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DESIGNING AN M-GOVERNMENT SOLUTION: ENABLING COLLABORATION THROUGH CITIZEN SOURCING

Research

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Abstract

By combining openness with m-government, OECD and the research community envisage benefits, and action is called for within this field. The objective of this paper is to answer these calls and address the research question How to design a citizen sourcing m-government solution to facilitate collaboration between governments and citizens? An instantiation of a complaint and problem management solution is designed and evaluated using design science. The solution (named Munizapp) comprises a mobile application (app) and an integration platform (ePlatform). The app is the front-end for citizens, enabling them to report complaints and problems to municipalities. The ePlatform facilitates seamless two-way communication between the app and back-end case management system in municipalities. Different evaluation activities have been carried out that proved the enabling features of the solution for facilitating collaboration. Usability evaluation and knowledge gained through the research process provides new knowledge to citizen sourcing and m-government theory. One example is the need to expand citizen sourcing frameworks to also include stakeholders other than citizens and governments as well as the need to explicate value co-creation between all stakeholders touched by the solution. The paper ends with suggestion for future research on value co-creation.

Keywords: Citizen sourcing, design science, open government, value co-creation.

1 Introduction

In recent years e-government focus has shifted towards open government that emphasizes the empowerment and engagement of citizens in governmental activities (OECD, 2005; Obama, 2009). Aspects of open government are transparency, accessibility and responsiveness (OECD, 2005), and participation and collaboration (Obama, 2009). The expectations of the public sector to adhere to the aspects of open government are high (OECD, 2005). Kassen (2013) however, points out a paradox in the concept of openness, in that the traditional process of its realization is not in line with a citizen-centric approach but instead “driven by traditional top-down administrative commands or directives practically without any input from members of the civil society” (Kassen, 2013, p. 512). A main feature of open government is for governments to engage citizens in becoming more active in shaping of service provision and thereby co-create value (McColl-Kennedy et al., 2012; Prahalad & Ramaswamy, 2000). The co-creation concept itself strongly relies on the idea of interaction and joint activities as means for successful collaboration (McColl-Kennedy et al., 2012). In order to collaborate together with citizens, governments should strive to deliver citizen-centric, as opposed to government centric, e-services, (Soufi & Maguire, 2007; Dwivedi, et al., 2012). The potential of m-government to foster an open, responsive and transparent government is highlighted, together with a specific call to analyse, prototype and evaluate m-government services (OECD/ITU, 2011). The transformational effects on governments of combining m-government with open government are also noted within the research community (e.g. Sandoval-Almazan et al., 2012). The authors claim that these two trends together “have the po-

tential to transform the relationship between government and the public” (Sandoval-Almazan et al., 2012 p.1).

An approach for enabling open government is citizen sourcing (Lukensmeyer & Torres, 2008), which can function to enable collaboration between citizens and government. The most appropriate usage of citizen sourcing is, according to Linders (2012), by local authorities. Through citizen sourcing technology citizens can influence and “improve the government's situational awareness, and may even help execute government services on a day-to-day basis” (Linders, 2012, p.447). There is still, however, very limited research directed towards utilizing citizen sourcing in an open government context (Nam, 2012, Abu-El Seoud & Klischewski, 2015). More specifically, research on how to design citizen sourcing solutions and especially research presenting complete design cycles. Moreover, there is a shortage of research on how open government (Sandoval-Almazan et al., 2012), and citizen sourcing can be enabled through m-government services. The authors further state that there is a shortage of research on the development of apps (Sandoval-Almazan, et al., 2012). Proofs of concept and examples of how open government can be enabled by the development and designing of m-government services are therefore needed.

This research aim to develop an m-government solution that enables collaboration between local government and citizens through a citizen sourcing approach. This is made through pursuing the following research question.

How to design a citizen sourcing m-government solution to facilitate collaboration between governments and citizens?

By addressing the research question the paper contributes with a proof of concept on how citizen sourcing can be enabled through m-government thereby enabling collaboration between local governments and citizens. Further, this research shows that stakeholder perspectives should be more fine-grained and not only include citizens and governments as stakeholders in citizen sourcing.

This research builds on the work performed in an international collaboration project including a university, a consultant, ten municipalities and two software companies in northern Europe. The goal of the project was to develop a mobile complaint and problem solution that simplified the reporting of complaints and problems (issues) to municipalities.

This research follows the design science research methodology defined by Peffers et al. (2007). The paper is structured according to Gregor and Hevner's (2013) suggestion for presenting design science research. After this introduction we present previous and related research (section 2). The research method utilized in this research is described in section 3. The results from the research in form of a description of the artefact and results from evaluations of the artefact are presented in section 4. The results are discussed in section 5. The research is concluded and directions for future work are given in section 6.

2 Previous Research

2.1 Open Government and M-government

The expectations of the public sector to adhere to the aspects of open government are high (OECD, 2005). These include becoming more transparent and accessible regarding information and decision-making, as well as being responsive, collaborative and participatory towards both citizens and private businesses. Transparency includes transparency in data and information as well as in operations and decisions (Gavelin et al., 2009; Nam, 2012). Transparency is also about exposing governments to public scrutiny (OECD, 2005). Transparency in itself is not enough; information needs to be accessible from governments, giving easy access to services and information (Gavelin et al., 2009) whenever and wherever it is required (OECD, 2005). Responsiveness is defined as a government being open to new

ideas, demands and needs (OECD, 2005; Gavelin et al., 2009) and collaboration should actively promote citizen engagement (Obama, 2009). Through participation, citizens should be invited to provide governments with their shared wisdom and to participate in policy making to improve decision making within governments (Chun, 2010). The transformational effect of Web 2.0 technology on governments to promote civic engagement is stressed by Mergel et al., (2009) and Traunmóller and Wimmer (2009) among others. Crowdsourcing or citizen sourcing (Lukensmeyer & Torres, 2008) is also acknowledged as a Web 2.0 technology that enables open government (Dutton, 2010; Hilgers & Ihl, 2010; Nam, 2012). How open government is to be enabled by the design of specific solutions or how these solutions are developed and disseminated is however not clear. A trend for governments is to strive to deliver citizen-centric, as opposed to government centric, e-services, (Soufi & Maguire, 2007; Dwivedi et al., 2012). As noted by Kassen (2013) these efforts are also well in line with the aspects of open government. The author, however, also points out a paradox in the concept of openness, in that the traditional process of its realization is not in line with a citizen-centric approach (Kassen, 2013). This might be one of the reasons why the adoption and rate of e-service use by citizens remains at a low level. Research focusing on the design and evaluation of citizen-centric services could be a way forward in getting a deeper understanding of the adoption of e-government and what role IT-artefacts have in this process.

Mobile technology can facilitate governments in responding to demands for openness (Trimi & Sheng, 2008; Misuraca, 2009). This is because, compared to e-government, m-government has the potential of (i) offering genuine two-way communication; (ii) improving the delivery of government information and services to citizens; (iii) helping to overcome internet connectivity problems and digital divide issues, and (iv) increasing the efficiency and effectiveness of government employees (Trimi & Sheng, 2008). M-government also increases the accessibility of government services, by not only making them available “anytime” but also from “anywhere” (Kumar & Sinha, 2007). Hung et al. (2013) explored acceptance factors by sending a questionnaire to users of m-services offered by the Taiwanese government. The success factors for citizen acceptance of m-government services are found to be similar to those for traditional e-services (Hung et al, 2013). Interesting to note is that both challenges and potentials with m-government are to a large extent visionary and high-level. There is little research investigating design of m-government solutions or outcomes in terms of benefits or value co-created, especially on a deeper level that visualize the underlying complexity of collaboration between included stakeholders.

2.2 Crowdsourcing and Citizen Sourcing

Crowdsourcing is a participative and online activity where stakeholders make open calls to a group of people, a crowd (Estellés-Arolas & González-Ladrón-de-Guevara, 2012). Crowdsourcing for the public sector, citizen sourcing (Lukensmeyer & Torres, 2008), is acknowledged as an approach for enabling open government (Dutton, 2010; Hilgers & Ihl, 2010; Nam, 2012). Hilgers and Ihl (2010, p.72) define citizen sourcing as “the act of taking a task that is traditionally performed by a designated public agent (usually a civil servant) and outsourcing it to an undefined, generally large group of people in the form of an open call”. The authors further state that citizen sourcing can offer governments new possibilities to co-create value together with citizens through incorporating external actors into administrative processes in a systematic way. Citizen sourcing could thereby be a fruitful way to deliver citizen-centric services instead of government centric. Several authors have presented frameworks for citizen sourcing, as depicted in table 1.

| Perspective | Description | Reporting solution | Author |
|-------------|---|--|------------------------|
| Governments | A framework for citizen sourcing has to include three dimensions, Citizen Ideation and Innovation, Collaborative Administration, Collaborative Democracy. | Citizen Ideation and Innovation: FixMyStreet | Hilgers and Ihl (2010) |

| | | | |
|---|---|--------------------------------------|--------------------|
| Citizens to Governments or Governments to Citizens | Depending on the nature of the collaboration, it can either be led by the government or by the public. | Community led: FixMyStreet | Lee et al., (2012) |
| Governments as beneficiaries. Citizens as providers | Three types of citizen sourcing are identified. Service Design, Service Monitoring, Service Delivery and Execution. | Monitoring: SeeClickFix, FixMyStreet | Linders (2012) |
| Governments | Three dimensions for citizen sourcing initiatives. Purpose, Type of Wisdom collected, Strategy together with a framework for evaluation of citizen sourcing solutions including Design Evaluation, Process Evaluation and Outcome Evaluation. | N/A | Nam (2012) |

Table 1: Frameworks for Citizen Sourcing

According to Linders (2012) governments should retain the main service responsibility in citizen sourcing, although citizens can influence and “improve the government's situational awareness, and may even help execute government services on a day-to-day basis” (Linders, 2012, p.447). In line with this Dutton (2010) suggests that citizen sourcing is a network of individuals that must be managed. In order for the public sector to utilize this network, structured technical platforms and management strategies are necessary (ibid). Lee et al., (2012) on the other hand state that two types of networked governance are possible depending on the nature of the collaborative arrangement, government-led and community-led.

Important aspects required for a citizen sourcing solution to be functional, according to Nam (2012) are moderation possibilities, the usability and interface of the citizen sourcing solution, as well as having an infrastructure of engagement that supports efficient, effective citizen-government interaction and communication and also clear open government policies that are enforced. Nam (2012) thereby implies that citizen sourcing is government-led and leaves out the community-led solutions. The other frameworks put solutions for monitoring (Linders, 2012), ideation and innovation (Hilgers & Ihl, 2010) as community led citizen sourcing. Two prominent examples brought up by several authors are FixMyStreet (www.fixmystreet.com), and SeeClickFix (seeclickfix.com). Both initiatives are community led and are intended for reporting and discussing of local problems in the environment. FixMyStreet was launched in Sweden in 2013 while SeeClickFix is not available in Swedish and thereby not a viable option for Swedish municipalities.

3 Method

3.1 Research Setting

Municipalities in Sweden aim to use citizens as ears and eyes to report problems in the environment, but also to get feedback and ideas to improve the internal work within municipalities. In order to do so a large amount of municipalities already have e-services or digital forms on their homepages where citizens can report problems and sometimes also provide feedback, complaints and opinions. It is also possible to call, send a letter, or in several municipalities, use a mobile app for the same purpose. The services are often integrated towards a case management system (CMS) where municipal employees can handle the issues. Complaint and problem management is one of the most common e-services offered by municipalities in Sweden, however the front-end for submitting complaints and problems should be available at the time of discovery of the problem (Juell-Skielse, 2010).

Complaint and problem reporting was deemed suitable service for developing an m-government citizen sourcing solution in this research. This was due to two main reasons: The first reason is, the nature

of the service implies that situated knowledge and wisdom can be collected from an undefined crowd (citizens) thereby it is regarded as a suitable citizen sourcing service. This is supported by the service of problem reporting is regarded as a suitable citizen sourcing example in previous research (Hilgers & Ihl, 2010; Lee et al., 2012; Linders, 2012). The second reason is that the front-end submitting complaints and problems should be available at the time of discovery of the problem and therefore suitable as an m-government service.

Swedish governments are autonomous and, to a large degree independent. This is especially true when it comes to local governments, Sweden has 290 municipalities; all are self-governed and autonomous. They also have their own infrastructure and offer their own e-services towards their citizens. It can be argued that the autonomy is a hindrance in the development of e-participation as well as reaping the benefits of digitalization in regards to effectiveness and efficiency. In order to address these weaknesses a strong emphasize on user centric development is promoted from the Swedish government.

3.2 Research Process

Design science was regarded as a suitable research method in this research since, in accordance with Hevner et al., (2004), the aim was to design and evaluate an information system artefact addressing an organisational problem. The type of artefact designed and evaluated is an instantiation i.e. an m-government solution for complaint and problem management. The research follows the six steps of the design science research process proposed by Peffers et al. (2007); the process followed is shown in figure 1.

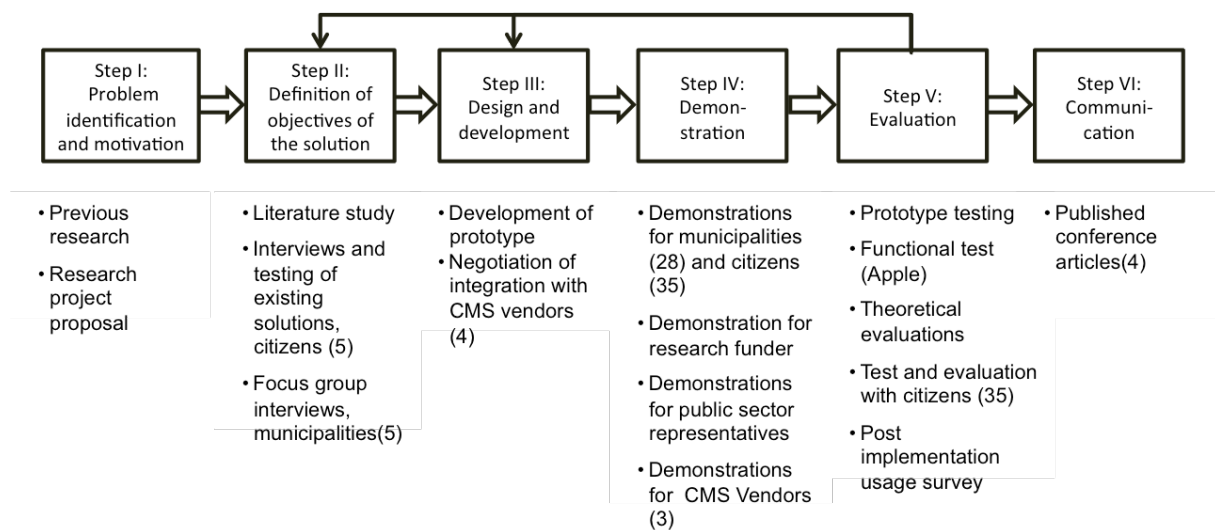


Figure 1. Research process and activities. Adapted from Peffers et al. (2007, p. 54)

3.2.1 Step 1: Problem identification

The design problem in this research is how to design an m-government solution that enables citizen sourcing and thereby facilitates collaboration between local governments and citizens. The theoretical motivation of the problem builds on previous research by Sandoval-Almazan et al. (2012) and Juell-Skielse (2010) among others. The practical motivation is the need to improve existing solutions used by Swedish municipalities to use citizens as providers for monitoring, in line with the suggestion by Linders et al. (2012). Important aspects of the development of the solution were to use a citizen-centric approach and also to have a nationwide coverage, i.e. including all municipalities on one front-end app, also the solution should be free of charge for citizens.

3.2.2 Step II: Definition of Objectives of the Solution

In line with Hevner et al. (2004), who view design science as a search process, the identification of solution objectives was conducted iteratively. First a literature study was conducted to investigate already existing knowledge within e- and m-government, as well as crowd- and citizen sourcing. Based on the literature study high-level requirements for the solution were formulated. Interviews with citizens and the testing of existing solutions gave additional input (Taklimouglu, 2012). To create a broad understanding of the problem that the solution aims to address, and to gather further requirements for the solution, focus group interviews were performed with five municipalities. The focus group interviews allowed for conversations about particular topics between chosen individuals (Beck et al., 1986) where the participants concentrated on a shared activity (Kitzinger, 1994). The focus groups sessions in this research were organized through ten workshops with municipality officials at the five municipalities. All of the participating municipalities showed interested in the research project and volunteered to participate. The municipalities were all interested in implementing complaint and problem management as an m-service.

The municipality officials who participated in the workshops were selected through purposive sampling. A high level official from each municipality made the selection of relevant participants from their municipality. The municipal officials that participated were in different roles, such as administrators, registry clerks, chief information officer and chief financial officer. The administrators and registry clerks involved all worked with complaints and problems in their municipality. The number of municipal officials that participated in the workshops varied from two and ten persons, and the number of researchers participating varied between two and three. In total 41 officials participated in the workshops. The agenda for each municipality was structured in the same way. First, all workshop participants introduced themselves. Secondly the research project was presented, and the m-government solution was discussed. The current municipal processes for complaint and problem management were analysed. The agenda ended by analysing the potential process for complaints and problems, with the app included as a new input channel. The empirical material gathered was used to define objectives for the solution from which solution requirements were formulated.

3.2.3 Step III: Design and Development

The m-government solution was developed iteratively and three prototype versions was developed: (i) an app, (ii) the app integrated with an ePlatform, (iii) final solution integrated with a case management system. The first version of the prototype was developed based on initial knowledge about the problem. The design of the solution was improved in the second and third version of the prototype alongside widening and deepening the understanding of the problem domain through the aforementioned workshops with municipalities. Results from evaluations of the prototype versions also contributed to improvements in the design. An important activity during the design phase was to discuss integration towards municipal CMS systems. The formulation of objectives for the solution concluded that integration between front- and back-end was of high priority for the solution to be usable. In total four different CMS vendors were participating in the discussions and negotiations for integration of the solution towards their systems.

3.2.4 Step IV: Demonstration

The solution was demonstrated for municipalities included in the project, and also for other municipalities and citizens, as well as the research funder and public sector representatives. Three CMS vendors showed interest in incorporating the solution into their existing CMS offering and the solution was therefore demonstrated for these vendors.

3.2.5 Step V: Evaluation

According to Gregor & Hevner (2013), an artefact is evaluated to ensure that it is relevant and useful by demonstrating that criteria such as validity, utility, quality and efficacy are fulfilled. Depending on the type of artefact and problem, evaluations can be performed in many different ways, by using different methods (Peppers et al., 2007; Hevner et al., 2004). In this research experimental, test and descriptive evaluation, in accordance with Hevner et al. (2004) was conducted. The evaluations methods used and activities conducted are compiled in table 2. The three first are ex-ante evaluations and the fourth is ex-post evaluation (Pries-Heje et al., 2008), i.e. during and after design (ex-ante) and when in use (ex-post).

| Evaluation method | Evaluation Activity | Type of evaluation |
|---|--|--------------------|
| Controlled experiment, simulation and functional black box test | Iterative prototype testing by project participants Functional test of final prototype by Apple | Ex ante |
| Informed argument | Theoretical evaluation of prototype from an open government and citizen sourcing perspective. | Ex ante |
| Scenarios | Demonstrations, tests and evaluations of final prototype version with citizens. | Ex ante |
| Survey | Interviews with vendor and municipalities and web page survey. | Ex post |

Table 2. Evaluation methods used and evaluation activities performed.

The software companies responsible for development of the solution performed controlled experiments and functional black box tests of the app and the integration continuously during the development. Beta versions of the app were distributed to project team members to perform simulations and functional tests of the solution. Apple also performed functional tests of the app. Before Apple publishes apps in the App Store they review them on “technical, content and design criteria” (Apple, 2013).

A descriptive evaluation was also performed by evaluating the solution from an open government and citizen sourcing perspective (Uppström & Lönn, 2013) using a framework suggested by Nam (2012). By interviewing citizens after executing scenarios in the solution additional descriptive evaluations were performed. A total of 35 citizens participated in the evaluation.

Approximately two years after the solution started its commercial afterlife, a post implementation usage survey was conducted. This was made through contacting the two vendors responsible for the front- and back-end solutions. Municipality webpages was also surveyed to investigate the usage of mobile apps for citizen sourcing monitoring services; both Munizapp and other solutions were included.

3.2.6 Step VI: Communication

To communicate the result of the research project four research articles have been published and presented at Information Systems conferences (Lönn & Uppström, 2013a; Lönn & Uppström, 2013b, Uppström & Lönn, 2013, Uppström & Nilsson, 2012). This paper is also a part of communicating the solution.

4 Result

In this design science research paper the result consist of a description of the artefact and the findings from the evaluation of the artefact.

4.1 Artefact Description

The solution comprises an app and an e-platform allowing integration with municipalities back-end systems. Complaint and problems, such as broken street lamps or potholes, can be reported to municipalities by using the app on a mobile unit. It is also possible to send in opinions, questions or give other feedback to municipalities through the app. In the remaining description of the solution, complaints, problems, opinions, questions and feedback are at times replaced with issues.

A report created in the app can include photographs, a title and a description of the issue and a global positioning system (GPS) position viewed as an address. Photographs and positions are optional to include in a report. When sending a report to a municipality the user is presented with the option to share the report on Facebook. Reported issues are stored in a private list with issues ('my reported issues') in the app, in this list with issues the user can see the status of issues, and receive and view confirmations and replies from the municipality. Confirmations are notifications sent by municipalities informing users that issues has been received and replies are municipalities' answers to an issue. Citizens can also see, in a public list and as pins on a map, what other citizens have reported. It is also possible to see the status of public issues, and by a voting function citizens can agree with issues reported by other citizens and see the vote count for issues. Municipality officials review issues before publishing them as public issues. Issues marked as public are made visible for everyone using the app, and private issues are only accessible by the user that reported the issue. By reviewing issues before publication ethically sensitive information being published can be avoided.

Municipalities can customize the solution through configuration options in the app. Municipalities can chose to display their logo together with municipality name in the app. A list with administrative units can also be included and configured in the app. When the administrative unit list is enabled in the app the user chooses a unit from the list when creating a report, thereby indicating what unit the issue should be sent to. A list with issue types used for categorizing issues is also configurable in the app. Examples of issue types are complaints, problems, questions, opinions and other feedback. Further, municipalities can choose to enable or disable the vote function.

It is possible to use the app to report issues to several municipalities. The user selects a municipality from a list with enabled municipalities. The app is hence prepared to include all Swedish municipalities, and thereby one app for potentially all municipalities in Sweden has been developed. Citizens who move across municipal geographic boundaries and want to communicate with several municipalities thus only have to download and use a single app. The aforementioned configurations are municipality specific; various functions can be enabled or disabled depending on the selected municipality in the app. The app is free of charge for users to download, and are available on iPhone and Android devices.

The ePlatform and the open integration API enables the app to be integrated towards any municipality CMS. Reported issues can thereby be automatically registered in municipalities systems and municipal officials can send status updates, confirmations and replies to the app through their own systems. Citizens who report issues on their mobile device receive status updates, confirmations and replies automatically. The unique ID of mobile devices is used to route the communication, this enables citizens to be anonymous and receive communication from municipalities without adding personal information in a report or register before using it. The integration between the ePlatform and CMS system is enabled through standard communication protocols, secure HTTPS, and web services. One CMS vendor has built a complete integration using the open API.

The ePlatform also functions as a case management system with a process for handling complaint and problems implemented. The solution can hence be offered with back-end support integrated with the app. Another solution is to send issues via e-mail through the ePlatform, however this solution does not enable two-way communication.

The solution architecture in figure 2 shows the three parts of the solution.

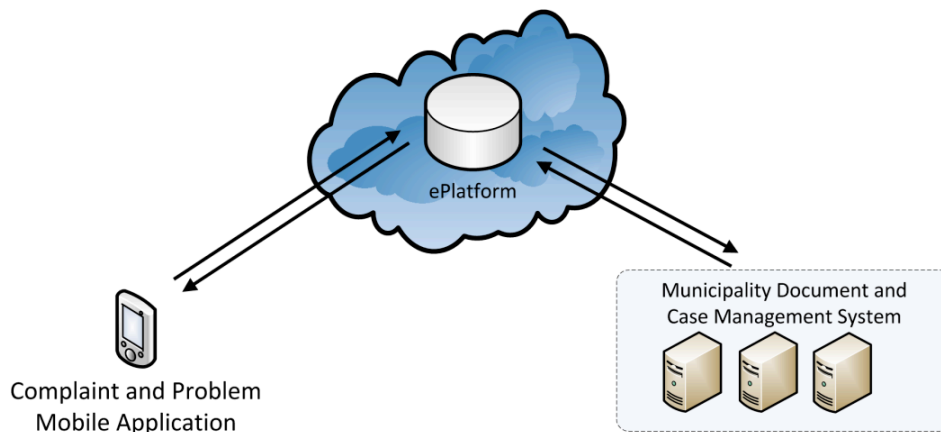


Figure 2. Solution Architecture

4.2 Evaluation

Several evaluation activities took place during the research process, and also after the solution were released to the Swedish market. During the controlled experiments and functional test of the solution, suggestions for improvement and issues with the solution such as bugs, errors, performance issues and malfunctions were found and fixed by the developers.

The theoretical evaluation shows that the solution has functionalities supporting transparency, participation, collaboration, accessibility and responsiveness. The appropriateness of the technical solution in supporting open government is thus confirmed. The appropriateness of the solution from a citizen sourcing perspective was also evaluated by using a citizen sourcing framework proposed by Nam (2012). The evaluation shows that the functional design of the solution is appropriate whereas there are potential weaknesses in the sociotechnical, procedural and open government policy designs (Uppström & Lönn, 2013).

The descriptive evaluations show that the citizens perceived the app as simple to use and that its purpose is clear. They also regarded it beneficial to be able to use a mobile channel to report complaints and problems to municipalities, and that it was valuable to see what other citizens had reported. The citizens believed that the solution contributes to making the municipalities work more open, and that it increases accessibility to municipalities. Citizens also found it valuable to see what issues municipalities had fixed and to receive responses from the municipality via the app. Citizens also found it valuable to be able to be anonymous when reporting complaints and problems.

One design objective was to design an app that could include all Swedish municipalities, but it became obvious in this research that different municipalities have different needs. To tackle the different needs of the municipalities involved, configuration possibilities had to be built into the solution. By configuring the solution, municipalities can customize it to improve the fit between the municipality's needs and the solution. This is an important lesson for future m-government services. It is also a difficulty since the configuration possibilities might create a less user-friendly interface for citizens.

The observational evaluation of the usage of the solution in practice was made approximately two years after the solution was released for the Swedish market. One Swedish CMS system vendors have developed integration between system and the solution, although dialogues with four vendors were held during the development of the solution. A survey of the municipality usage shows that the app is offered by nine Swedish municipalities, five out of these nine municipalities have received several hundreds of reports made by their citizens. Examples of types of reports are (i) reporting of issues in the municipal environment e.g. broken streetlights, fallen trees and snow plowing. (ii) Suggestions for improvement e.g. environment and websites. (iii) Reports of regulations broken and (iv) questions and

requests for information e.g. Is there a music school available in the municipality? All these five municipalities are users of the CMS offered by the only vendor that offers integration towards their CMS. None of these municipalities participated in the design of the solution, which point towards the solution being inclusive and able to cover the needs of Swedish municipalities. It also confirms the necessity of using complete solutions with front- and back-end compatibility. Integration with CMS is proved to be an imperative.

The evaluation of the solution confirms the validity and the quality of the designed artifact in regards to solving the problem stated, i.e. to enable collaboration through citizen sourcing. It does however, also point towards the utility and efficacy of solution being dependent on several aspects. The functionality is found to enable collaboration between citizens and governments on a high level but it is also dependent on a third stakeholder, the CMS vendor. In regards to utility of the solution the evaluations to some extent deviate, if the appropriateness is considered, the utility is high. In terms of use it can be considered doubtful since only 9 municipalities out of 290 uses the solution. When knowledge is considered our artefact shows how an appropriate solution for citizen sourcing can be designed, this can also be considered a utility.

5 Discussion

In this section the knowledge gained from the design science research process is discussed and implications for practice and research is highlighted.

5.1 Practical Implication

The solution offers several potential benefits for citizens, especially in regard to transparency, availability and accessibility. The solution clearly facilitates the reporting of complaints and problems and thereby potentially improves the environment and the quality of municipal services. The solution can facilitate municipalities in making more accurate assessments of actions that need to be taken to fix a problem due to the enhanced information quality from utilization of app technology such as the inclusion of pictures and geographical position in a report. The solution enables municipalities to be informed about problems by the public. The solution thus reduces the need for municipalities to spend resources on identifying problems themselves.

By making a service for reporting complaints and problems available through mobile devices that service is available to more people than corresponding e-services, thus potentially reducing the digital divide. This is also further strengthened by offering one app for all citizens instead of specific apps for different municipalities. The solution highlights potential risks and also a number of challenges, especially from a municipality point of view. These risks and challenges are, to a large extent, associated with the facilitation of open government through the m-government solution and there are risks associated with all aspects of open government examples include making it easier for citizens to communicate with municipalities, which presents a risk that municipalities will not be able to handle the new information flow. Municipalities fear that dogmatists and spam will become a problem due to new demographic of citizen who does not traditionally engage in communication with the municipalities, but are frequent users of mobile devices (youngsters) will be invited to report complaints and problems through the solution.

There are also privacy and ethical risks with the solution. There is a risk that if people use the app to send in ethically sensitive information, this information could become available to the public. Another risk with the solution is that personal information could become available to the public, thus violating the privacy of individuals. To reduce the risk of publishing personal information to the public citizens do not need to provide personal information when reporting a complaint or a problem. The solution uses the unique id of the mobile device to communicate, thereby enabling replies to be sent to citizens without providing personal information. The mobile communication channel thereby offers the possibility of anonymity. To further reduce the risk publishing ethically sensitive information moderation

functionality is built in. Municipalities need to review and approve complaints and problems before they are published, for example. On the other hand this might create bottlenecks in publishing issues, which in turn might lead to redundant issues being reported. This balance between transparency and the protection of citizen's privacy is something that needs to be considered when developing solutions for open government.

5.2 Theoretical Implications

This research contributes with a proof of concept of how citizen sourcing can be enabled through m-government. This research thereby contributes with a proof of concept that the combination of m-government and citizen sourcing enables collaboration between citizens and local governments. Research directed towards developing and utilizing citizen sourcing in an open government context is limited (Nam, 2012; Abu-El Seoud & Klischewski, 2015), one exception is de Reuver et al (2013) who report from a design study developing a mobile front-end solution for incidents reporting as an extension to an existing e-participation solution developed for German governments. The focus is mainly business modeling and only the first three stages of a design cycle is included, also the focus is on the front-end mobile app, while processes and back-end is left outside the scope of the paper (de Reuver et al., 2013). This study presents a complete design cycle of a citizen sourcing solution where front- and back-end is considered; it therefore complements and extends earlier work on realization of citizen sourcing through mobile technology in open government. The theoretical contribution of this research is also within the realm of m-government by answering the call from Sandoval-Almazan et al. (2012). This research provides a practical example of how it is possible to combine open government with m-government and thereby provide the potential to transform a traditional government service to one carried out by citizens.

The ex post evaluation of the usage if the solution shows that the municipalities using the solutions are customers to the only CMS vendor offering the solution together with their CMS. Further, the users of the solution are not the same municipalities that participated in the development of the solution. This implies that CMS vendors have a greater impact on utility and adoption compared to participation in the design process and power to impact the functionality of the final solution. This makes it imperative to consider the vendor stakeholder perspective in the development of citizen sourcing solutions. This has not been addressed by previous researchers who have mainly focused only on citizens and public organizations (e.g. Hilgers and Ihl, 2010; Lee et al., 2012; Linders, 2012).

How and by whom the solution is used among citizens and municipality employees are not clear and needs further investigation. Also the dissemination of the solution in a larger scale has not (yet) happened and the reasons remain unclear although it does not seem to depend on the appropriateness of the solution for the intended use. The solution as a design science artefact is thereby considered to provide utility in some aspects while utility in other aspects is unclear. The utility concept in itself then becomes ambiguous and dependent on aims and intentions of developers, user and other stakeholders motivations.

This research also provides a different perspective to the problem of citizen centric development as pointed out by Kassen (2013) among others. Previous research states that an issue with e-government development is that the focus is government centric instead of citizen centric (Kassen, 2013, Millard, 2010). In this research a third stakeholder i.e. IT vendors impact the adoption of the solution by municipalities and citizens. We thereby agree with Axelsson et al. (2013) and Flak et al. (2007) about the need to consider several stakeholders in e-government development and also that the inherent win-win situation between government and citizens is problematic. Citizens and governments as stakeholder perspectives do not suffice instead a more considerate and fine-grained level needs to be used to provide valuable insights. This is also in accordance with Balta et al. (2015) who state that the management of stakeholder interest and motivation (including IT-vendors) as well as how they influence each other should be carefully considered when developing e-government services.

Another important aspect that is emphasised in our findings is the aspect of value co-creation in collaboration. Value co-creation relies heavily on the value creation during joint efforts and all participating stakeholders participate and receive value from the collaborative arrangement (Madhok & Tallman, 1998). When engaging in collaborative activities stakeholders have the opportunity to take an active part in coordinating actions, learning and influencing each other directly (Grönroos, 2011). In our study it seems obvious that the incentive for CMS vendors to participate in the collaborative efforts are not enough. Only one out of four CMS vendors decided to actively participate and provide input to the collaboration, the others declined. This implies that further effort is needed in establishing motivational factors, such as benefits for stakeholders other than public organisations and citizens. This is in line with McColl-Kennedy et al., (2012) who, in a health care collaboration study points out that it is often overlooked that there are multiple stakeholders who have to create the environments in which collaboration and value co-creation can take place.

Other important lessons learned are connected to integration issues which can be regarded as necessary for creating the environmental conditions necessary for collaboration and value co-creation (McColl-Kennedy, 2012). It became clear that there are challenges hindering the municipalities in systematically handling reported complaints and problems. At the beginning of the research project the researchers assumed that municipalities in Sweden would have streamlined processes for handling complaints and problems, and that a new communication channel (m-service) for complaints and problems would be easily added to the existing processes. This assumption was proved to be wrong. One of the main issues that will create difficulties involves integration with municipal CMS systems. It was deemed impossible to develop integration with all CMS systems in Sweden, since there are too many different systems in use. If a municipality wants to adopt the solution and enable two-way communication with a specific CMS system not already integrated with the solution, integration needs to be developed, which is associated with a certain cost for the municipality. This affects the transferability of the solution. Several municipalities utilize a number of CMS systems within one municipality, which can have an impact on the usability of the solution. That the solution is built on open standards, using web services that can be replicated, facilitates the ease of building integration with several CMS systems within one municipality, but there is then a risk that data is duplicated and that the solution does not contribute to a more streamlined process for handling complaints and problems. The same integration issues can be expected in any m-government service built for municipalities.

6 Conclusions and Future Research

This research contributes to citizen sourcing by presenting a complete design cycle of the development of an m-government citizen sourcing solution. The evaluation also shows that the solution enables open government. This research is thereby a proof of concept that the combination of m-government and citizen sourcing is fruitful for enabling collaboration between citizens and local governments. The utility concept in design science evaluation is considered ambiguous and how to regard utility when designing e-government artefacts should be investigated in future research.

Integration and configuration is concluded to be important aspects when designing citizen sourcing solutions. To consider both front- and back-end functionality is also found to be important. Based on the evaluation of the developed solution, we also conclude that IT vendors can have an impact on the adoption and diffusion of e-government. It therefore becomes important to consider all stakeholder perspectives when designing and evaluating citizen sourcing m-government solutions. Further, this research concludes that existing frameworks on citizen sourcing need to be complemented to also consider the IT vendor perspective, how this should be done and to what extent needs to be further investigated in future research.

During the research project private IT vendors have developed additional m-government solutions for problem management and reporting. Future research should investigate and compare these solutions, using this research to deepen knowledge on designing m-government solutions and co-create value.

The inclusion of other solutions also provides an opportunity to investigate the motivations for IT vendors to develop citizen sourcing solutions and how this affects the adoption and usage. How the solutions are used (e.g. types of issues reported, by whom, response time etc.) by stakeholders and how this affects the relationship between them will also be included in future research.

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