more motivated to contribute in online communities if they are challenged with specific goals. This study also proves that

a group goal is more stimulating rather than an individual goal. So for social innovation projects that seek a higher rate of user engagement, setting group goals might be a good way to increase this number. The study of Farzan et al. (2008) gives an example of this method by mentioning the completion about ones profile on the social network site LinkedIn (*LinkedIn*, 2018).

According to the Goal-setting theory (Locke & Latham, 2002) performance can be influenced by goals by means of four elements. The first element is that goals provide the user with a direction. This results in users using the project platform in a more efficient manner. Activities that are less important to achieve a specific goal are less likely to be executed by the user. The second element explains that goals function as an energizing element. In line with the finding of Beenen et al. (2004) is the fact that more challenging goals lead to a higher motivation in users than goals that are easier to achieve. As third, the Goal-setting theory states that goals have an influence on the persistence of the users. So if a goal is hard, users are motivated to keep on working to reach that specific goal. In that way, a user is more likely to engage more in the project. The fourth and final element that is stated in the Goal-setting theory is that goals increase the enthusiasm of being part of something. Goals increase the motivation to discover more about the task. This results in a higher level of intrinsic motivation.

This method can be carried out in different manners, dependent on the form of the project. However, some basic steps need to be taken in order to fulfil this method. The first step is that possible goals need to be formulated. A possible intermediate step is to state certain steps to reach every specific goal. This leads to a more guided way of working to the concerned goal for the user. Then, the goals need to be implemented into the platform. This method could be combined with the method of providing monetary rewards. If a user reaches a specific goal, then a specific rewards that is linked to that goal can be given. The PDD of this method is shown in figure 10.

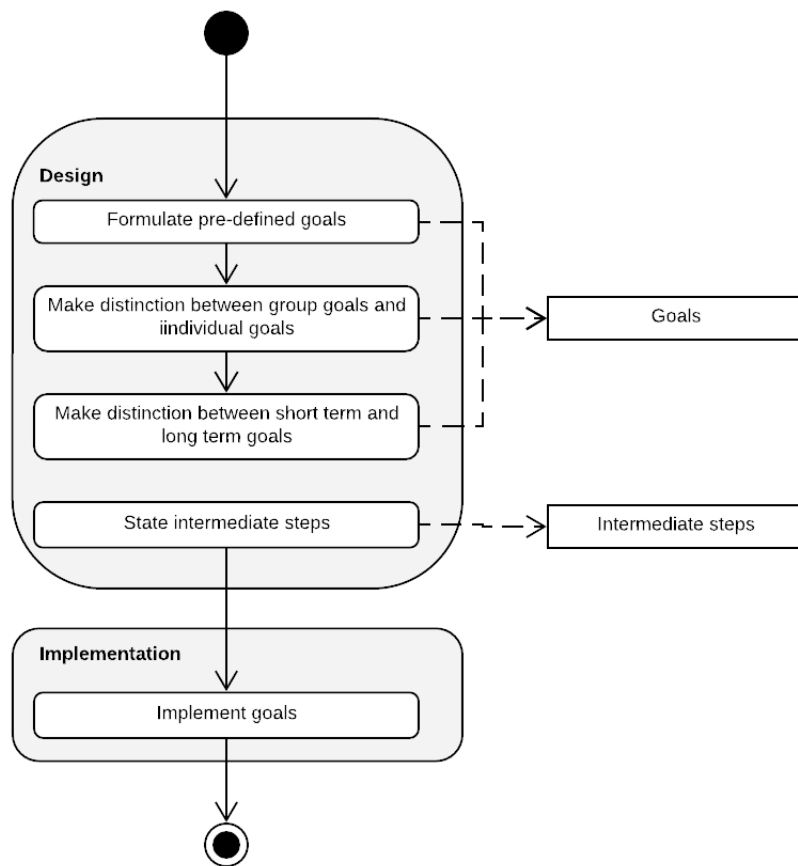


Figure 10: PDD Model of the method: Set goals and achievements

#### Maximum number of users

No information has been found on the maximum number of users for this method. However, if the method is combined with the method of providing monetary rewards there are some remarks, which are discussed in section 3.2.6.

#### Age of users

The age of the users does not have an influence on the implementation of this method.

#### Project Size

The size of the project does not matter for this method to be successful. This method can be applied to a project that is active either on a local, national, or global scale.

#### Time of implementation

The time it takes to implement this method is considered to be *medium*. The development of goals and possible intermediary steps can be quite time consuming.

#### Costs

For this method no direct costs are found. However, the costs of research and development of the goals, intermediary steps, and the platform itself are not taken into account.

### Example of Implementation

LinkedIn implemented the method of setting goals. A goal that has been set by LinkedIn is to create a complete profile. In order to show this to the user, a visual bar is shown that shows the progress of the profile completeness (figure 11) (LinkedIn, 2018).

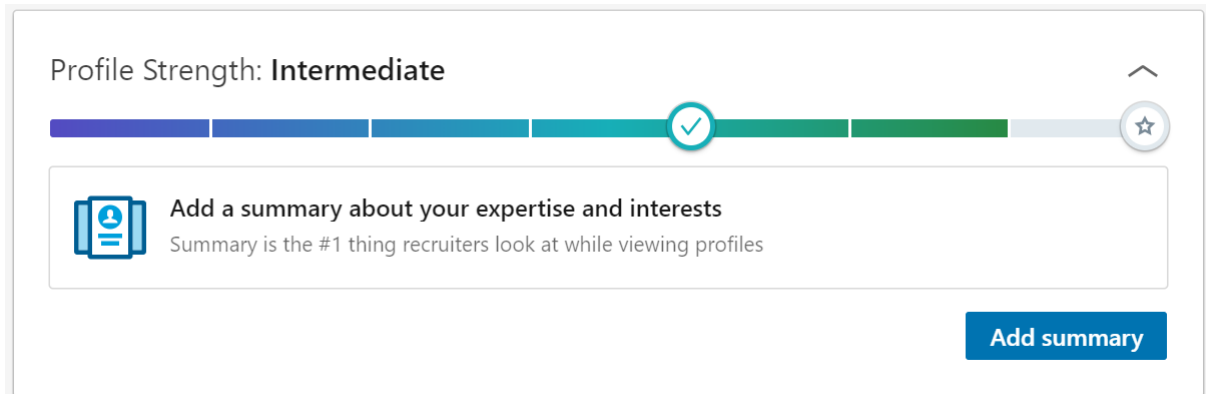


Figure 11: Implementation example: Set Goals and Achievements

### 3.2.9 Use reminders

Method Category: *Motivational Factors*

The method of using reminders to increase user engagement is fairly small, meaning that the effort to implement this method is not high. The study of Goldbach and Gözl (2015) states that a useful way to engage users is to send them recurrent and occasional reminders. They state that this will increase the overall participation rate on a project. Reminders help the user remember a specific goal and it increases motivation to devote time to the project (Locke & Latham, 2002). Next to that, direct messages create a feeling of higher engagement by the user. Instead of general information flows, with direct messages or reminders the user is approached individually. This method can be used in combination with the previous mentioned method of setting goals, discussed in section 3.2.8.

The study of Beenen et al. (2004) states that reminding people of their own efforts of contributing, or their possible lack of contribution, will increase their actual motivation to contribute. However, the research also explains that this is only true when the benefits of contributing are being mentioned in the message.

Examples of reminders that are mentioned in the paper of Goldbach and Gözl (2015) and the thesis of Kampanos (2016) are emails, push notifications, and SMS messages. In figure 12 the guidelines of this method are briefly visualised.



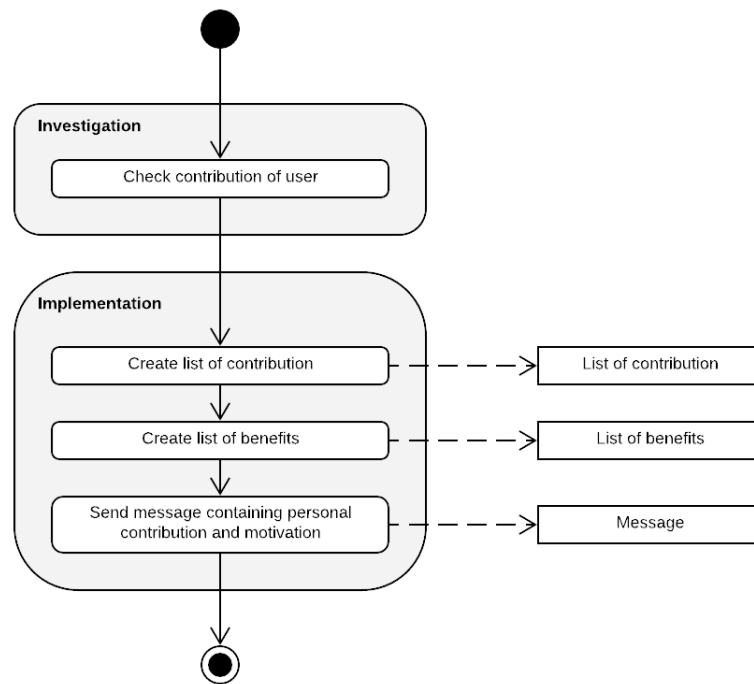


Figure 12: PDD Model of the method: User reminders

#### **Maximum number of users**

There is no maximum amount of users for this method to be successful. However this method might be more effective for methods that operate on a larger scale, because this is a convenient way of communicating directly to the user if no personal contact is possible (López, Farzan, & Brusilovsky, 2012).

#### **Age of users**

Reminders can be sent to persons of all ages. No literature has been found that explains a difference in age categories on the effectiveness of this method.

#### **Project Size**

This method can be carried out for projects that operate on a local, national, or global scale. No difference in sizes of projects for this method are found in literature.

#### **Time of implementation**

The time that is needed for this method to implement is considered to be *short*. The reason behind this is because there is no big implementation process. Sending reminders to a specific user only requires contact details of the user.

#### **Costs**

For sending messages no direct costs are involved.

### 3.2.10 Give feedback

Method Category: *Motivational Factors*

The concept of giving feedback is informing users about the nature, goals, and process of the project (Goldbach & Gözl, 2015). The paper of Goldbach and Gözl (2015) states that users or consumers are motivated by the feedback they receive. They explain that feedback can be given in order to let a user know if they are contributing in the right way or not. If they receive positive feedback, this will motivate them to pursue in the same manner as they are doing. If however, negative feedback is received by the user two possible outcomes can occur. The user can be motivated to contribute in a better way, or the user could be demotivated by the negative information (Goldbach & Gözl, 2015). Farzan et al. (2008) and Kampanos (2016) state that a way of giving feedback is to show the importance of the contribution of users. This method could be implemented in combination with the methods of providing analytics (section 3.2.4), and the user of reminders (section 3.2.9). The guidelines for this method are close to the method of using reminders (section 3.2.9). The guidelines are briefly visualised in figure 13.

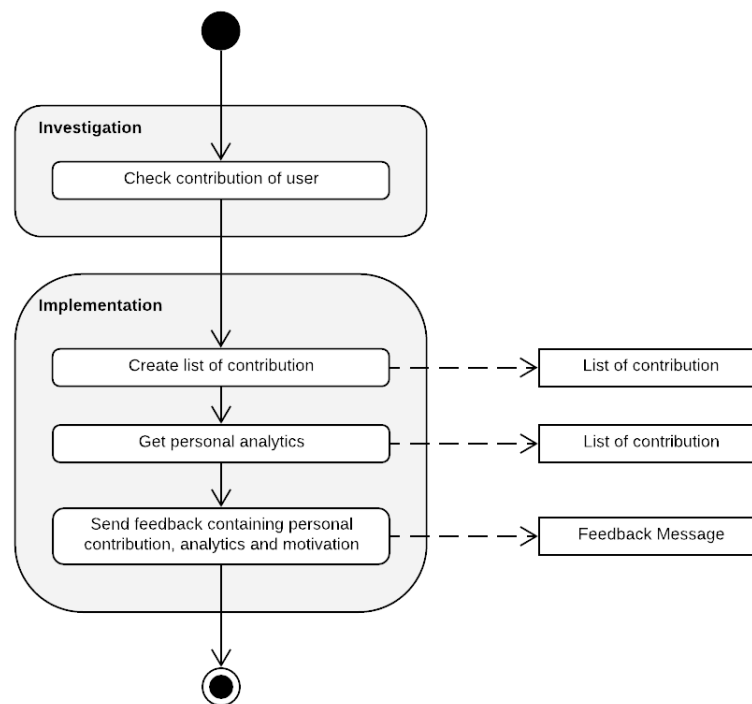


Figure 13: PDD Model of the method: Give feedback

#### Maximum number of users

There is no limit in the number of users for this method. If a community with a high number of users is available, another option is to let users give feedback to each other. In that way a greater sense of the goal of the project is created (Goldbach & Gözl, 2015).

#### Age of users

The age of the users does not have an influence on the implementation of this method.

### **Project Size**

Giving feedback can be conducted on a local, national, or a global level. No literature has been found that states an essential difference.

### **Time of implementation**

The time to implement for this method is considered to be *short*, while no big changes or development in a possible current platform have to be made. Giving feedback to users can be in the form of direct messages and is easy to carry out.

### **Costs**

Sending messages with feedback does not require any investments. Therefore no direct costs are involved with this method.

### **Example of Implementation**

The example that is shown in figure 14 is of the Charity Miles application, which allows users to raise money by walking, running, or biking. During this sporty effort, the application provides feedback to the user as shown in the figure (Trahant, n.d.).

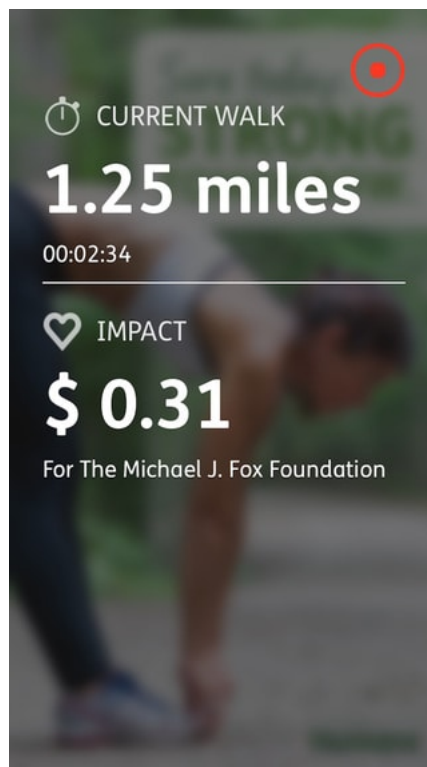


Figure 14: Implementation example: Feedback within the Charity Miles application

### 3.2.11 Award badges

Method Category: *Gamification*

The use of badges is common in a gamification environment. Badges are defined as "ornaments or symbols users can earn for pre-defined favorable behaviours (Hamari, 2013)". Hamari (2013) also states that the awarding of badges in gamification is so important and commonly used that gamification is also referred to as badgification, and therefore badges are considered as the blueprint of gamification. However, this gamification element can also be applied to projects where the core goal is outside the scope of gaming. Badges are rewards and goals that are in line with the goals and activities of the concerned project.

Badges are also a way of providing feedback on the progress or contribution to the user (Ďuríník, 2015). As mentioned in section 14, feedback stimulates to engage more in a specific project. The paper of Hamari (2013) proves that users that check the badges that are earned by themselves or earned by other users show a rise in contribution. He also states that a badge consist of a signifying element, rewards, and the conditions that needs to be fulfilled in order to achieve the specific badge. The signifying element that is discussed is explained as the way the badge looks, and what the textual cues are like. It is also proven that if there are intermediate steps or challenges that need to be completed before one can achieve the badge, users are more likely to show an increase in engaged behaviour (Hamari, 2013). The awarding of points can also be an example of the intermediate steps that are mentioned. The awarding of points will be discussed in section 3.2.12.

Examples of goals that can be used as achievements for badges are the contribution for several consecutive days, performing a specific type of task, reaching a new level, and so on. Ďuríník (2015) also suggests that a badge could be made publicly visible, so that comparison between other members of a community can take place. This will result in an extra incentive to be better than another user. Users that achieved a hard-to-get badge are satisfied more, and users that scored less badges than the average user are motivated to contribute even more. If users are scoring a high number of badges and they are acknowledged as the best performers of the platform, they feel more valuable to the project and have a higher feeling of engagement (Ďuríník, 2015).

The paper of Miller, Cafazzo, and Seto (2016) describes that there are two types of badges: absolute and relative badges. Absolute badges are described as badges that are awarded for reaching a certain achievement. Relative badges are badges that are awarded for achievements relative to other users. So, relative badges can only be won by a limited amount of users. They also suggest to use a dashboard to visualize all the achieved badges.

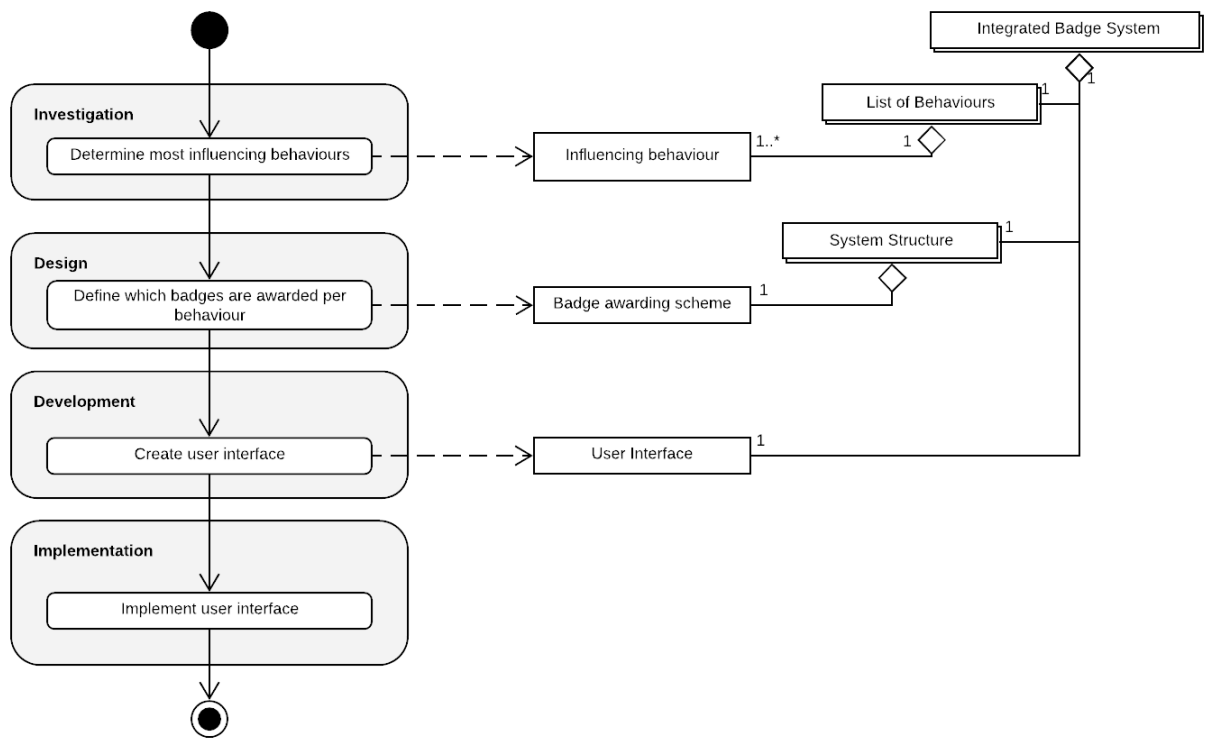


Figure 15: PDD Model of the method: Award Badges

### Maximum number of users

In order to implement the awarding of badges in a project, there is no maximum number of users that a project can have.

### Age of users

There is no specific age range that restricts this method from being efficient or effective. However, there are some general age remarks with all gamification methods, which are discussed in section 3.1.1.

### Project Size

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

### Time of implementation

The time of implementation for this method is considered to be *long*. If no gamification is applied in the current project, a lot of time is needed for the research and development of the gamified application.

### Costs

No direct costs are involved with this method. However, implementing gamification elements can be very costly. First, research has to be conducted. Next, the platform has to be developed and maintained, which requires staff and development costs.

### Example of Implementation

In figure 16 an example of the awarding of badges within an application is given (*Untappd*, 2018). This specific application is not a social innovation project, but shows the badges that can be earned by conducting specific actions on the platform.



Figure 16: Implementation example: Badges in the Untappd application

### 3.2.12 Award points

Method Category: *Gamification*

As like awarding badges (section 3.2.11), awarding points is another gamification element that can be applied in order to achieve a higher user engagement level. Ďuríník (2015) states that the ability to earn points is a "fundamental part of any gamified system". Points can be awarded to users who perform a certain task. The content of these tasks are heavily dependent on the concerned project. Examples that are given by Ďuríník (2015) are contributing with knowledge, submitting articles, and replying to discussions. The points do not have a monetary value. If there is sought to implement a method that rewards the user with monetary rewards, information can be found in section 3.2.6. Furthermore, users that are rewarded points are motivated by a feeling of competition

with other members of the community, and a feeling of social pressure. Also a feeling of satisfaction can occur, because during the time that points are achieved the number of points that is achieved keeps on rising (Ďuríník, 2015).

In order to design a point-based system Farzan et al. (2008) describes several steps. The first step is to determine the most influencing behaviours on the project. Next, there has to be defined which behaviours are rewarded. After that, the number of points that is awarded for every achievement has to be defined and different levels need to be created. After that, a complete system structure is created. Next, a point system and a user interface for the project need to be build, and finally these can be implemented. The result is an integrated award point system. This process is visualised in figure 17.

When implementing this method, it is important to set up the awarding system in a transparent manner. In that way, users know what they are working towards and what tasks are awarded with a specific amount of points (Ďuríník, 2015).

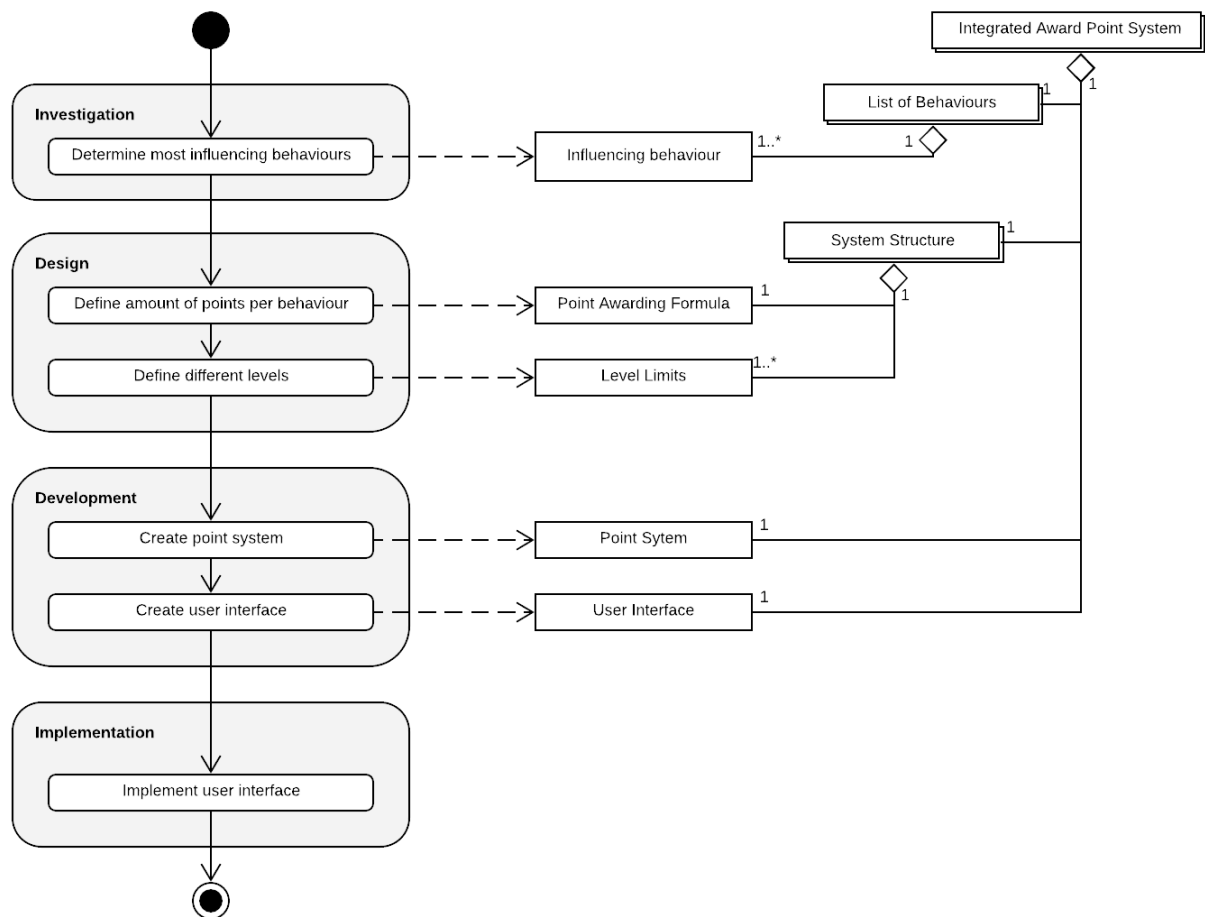


Figure 17: PDD Model of the method: Award Points

### Maximum number of users

In order to implement the awarding of points in a project, there is no maximum number of users that a project can have.

### Age of users

There is no specific age range that restricts this method from being efficient or effective.

However, there are some general age remarks with all gamification methods, which are discussed in section 3.1.1.

### **Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

### **Time of implementation**

The time of implementation for this method is considered to be *long*. If no gamification is applied in the current project, a lot of time is needed for the research and development of the gamified application.

### **Costs**

No direct costs are involved with this method. However, implementing gamification elements can be very costly. First, research has to be conducted. Next, the platform has to be developed and maintained, which requires staff and development costs.

### **Example of Implementation**

In figure 18 an example of the awarding of points is shown (Jokhio, 2017). This screenshot is from the Pain Squad game, which is used in order to conduct research on children that suffer from cancer. In order to find out where the patients have pain, a gamified application is used. In this example points are awarded for specific actions.

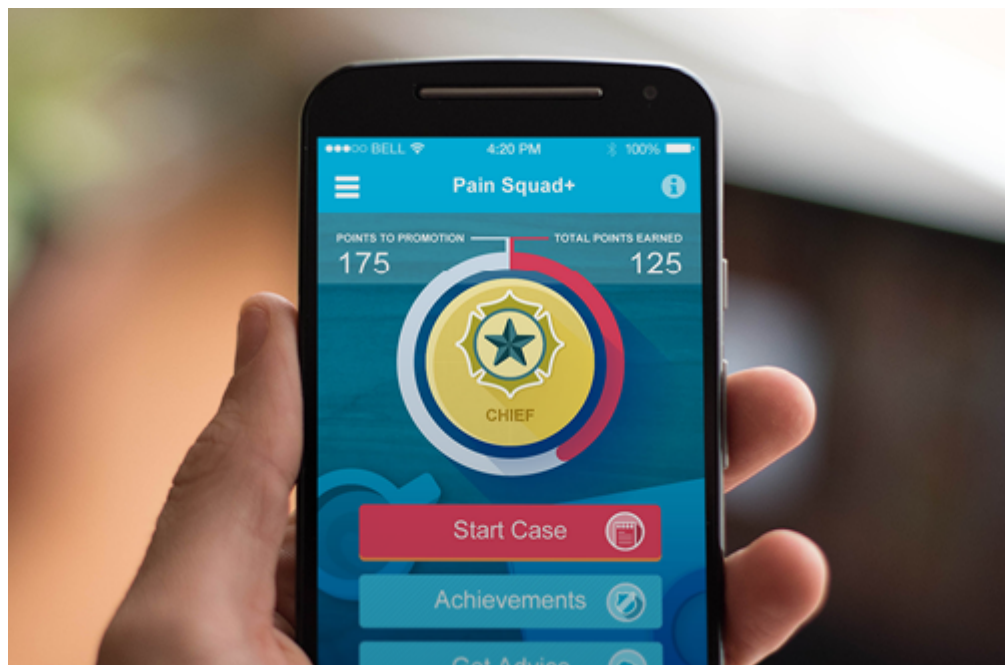


Figure 18: Implementation example: The awarding of points in the Pain Squad application



### 3.2.13 Use rankings and leaderboards

Method Category: *Gamification*

This method is an additional method that can be used with the method of awarding badges (section 3.2.11) and the awarding of points (section 3.2.12). Leaderboards are used in order to visualise the cumulative results of all the badges and the points that are collected (Ďuríník, 2015). This article states that the use of leaderboards result in an increase of motivation to contribute to the concerned project. People are satisfied and are more stimulated to contribute to a project if they see that they achieved a high ranking.

It is an option to show the intent of the application within the leaderboard. Also, extra columns and filters can be applied to provide analytics. Therefore, this method can be combined with the method of providing analytics, described in section 3.2.4. Within these columns the time the application has been used can be displayed as an example (Miller et al., 2016).

#### **Maximum number of users**

In order to implement leaderboards in a project, there is no maximum number of users that a project can have.

#### **Age of users**

There is no specific age range that restricts this method from being efficient or effective. However, there are some general age remarks with all gamification methods, which are discussed in section 3.1.1.

#### **Project Size**

Leaderboards are created to provide the opportunity for users to compare their own achievements with peers. The bigger the project, the better, because in that way more people can compare scores and ranks with each other. However, this method is applicable for projects that operate on a local, national, and a global level.

#### **Time of implementation**

The time of implementation for this method is considered to be *long*. If no gamification is applied in the current project, a lot of time is needed for the research and development of the gamified application

#### **Costs**

No direct costs are involved with this method. However, implementing gamification elements can be very costly. First, research has to be conducted. Next, the platform has to be developed and maintained, which requires staff and development costs.

#### **Example of Implementation**

In figure 19 the application of Spotsfund is shown, where leaderboards are used to show the user who has made the biggest donation (Trahan, n.d.).



Figure 19: Implementation example: Leaderboard function within the Spotfund application

### 3.2.14 Give in-app awards and prizes

Method Category: *Gamification*

This method is about implementing a gamified element into a system that awards users with prizes. Examples of these prizes could be that new levels are unlocked, and the unlocking of new interfaces customization elements (Kampanos, 2016). These prizes are given because of the same reasons discussed in section 3.2.11 and 3.2.12. In-app rewards and prizes however, can be virtual items or in-app currency. These items and currency do not have any monetary value. Awards can be given to the user after they successfully reach a goal or achievement through gaining points or badges (Kazhamiakin, Marconi, Martinelli, Pistore, & Valetto, 2016). Therefore this method can be combined with the methods of awarding badges (section 3.2.11) and the method of awarding points (section 3.2.12).

#### Maximum number of users

In order to implement in-app awards and prizes in a project, there is no maximum number of users that a project can have.

#### Age of users

There is no specific age range that restricts this method from being efficient or effective. However, there are some general age remarks with all gamification methods, which are discussed in section 3.1.1.

### Project Size

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

### Time of implementation

The time of implementation for this method is considered to be *long*. If no gamification is applied in the current project, a lot of time is needed for the research and development of the gamified application.

### Costs

No direct costs are involved with this method. However, implementing gamification elements can be very costly. First, research has to be conducted. Next, the platform has to be developed and maintained, which requires staff and development costs.

### Example of Implementation

In figure 20 another screenshot of the Pain Squad application is shown (Stinson et al., 2013). This screenshot shows the awarding of ranks after conducting specific actions.



Figure 20: Implementation example: Unlocking new ranks within the Pain Squad application

### 3.2.15 Use challenges and contests

Method Category: *Gamification*

(Ďuríník, 2015) describes in his article that the use of challenges and contests are another way of implementing gamified elements into projects. Typically, such challenges have a limited time in which they need to be executed. This could be a couple of hours, a day, or a week. If the challenge is fulfilled in the pre-defined time, a reward can be given in the form of badges, points, and prizes, as discussed in sections 3.2.11, 3.2.12, and 3.2.14. The paper of Ďuríník (2015) also describes that performance and productivity of the user will increase if the user is put under time pressure. This is beneficial for the project. However, tasks that need to be fulfilled in a pre-defined time are not working for every type of project. The pressure of time increases the performance of a user, but also the precision and the output quality are decreased. Therefore challenges with a time limit are not suitable for projects that require a creative input. Projects that require an input for more repetitive tasks are good subjects for this method (Ďuríník, 2015).

#### **Maximum number of users**

There is no maximum amount of users for this method to be successful.

#### **Age of users**

There is no specific age range that restricts this method from being efficient or effective. However, there are some general age remarks with all gamification methods, which are discussed in section 3.1.1.

#### **Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

#### **Time of implementation**

The time of implementation for this method is considered to be *long*. If no gamification is applied in the current project, a lot of time is needed for the research and development of the gamified application.

#### **Costs**

No direct costs are involved with this method. However, implementing gamification elements can be very costly. First, research has to be conducted. Next, the platform has to be developed and maintained, which requires staff and development costs.

#### **Example of Implementation**

The WE application contains challenges for users in order to execute positive actions (figure 21) (Trahan, n.d.).

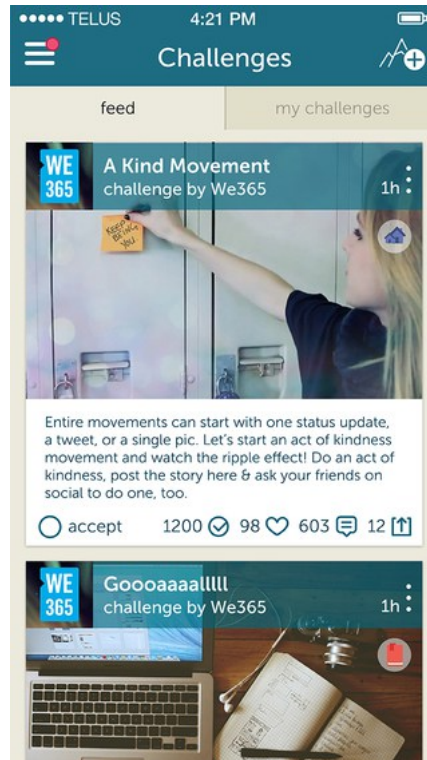


Figure 21: Implementation example: Challenges in the WE application

### 3.2.16 Use levels

Method Category: *Gamification*

Levels are used in gamified systems as point thresholds. As mentioned in section 3.2.12, points can be awarded to users who achieve a certain task. If a certain number of points is reached, the user can level up. In that way, levelling up is based on participation (Kampanos, 2016). Rampoldi-Hnilo and Snyder (2013) state that levels are an indication for reaching milestones. They also mention that if a certain level is reached, this can be rewarded with badges (section 3.2.11), points (section 3.2.12), and prizes (section 3.2.14).

In order to let users identify with levels, every level can be assigned with predetermined point values and metaphorical icons or titles (Miller et al., 2016). They state that this is an important factor in order to drive social user engagement. They argue that new and potential users are more likely to engage if there are more experienced users present. The article of Miller et al. (2016) also explains that levels should increase exponentially in difficulty. The first levels should be fairly easy to achieve, and as a user reaches a higher level, more effort should be needed to reach new levels. In order to indicate the progress of a level, and how many points it takes to reach the next level, progress bars can be used. This is a motivating element, because this creates an awareness of the "few" points that are left in order to achieve a new level.

#### Maximum number of users

In order to implement levels in a project, there is no maximum number of users that a project can have.

**Age of users**

There is no specific age range that restricts this method from being efficient or effective. However, there are some general age remarks with all gamification methods, which are discussed in section 3.1.1.

**Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

**Time of implementation**

The time of implementation for this method is considered to be *long*. If no gamification is applied in the current project, a lot of time is needed for the research and development of the gamified application.

**Costs**

No direct costs are involved with this method. However, implementing gamification elements can be very costly. First, research has to be conducted. Next, the platform has to be developed and maintained, which requires staff and development costs.

**Example of Implementation**

The different ranks in the Pain Squad game that is mentioned earlier also function as levels, and are shown in figure 20.

**3.2.17 Use virtual goods**

Method Category: <i>Gamification</i>
--------------------------------------

Virtual goods are defined as intangible objects that are used in online communities or games. They can be purchased and sometimes traded in a social community. Examples of virtual goods are clothing, weapons, or decorations. These items are used in order to create a more distinguished online identity (Kampanos, 2016). Virtual goods can also be used as awards or prizes as is discussed in section 3.2.14 (Simões, Redondo, & Vilas, 2013). Another option that can be applied is to let badges (section 3.2.11) and points (section 3.2.12) be converted into virtual goods (Muntean, 2011).

**Maximum number of users**

Equivalent to other gamification methods, there is no maximum number of users that a project can have in order for this method to be successful.

**Age of users**

There is no specific age range that restricts this method from being efficient or effective. However, there are some general age remarks with all gamification methods, which are discussed in section 3.1.1.

**Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

### **Time of implementation**

The time of implementation for this method is considered to be *long*. If no gamification is applied in the current project, a lot of time is needed for the research and development of the gamified application.

### **Costs**

No direct costs are involved with this method. However, implementing gamification elements can be very costly. First, research has to be conducted. Next, the platform has to be developed and maintained, which requires staff and development costs.

### **3.2.18 Social Comparison**

Method Category: <i>Social Layer</i>
--------------------------------------

Social comparison is a way for people to feel more engaged. If for example, a social platform provides the opportunity to compare the situation of a person with the situation of another person, this can function as social support (Baghaei et al., 2009). The study argues that users who receive more social support, are motivated to perform a certain target behaviour. Also with the combination of the communication among end-users method, discussed in section 3.2.22, experiences can be shared. This will also help to create a social support, because other persons are in similar situations.

Also, social comparison appeals to the competitive nature of people (Valkering, Laes, Kessels, Uytterlinde, & Straver, 2014). Also, this method can be combined with gamification elements. If points (section 3.2.12), badges (section 3.2.11), or prizes (section 3.2.14) are earned, users might have the urge to share this with peers. The sharing can also be carried out by implementing a leaderboard (section 3.2.13).

### **Maximum number of users**

There is no maximum number of users for this method. A higher number is even preferred, because in that way a more complete comparison can take place.

### **Age of users**

There is no specific age range that restricts this method from being efficient or effective.

### **Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

### **Time of implementation**

The time that is needed to implement this method is considered to be *short*. However, no specific guidelines are found in literature for this method, so this could deviate per project.

### **Costs**

There are no direct costs involved with this project.

### Example of Implementation

In figure 22 an example of social comparison is used (Kuperman, 2018). The figure shows a screenshot of the Deluminate application, where users can compare their own actions to the actions of others. The application stimulates to reduce energy consumption and users can see how much energy their connections use less.

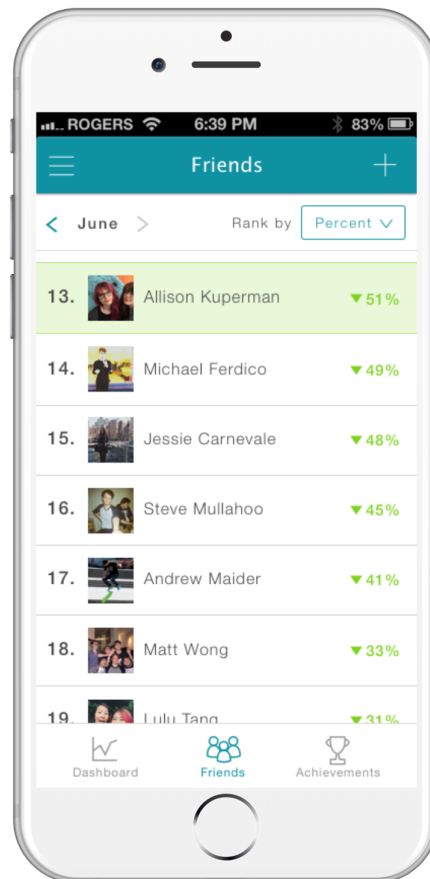


Figure 22: Implementation example: Social comparison on the deluminate application

### 3.2.19 Use the social networks

Method Category: *Social Layer*

Using social networks such as Facebook and Twitter, will motivate the current users to keep on contributing to the project. Implementing the interface of social media platforms will increase social engagement in two ways. First, the users of the platform may have the urge to share personal information with peers. This is also explained in section 3.2.18. If gamification elements are applied, these can also be shared on the social networks. Also for this method, a form of social support is sought on the social networks. Secondly, using the social networks will recruit new members to the platform or project. Social networks can serve as a good way of advertisements. Another option is to let users invite each other to the project through these social networks (Miller et al., 2016).



### Maximum number of users

There is no maximum in the amount of users. However, if there is a high number of users, the method will be more effective. Using social networks will make the number of users grow exponentially, because every new member has the ability to invite their personal connections.

### Age of users

There is no specific age range that restricts this method from being efficient or effective.

### Project Size

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

### Time of implementation

The time that is needed to implement this method is considered to be *short*. However, no specific guidelines are found in literature for this method, so this could deviate per project.

### Costs

Implementing social network into current systems is free of costs.

### Example of Implementation

In figure 23 a screenshot of the option to login with social networks on the AirBNB website is shown (*Airbnb Pageflows*, 2018).

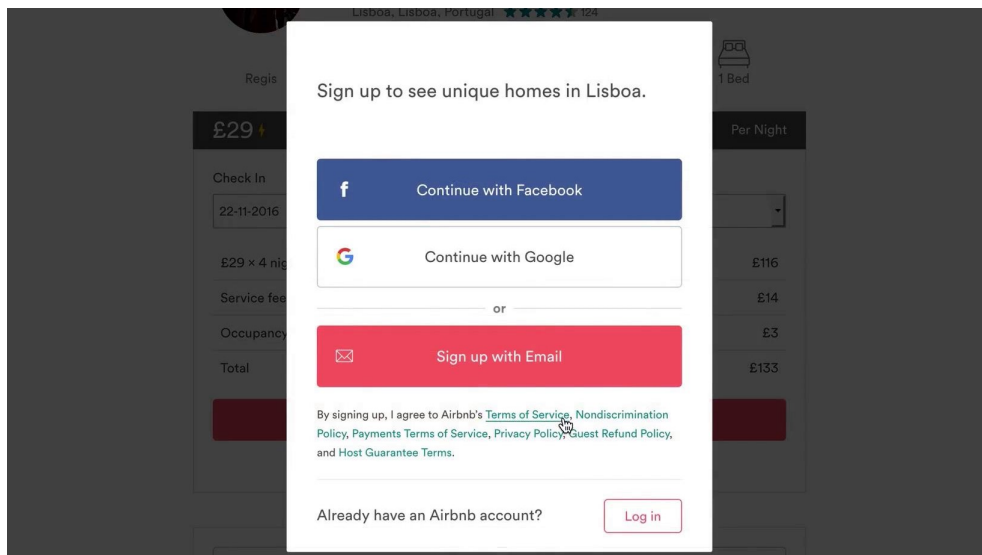


Figure 23: Implementation example: Connecting with Facebook on AirBNB

### 3.2.20 Use likes or up-votes

Method Category: *Social Layer*

The use of likes or up-votes can also motivate user engagement (Lee et al., 2013). Likes and up-votes are used on social platforms, as discussed in section 3.2.19. Also, the like button of Facebook itself can be embedded in a certain project page, resulting in a higher level of user engagement (Gerlitz & Helmond, 2013). Users can give other users likes or up-votes, depending on the quality of what the user creates, shares or expresses. Up-votes are used in order to create a certain ranking of posts. With the use of up-votes, also a feeling of responsibility is given to the user, as discussed in section 3.2.7.

#### **Maximum number of users**

There is no maximum in the amount of users. However, if there is a high number of users, the method will be more effective. Using social networks will make the number of users grow exponentially, because if people use likes to recommend a project page, the brand awareness of a certain project increases.

#### **Age of users**

There is no specific age range that restricts this method from being efficient or effective.

#### **Project Size**

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

#### **Time of implementation**

The time it takes to implement is considered to be *short*. The simplest step that can be taken in order to conduct this method is embedding a Facebook like button on the project page. This does not require a large time investment.

#### **Costs**

There are no direct costs involved with this project.

#### **Example of Implementation**

In figure 24 an example of the up- and down-voting of a post on Stack Overflow is shown (*Stackoverflow*, 2018). Up and downvotes are used in order to calculate reputation, discussed in section 3.2.21.

## How to configure Apache with PHP

I want to configure Apache with PHP to execute PHP files

+1 can anyone guide me please

-3 php apache

share | edit | close (2) | flag

asked 8 mins ago  
Prasad V S  
32 ● 6

1 You need to install a PHP expansion board in a spare ISA slot of your server. Then configure Apache with the same IRQ as the DIP switches on the PHP board. – Jonathon Reinhart 5 mins ago [edit](#)

[add comment](#)

Figure 24: Implementation example: Up- and down-voting a post on Stack Overflow

### 3.2.21 Increase users' reputation by their contribution

Method Category: *Social Layer*

A reputation is described by Farzan et al. (2008) as a form of user motivation. The engagement or contribution of a community can be motivated by individual and interpersonal factors (Lui, Lang, & Kwok, 2002). Intrinsic motivation is part of these individual factors. Creating or affecting a specific reputation is part of intrinsic motivation. Kollock (1999) states that reputation plays a large role in motivating a communities contribution. Also is stated that it is more probable that people share information when their reputation is at risk, or has the possibility to grow.

The displaying of a users' reputation is used on many social networking sites. Here the examples of showing the number of connections is used (Farzan et al., 2008). This method is about stimulating users to contribute with the use of reputation. Users can be made aware of their contributions by putting the users who contribute the most in the spotlight. This will create a greater incentive to contribute. Also this method can be combined with gamification methods. If users have a greater reputation, additional awards can be given like points, (section 3.2.12), badges (section 3.2.11), and prizes (section 3.2.14). In that we users can be provided with a personal benefit. Especially when there is focussed on a social perspective of the project, this method will be effective (Farzan et al., 2008). The guidelines for this method are visualised in figure 25.

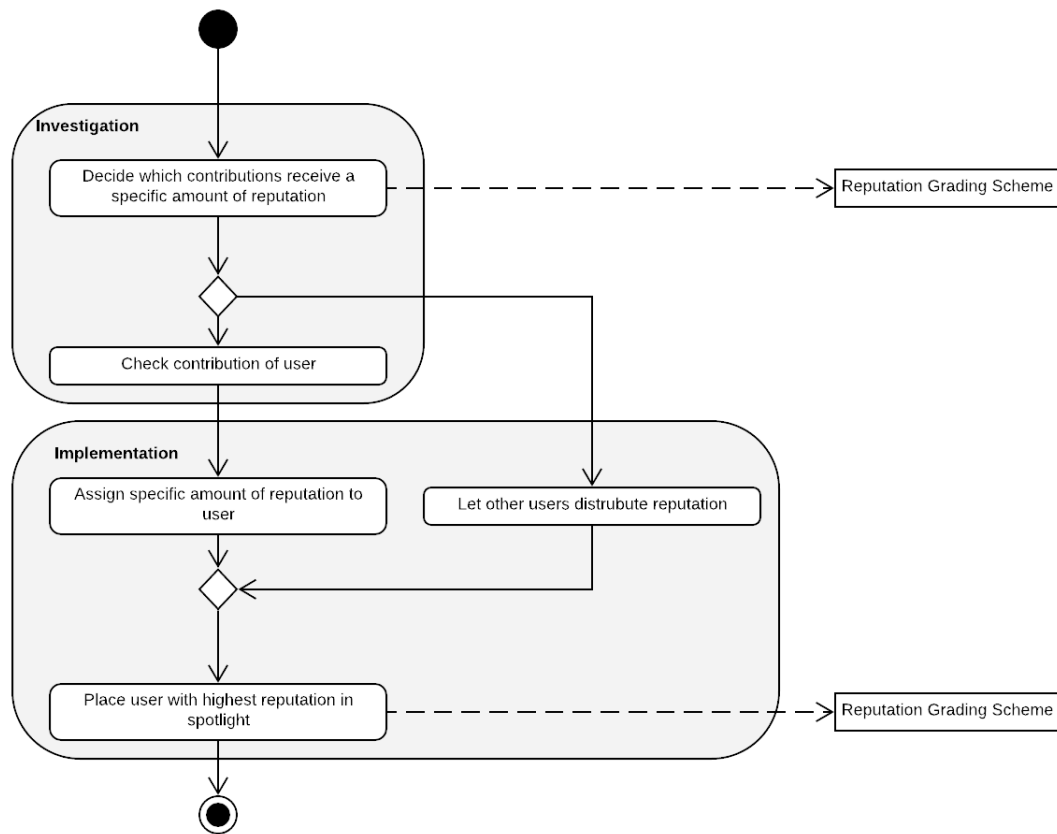


Figure 25: PDD Model of the method: Increase users' reputation by their contribution

### Maximum number of users

There is no maximum number of users found in literature for this method.

### Age of users

The age of the users is not relevant for this method.

### Project Size

The size of the project does not matter for this method to be successful. This method could be applied to a project that is active either on a local, national or global scale.

### Time of implementation

The time it takes to implement this method is considered to be *short*. However, it is dependent on the type of project and the way that reputation based incentives are implemented. If a complete new system needs to be build, the time to implement can also be considered *medium*. Then, research has to be conducted, and a new system has to be developed.

### Costs

There are no direct costs found for this method. However the new incentives need to be implemented into the current project, which can take some time. Staff is needed in order

to fulfil this job. So the hiring costs of staff need to be taken into account. Also, possible research and development costs need to be considered if no platform is currently available.

### Example of Implementation

In figure 26 an example of the distribution of reputation on Stack Overflow is shown (*Stackoverflow*, 2018).

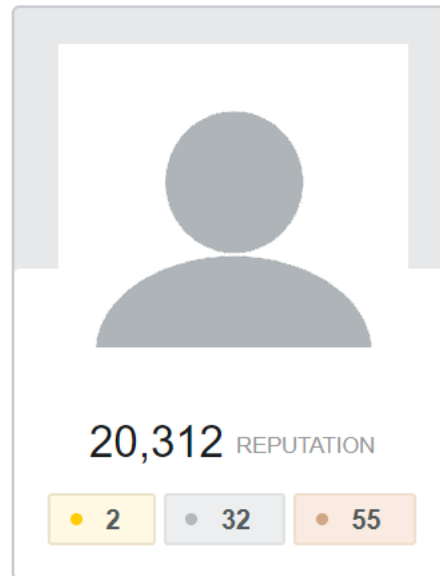


Figure 26: Implementation example: Profile reputation on Stack Overflow

### 3.2.22 Communication among end-users

Method Category: *Non-ICT Strategies towards User Engagement*

Geelen, Reinders, and Keyson (2013) propose a method to develop products and services that stimulate the communication between end-users. In order to achieve this, a project platform could be provided with a messaging function. The study of Cruz-Benito, Therón, García-Peñalvo, and Lucas (2015) states that people are more engaged if their is a chat function available.

#### Maximum number of users

In order to implement a communication function between end-users, no maximum number of users is given. If there are more users, the communication network will be bigger, resulting in more options for users to exchange messages with.

#### Age of users

There is no age restriction included for this method.

#### Project Size

This method could be used for projects that operate on a *local*, *national*, and *global* scale.

**Time of implementation**

The time of implementation for this method is considered to be *short*. A messaging function has to be coded into the platform, which does not have to take too much time.

**Costs**

There are no direct costs involved with this method.

**3.2.23 Use a combination of low and high tech platforms**

Method Category: <i>Overcoming Technology Barriers</i>
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As mentioned in section 3.1.1, within social innovation projects there is often little to no relation with IT. Therefore, in those cases it is advised to combine low and high tech platforms. Little literature can be found on this topic. Also mentioned in the thesis of Kampanos (2016) is the example of (Vila, 2014). In this example a wall is used to draw an interface, and chalk is used to fill in the loose variables. In that way, the high tech platform is simplified and is usable for people that do not have the ability to use the high tech platform.

**Maximum number of users**

No literature has been found on this topic. Therefore no maximum number of users is given for this method.

**Age of users**

As with the gamification elements, there are still barriers for elderly people when using technology. An example that is mentioned earlier in section 3.2.4 is that elderly persons might have difficulties with reading small letters on web pages (Nimrod, 2009). Therefore, the use of low tech platforms might be a very convenient way for elder persons to interact with projects.

**Project Size**

No literature has been found on this topic. However, it is argued that if low tech platforms are used, reaching users on a national or even global scale is very difficult. This is dependent on the project type for which the method is used, but without taking this last argument in consideration, the project size for which this method is effective is considered to be *local*.

**Time of implementation**

No information has been found on the time of implementation for this method. The reason for this is that this method is very broad and free to interpret.

**Costs**

Because no specific method or task is described in this method, there are no direct costs.

## 4 Designing a repository of methods to increase user engagement in ICT-based social innovation projects

With the means of creating an online repository, first the requirements need to be identified. After that, a design of the repository can be made. After finishing the initial design, a first prototype of the repository can be implemented. All these steps are discussed in this section.

### 4.1 Identifying requirements for the repository

In order to identify the stakeholders and their needs, the process of requirements engineering (RE) is performed. RE is a very important process in the early stages of designing software or a product. The elicitation of requirements is considered to be one of the first steps in the RE process. However, requirements are not easily collected by asking the right questions. Information that is gathered during the elicitation phase still needs to be interpreted in the right way, analysed, and modelled, before a complete set of requirements can be created (Nuseibeh & Easterbrook, 2000). Nuseibeh and Easterbrook (2000) also state that it is important to identify the problem that needs to be solved. The problem statement is already explained earlier in this thesis. Additionally to the problem statement, it is also of great importance to specify the scope and the boundaries of the solution that is aimed to achieve. The scope and the boundaries describe how the solution will fit into the operational environment (Nuseibeh & Easterbrook, 2000).

Requirements can be divided in hard and soft requirements. Hard requirements are requirements which have to be taken into account at all costs. Soft requirements on the other hand are requirements that are desirable, and can be seen as preferences (Eiselt & Laporte, 1987). In this research a division will be made between the two types of requirements.

For this research, the main stakeholders are considered to be the users that interact with the new system (Nuseibeh & Easterbrook, 2000). The main stakeholders are therefore defined as the project managers of social innovation projects. Elicitation sessions in the form of semi-structured interviews are used to define the requirements for the repository.

#### 4.1.1 Semi-structured Interviews

As mentioned before, within the elicitation process semi-structured interviews have been carried out. The goal of the elicitation process is to identify the needs of the users. Semi-structured interviews are chosen as elicitation technique, because this was found to be the most suited method for the cause of finding potential needs and requirements. A semi-structured interview gives the opportunity to rephrase questions during the process if this will suit the situation or context in a better way. This helps in exploring new subjects if they arise. Also, in a semi-structured interview the expert has more freedom to speak freely, which can be very useful in situations that have the goal to gather new information (Benyon, 2014). Within a semi-structured interview it is also possible to leave inappropriate questions out for some specific expert, or include additional questions (Van Teijlingen, 2014). There is chosen for interviews over a survey, because it is reasoned that with semi-structured interviews more qualitative information could be gathered.

Within a survey the input of the expert is limited and has a constricted way of sharing opinions.

Three semi-structured interviews are conducted for this research. All three interviews are conducted with different project managers of social innovation projects. The experts are initially requested to participate in the research via email. The elicitation sessions have been carried out during a conference call with the concerned project managers.

In the interviews, first an introduction is done and the interviewee is asked for consent to record the audio of the interview. Next, the goal of the study and the argumentation for the interview is explained. Then the interview is started and the expert is asked the questions that are documented. The complete interview protocol can be found in Appendix A.

### **Interview Results**

In this section the results that are found in the interviews are discussed. It is found during the interviews that there already was a focus on user engagement within the concerning projects. However, not many different methods for increasing user engagement were implemented yet. In the past, the project managers tried to motivate the users to keep using the project platform by playing on the feeling of being proud. If users were proud of using the application that is used for the project, they were more likely to spend time in the project environment. User engagement methods concerning social media have been adopted by some project managers in the past. It is attempted to let people share their activities within the social innovation project on social media like Facebook and Twitter. If these activities are shared on social pages, other people discover the existence of the project and might be motivated to join. It is considered that one cannot go without social media in this moment in time, but not all the people that a project might want to reach are accessible via social media. Another way that is sought to increase the user engagement within one of the projects is by letting people be part of the searching process. This project had the aim to create a network of data points. The user was motivated to contribute in the process of searching new data points. If a new data point was found, a proposal could be sent by using a form that was initiated by the project application. Also mentioned in the interviews is that the engagement process should be as streamlined as possible, rather than increasing user engagement on a massive scale at all costs. Furthermore, Google Adwords and other online advertisement methods are mentioned in the interviews as methods to increase awareness.

Non-technical methods to increase user engagement are the most used by the interviewed project managers. They indicate that those methods feel the most accessible, are not as costly, feel easy to implement, and have less restrictions. For example, mouth to mouth advertisements are used. This way of advertising help the project managers of the concerned projects to increase user engagement, and no costs are attached to this method. Not only the discussion of the project between private individuals are positive, but also between businesses and organisations are of great importance and a greater brand awareness is created. It came forward in the interviews that brand awareness is a concept being confused with the concept of user engagement. Both concepts are alike, but are more in a causal relation. If there is a higher brand awareness, user engagement might increase (Hutter, Hautz, Dennhardt, & Füller, 2013). Other non-technical methods that are mentioned are the use of Public Relations within the organisation, press releases, publishing in local media and giving interviews.

As mentioned before, social media is seen as a convenient way of increasing user



engagement. In a specific case that is discussed during the interview, the goal was to promote a mobile application. There was chosen for the use of social media because people use the mobile application when they have their phone in their hands. This is also the place where the main social media activities take place. It is an easy and free way of sharing information and integrating social media within a mobile application is quite simple and cheap. Advertisements on the other hand are very costly.

As mentioned earlier, there are a lot of different methods with the means of increasing user engagement that fall beneath the category of gamification. During the interviews this category of methods is also discussed. It became clear that gamification methods are not very popular within social innovation projects. The reasoning behind this is that the prices of implementing gamification elements or methods into a project can be very expensive. An application with gamification elements is costly to develop and maintain. Also, gamification methods can only be applied if it fits with the goal of the project. For example if the social innovation is a service users are just interested in the service, and nothing else. The interviewees also indicated that most social innovation projects have a limited budget, so that makes the search for the right method a lot more difficult.

All three experts pointed out during the elicitation sessions that for now no complex methods are used regarding user engagement. The decision making process on this matter is found to be a quite iterative process. During brainstorm sessions and meetings this topic has been mentioned. The experience is that this process just consisted of persons coming up with new ideas. Some research has been carried out, but no complex investigations took place in the different methods that are available. It also came forward that there was a slight sense of frustration within the organisations about the lack of user engagement. This led to start of the research and brainstorm sessions about new methods to increase the engagement in the first place.

The experts declared they had an interest in a tool or repository with methods to increase user engagement, and they would potentially use it. They stated that it would be effective to describe the aims of the methods and the way to implement different methods. It came forward that in the process of making the decision about choosing the method that suits a specific project best, an interactive tool with a search filter would be helpful. Also was mentioned that they were interested in seeing examples of how other organisations work and implement methods to handle the problem of a lack of user engagement.

During the interview is also asked what kind of information the experts would expect in such a repository. Mentioned was that the repository should at least consist guidelines on the implementation of the methods. Graphical models to support the guidelines were also considered to be convenient. However, the interviewees also voiced that these models should be kept simple. Also there is a need for a short summary in of the methods, following with a more elaborated description eventually. A technical description might also be helpful, but the managers argued that most project managers do not have a much knowledge about technical aspects. Therefore any technical description should be kept basic. The interviewees also mentioned they are interested to see the effectiveness and the complexity of the implementation the method and running the process, as this might influence which method they choose to implement. The experts also expressed the need for user feedback or testimonials on the methods in the repository. Lastly, live examples of implementation were also desirable.

To conclude, user engagement was identified to be a very big umbrella, with a lot of different methods and tools falling under this umbrella. Project managers of social

innovation projects have a hard time finding the right method for their project. In most cases, there is no budget, and no resources are available to use new methods or tools. For a small project, the main focus is not always on engaging new users, but building a higher quality project. The experts are interested in an interactive repository, because they do not know where to start the research in these methods right now. A repository would make the search a lot more convenient because all information is organised in one place.

#### **4.1.2 Requirements**

As mentioned before, requirements can be divided over soft requirements and hard requirements. Based on the information that is gathered during the elicitation sessions, requirements are drafted and divided over these two types.

##### **Hard Requirements**

For the repository itself, a filter tool is considered to be a hard requirement. An operational filter would be of great value in the repository. In this way the user is able to actively use the repository instead of finding the information manually. Therefore the repository should be automated.

For the methods, guidelines should be available in the repository, next to a summary or description. First a small description should be available with the option to view more elaborated information about the method. Also the complexity of implementation is a requirement that should be implemented.

There are some other factors that are essential for the repository. There should be a page available where the conditions that are used in the filter are explained. Next to that a page should be created where information about the goal and the creators of the repository are described. Next to that, a contact page with a functional contact form should be added. Such a page gives the user the opportunity to give feedback to the user and possible new methods could be proposed to be added to the repository. Also, possible questions that a user might have could be asked via this function.

##### **Soft Requirements**

A technical description is considered to be a soft requirement. Project managers have a aim to learn about the main information of the method, and specific technical implementation techniques are not desirable. This will be carried out by technical staff, after the research phase. Live examples and user feedback or testimonials are also requirements that would be nice if they are added, but not required for the system to work properly.

In table 1 a list of requirements with the corresponding identifiers is shown. In table 2 a list of needs with the corresponding identifiers is shown. In table 3 a traceability matrix is shown, which visualises how the different requirements cover the needs of the user.

Table 1: List of requirements with identifiers

	<b>Name</b>
R1	Operational filter tool
R2	Guidelines
R3	Description
R4	Complexity of implementation
R5	Explanation conditions page
R6	Goal page
R7	Page with info of creators
R8	Contact page
R9	Live examples
R10	User feedback/Testimonials

Table 2: List of needs with identifiers

	<b>Name</b>
TC1	Structured overview of information
TC2	How to Guide
TC3	Supported decision making
TC4	Graphical explanation

Table 3: Traceability matrix of requirements and needs

	TC1	TC2	TC3	TC4
R1	X		X	
R2	X	X	X	X
R3	X	X	X	
R4	X		X	
R5	X		X	
R6	X			
R7	X			
R8	X			
R9	X	X	X	X
R10	X		X	

## **Prioritizing**

Not all the requirements that are proposed have the same priority. First of all, hard requirements have a higher priority to be implemented than the soft requirements that are mentioned. Next to that, another hierarchy can be made within the hard requirements. The most important requirement is that the repository should be automated and be fully operational. The most important factor of this repository is that the structured information on all the different methods should be available. After that, a filter tool is needed. Additional pages like the explanation of the different conditions, the contact page, and the information about the goal and the creators are less important, and therefore have a lower priority.

### **4.1.3 Identifying potential improvements of the existing prototype of the repository**

As mentioned before, an early version of an automated repository has been created by Kampanos (2016). Due to time restrictions the content and the implementation of that prototype could not be implemented in its completion. The existing prototype has some potential improvements. These improvements are discussed in this section.

All the twenty-three methods that are discussed in this thesis are also described in the existing repository prototype of Kampanos (2016). However, the description of every method is short and little additional information for every method is present. There is a short textual description of an example, and no visual examples are shown, which are desired by project managers of social innovation projects. Also the experts that are interviewed for this bachelor's thesis mentioned that they would be interested in user feedback or testimonials. This is also a possible improvement that can be made from the current prototype. However, this function can only be applied after a complete implementation of the automated repository. After that, user feedback is needed in order to display this on the website.

There is a filter with conditions available. However, no project specific conditions are available. As has been found in the semi-structured interviews in section 4.1.1, there is a need to filter on specific conditions like the costs of a project.

Kampanos (2016) also mentions in his thesis that it "would be better to have more details for each category, the sample size and the project participants". This is also an improvement that can be made from the already existing prototype.

## 4.2 Implementing the repository of methods

As a result of this thesis, an automated repository is going to be implemented. The repository consists of methods to increase user engagement. There is chosen to build this tool in the form of a website, because websites are easy to reach for the user. In that way, no additional software has to be installed in order to use the repository. This achieves the effect of a low threshold of exploring the repository.

### 4.2.1 System Architecture

Based on the requirements that are drafted and the literature that is found for every method a system model is created. The system model is shown in figure 27. The model demonstrates the interaction between the different components in the system. First, the user sends a set of conditions to the repository. The user has the ability to check the boxes within the filter function of the repository and subsequently sends them to the tool. The online repository is a website that proceeds the search request to the linked database. The database responds to the request by passing the all the information to the filter. Here, only the methods that are valid for the concerning conditions are passed through to the repository. Finally, the repository shows the information of all the valid methods for the specific filter request.

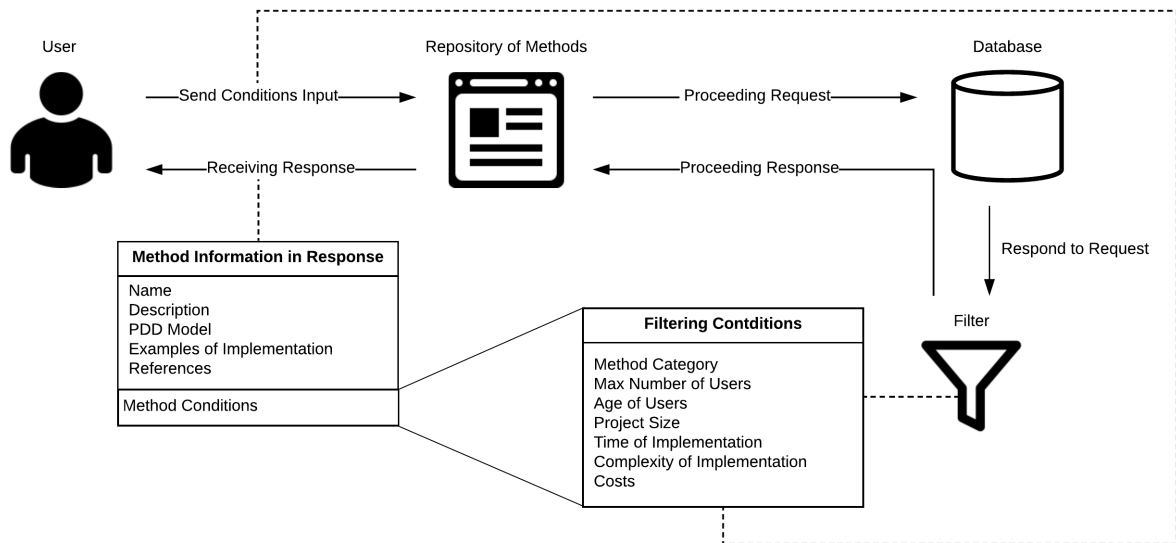


Figure 27: System Model of the Automated Repository

What came forward in the requirements and the findings of the previous prototype of the repository, is that the tool should at least consist of seven pages. A homepage should be available with general information and links to all the functions of the tool. Then, five additional main pages should be added. The first page that will be added is a page containing the filter function. On this page, all the filter conditions will be present. On the basis of ticking checkboxes the user will be able to activate certain filter patterns. By means of these checkboxes the results with the right methods will be displayed as modelled in figure 27. The methods that are a result of the filter function will be displayed on the same page with a concise description, and an option will be available

to show the elaborated information on those methods. Next to that, a conditions page needs to be available, where all the optional conditions of the filter are explained. A page containing information about the goals and the creator of the repository should be available. And lastly, a contact page needs to be present. The basic architecture is shown in figure 28.

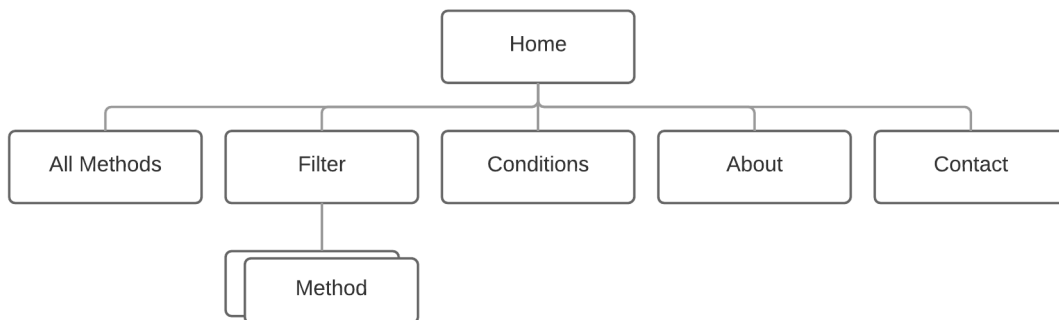


Figure 28: Site Map of the Repository

#### 4.2.2 Building the Repository

The building process of the repository can be divided over two different parts. First, all the information that is gathered on the different methods is structured in a database table. Next, the website is programmed. Both processes are elaborated in the sections below.

##### **Database**

The database for the repository is managed with a tool called phpMyAdmin (*PhpMyAdmin*, 2018). This software designed with the means of handling the administration of MySQL online. The software is written in PHP and MySQL is used to access the database. In order to use phpMyAdmin, the program files are downloaded and placed into the website directory. Next, the phpMyAdmin menu can be opened by navigating to the correct directory path on the website. In this menu a new database is created with an additional table. This table has a column for every condition or information element. Every row stands for a specific method that is present in the tool. The content of the database table is found in table 4. In this table every variable is shown in combination with its variable type. In the following section will be explained how the database is linked to the website.

Table 4: Variable names and variable types from database table

Variable name	Variable type
ID	int
Name	string
Description	string
PDD model	blob
Method category	string
Examples of implementation	blob
Examples of implementation (comments)	string
Max number of users	int
Max number of users (comments)	string
Age of users	range
Age of users (comments)	string
Project size (local)	boolean
Project size (national)	boolean
Project size (global)	boolean
Project size (comments)	string
Time of implementation	string (long, medium, short)
Time of implementation (comments)	string
Complexity of implementation	int (scale 1-5)
Costs	boolean
Costs (comments)	string
References	string

### Website

The website for the repository is created using HTML, CSS, PHP, SQL, and JavaScript. In this section every programming language that is used to create the repository is explained, and their usage is elucidated.

### HTML

HTML is used to create the basic structure and elements of the website. Also the main or static content of the website is programmed with HTML. Text that is written on the homepage, the contact page and the about page for example, is text that does not have to be altered. Therefore, this information is not placed in the database but is already pre-coded on the website. Overall, the *div* classes are used to separate different parts of the text, and according to these classes, different markup styles can be added with CSS. On the filter page, HTML is used to create checkboxes. These checkboxes are all placed in an array. This will be used in combination with JavaScript, and is explained in a later section.

### CSS

CSS is used as markup language. A disjointed stylesheet is added in order to apply changes for all the different pages on the website at once. In this stylesheet the layout of the page is programmed. Elements like the background, page margins, and text-styles are stated. Font-Awesome is used to create custom checkboxes on the filter page (*Font Awesome*, 2018). Also the navigation bar on top of the pages, the logo, the page footer,

and the page headers are styled within the CSS stylesheet. The layout of the form is also created with the use of the stylesheet.

### *PHP*

In order to establish a connection to the database PHP is used. The name of the database is mentioned in the code, together with the username and the password that is needed to login. Then, a small piece of SQL code is used to select all the information from the concerning table in the database. On the pages of every specific method PHP is used in the same manner. Also, if for example no PDD model is available for a method, PHP is used to display a default method. This is coded in order to ensure that no empty field is displayed.

### *JavaScript*

JavaScript is used to check whether a specific checkbox in the array is checked. The system monitors which checkbox is active and subsequently asks the database for the corresponding methods. Thereafter, those methods are set to show on the filter page.

## 4.2.3 The Repository Prototype

In figure 29 a screenshot of the filter page of the repository prototype is shown. However, this is not a finished prototype, and therefore is not published online.

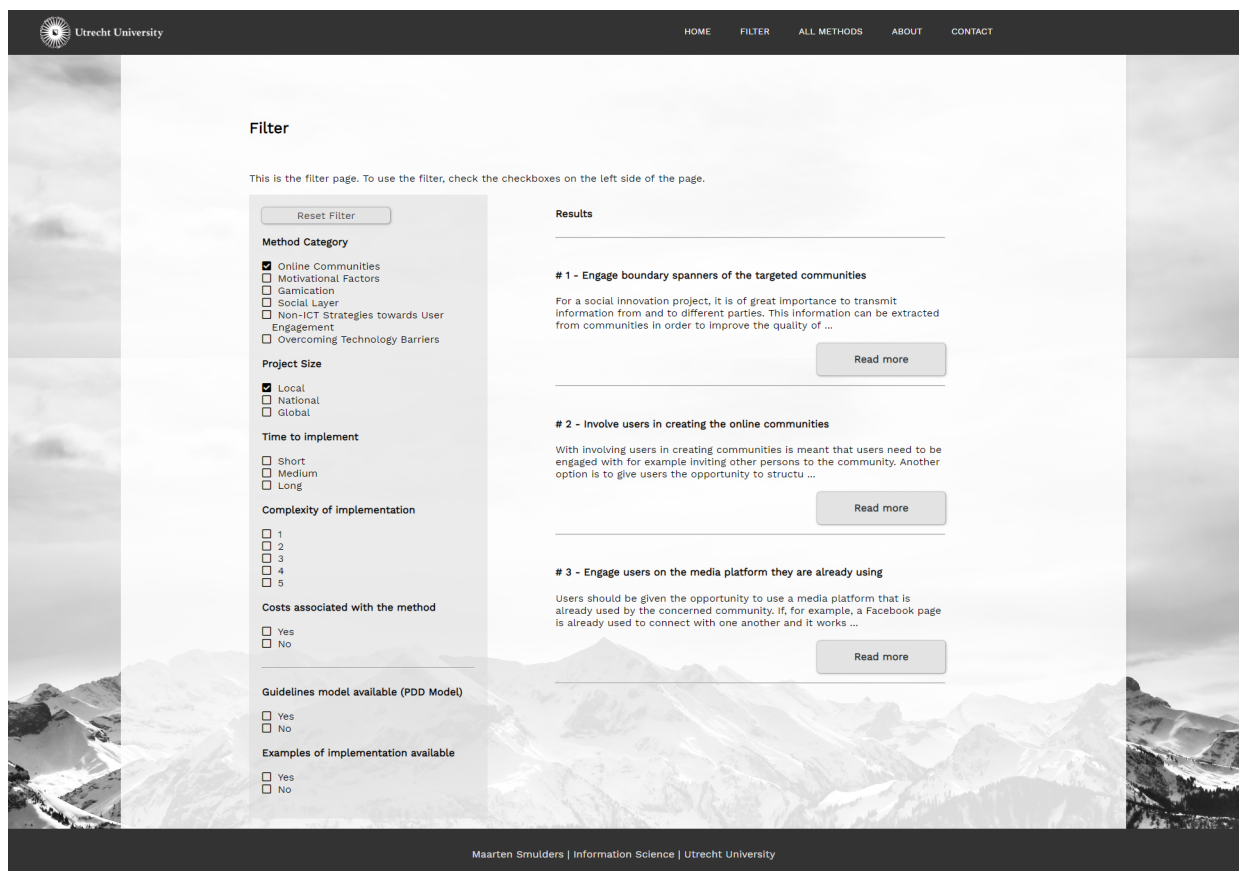


Figure 29: Screenshot of the filter page of the repository prototype



## 5 Discussion

The main goal of this bachelor's thesis was to build a repository of methods and tools in order to increase user engagement within ICT-based social innovation projects, that is detailed to an operational level and usable enough to be exploited by project managers. In order to conduct this, four research questions are formulated.

First, a systematic literature review has been conducted in order to find out how user engagement methods can be properly specified. For this research question, twenty-three methods are discussed and for every method there is sought to find the same type of information in literature. The found information is systematically structured and for the methods where enough information was available, a PDD model was created. Secondly, the requirements for an online automated repository are gathered. RE has been carried out through the use of semi-structured interviews of project managers of social innovation projects. Next to that, the prototype that is created by Kampanos (2016) is analysed and potential improvements of this prototype are identified. As third, a new prototype of an automated repository is build. First, a schematic plan for the system architecture is made and after that the development of the prototype is started. The automated repository is divided into a database with all the information of the twenty-three methods and a website with a graphical user interface.

It can be concluded that the main goal of this thesis is fulfilled partly. An automated repository with methods to increase user engagement is created, and can be exploited by project managers. The level of detail is higher and the tool is more sophisticated than the prototype that already existed. However, the repository is not online yet, and a lot of future work can still be done in order to improve and perfect the repository.

### 5.1 Implications

The search for the right conditions was difficult. There is no consistent information available about all the methods. Therefore, the information in the final prototype of the automated repository is not complete. During the programming of the repository another implication came forward. As mentioned earlier, PHP is used to retrieve information from the database, and subsequently JavaScript is used in order to display the methods in the user interface. However, combining PHP and JavaScript is not convenient. The reason for this is that PHP is a programming languages that operates server-sided, and JavaScript is a programming language that operates client-sided. Therefore, the decision has been made to programme some pieces of code directly into the script. No other convenient solution has been found.

### 5.2 Limitations

The final prototype of the repository has a lot of potential improvements. Due to time restrictions the prototype is not finished entirely, and therefore the treatment validation task of the Design Cycle (Wieringa, 2014) could not be carried out. Also, because not for every method the same information is found, the filter does not work in an optimal way.

### 5.3 Future work

For now, no user feedback or testimonials are implemented in the repository. This function can only be applied after a complete implementation of the automated repository. After that, user feedback needs to be gathered in order to display this on the website.

Also, in future work the conditions that are used to filter the methods in the repository could be linked to specific goals of the projects. For instance, gamification cannot always be applied to every project. Therefore a new filter condition could be introduced, namely the *project goal*.

Furthermore, the last two steps of the design cycle (Wieringa, 2014) could be carried out. These two steps are the treatment validation and the treatment implementation. First, if the prototype of the repository is fully functional, the prototype can be validated with project managers of social innovation projects. After the validation, possible changes could be made. After these improvements are made, the repository can be fully implemented.

Lastly, the repository could be expanded with more methods that can increase user engagement within social innovation projects.

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# Appendices

## A Interview Protocol

After introductions, the person is asked for consent to record the audio of the interview. If the person does not give consent, notes will be taken on the answers given during the interview. The goal of the study and the argumentation for the interview is explained.

### **Brief goal of the study**

For my bachelor thesis I'm conducting a research about twenty-three different methods to increase user engagement within social innovation projects. The goal is to create a repository with these methods, in order to support project managers in the decision-making progress.

### **Argumentation on the interview**

By conducting this interview, the intention is to gain information on the needs and expectations from possible users of the tool. In that way, a more complete set of requirements can be created.

Next, the following questions will be asked. The questions are formulated open-ended so that the player has the chance to speak freely about the subject without any restrictions.

*Q1: What can you tell me about the previous experiences you have with searching for and implementing methods to increase user engagement?*

If the methods that are implemented are unknown:

*Q2a: What methods did you use in your project in order to increase user engagement?*

In case the methods used are known, checking if some are missed:

*Q2b: The methods you used to increase user engagement are ... and ... . Are there any more?*

*Q3a: Why is there chosen for those methods?*

*Q3b: What were the most attracting elements of that/those specific method(s) for your project? Why?*

*Q3c: Were other methods not usable for your project? Why were they not appropriate?*

For every method that is mentioned in the previous question:

*Q4: Did the method work directly, or had some alterations being made after some time*



*had passed? What was the reason for this?*

*Q5a: How did you find the methods you used? Did you use a repository, did you conduct any research, or was a brainstorm session enough?*

*Q5b: What did the decision-making process look like?*

*Q5c: Were there any doubts on the chosen methods? Why?*

*Q5d: How could these doubts be taken away?*

*Q6a: If you could make the decision to choose between methods again, would you make the same decision? Why?*

*Q6b: If a tool was available when you had to make the decisions, would you use it to get a better overview of the different possibilities? Why?*

*Q7: I plan on creating a repository with methods to increase user engagement. Would you potentially use it?*

*Q8a: In such a repository, what information do you expect?*

If not answered in the previous question:

*Q8b: Would you expect information on the way a method should be implemented? Guidelines?*

*Q8c: How should those guidelines take form?*

*Q8d: Would you have the need to get a quick overview of the methods, or is it desirable to have an elaborate explanation of the method?*

*Q8e: Would you have the need for an interactive tool? E.g. filtering methods according to project conditions?*

*Q8f: What kind of conditions would you think are useful to filter methods with?*

*Q9: Do you have some recommendations for other project managers when searching for methods to increase user engagement?*