# Engaging Citizens in the Smart City through Participation Platforms: A Framework for Public Servants and Developers

Anonymous Authors

## Abstract

Smart cities refer to the application of information and communication technologies to improve the quality of life of citizens. Smart city projects may fail if citizens do not actively participate in their design. In smart cities, this participation often occurs through dedicated participation platforms where citizens can vote, discuss, and submit ideas. However, current platforms are not always aligned with the requirements of citizens in a representative way. Furthermore, they are neither always aligned with the reality of the administration and the requirements of public servants.

In this paper, we examine what characteristics a participation platform should possess to be aligned with the requirements of citizens and public servants. A quantitative survey of citizens and qualitative interviews of several public servants are performed to elicit those requirements. The most important requirements for citizens are free access, user friendliness, and government usage of the ideas while the most important for public servants are the representation of the city’s identity, back-end functionalities, and inclusivity. Afterwards, a guiding framework, following Design Science Research, is composed based on the requirements and applied to the platform *LeuvenMaaktHetMee*. Furthermore, the framework updates the founding framework of Macintosh and Whyte from 2008, allowing to guide the development and implementation of participation platforms.

KEYWORDS: Smart City; Citizen Participation; Participation Platform; Citizen; Public Servant; Design Science Research.

# Introduction

Smart cities emerged as a consequence of the continuous urbanization development and the growing population in urban areas (Chourabi et al., 2012; Osman, 2019). Indeed, urbanization leads to several environmental, economic, and social sustainability challenges (Bibri, 2018). Smart cities aim to mitigate these challenges to ultimately improve the quality of life of citizens. Bibri & Krogstie (2020) state that a city becomes a smart city when it can develop and implement innovative solutions, underpinned by innovative technologies and revolutionary scientific knowledge. In other words, a city becomes “smarter” by developing and implementing data-driven solutions to facilitate, monitor, understand, analyze, plan, and optimize its operations, functions, services, policies (Zhuhadar, Thrasher, Marklin, & de Pablos, 2017). Several stakeholders are involved in smart city development such as political representatives, public servants, businesses, universities and citizens (Axelsson & Granath, 2018).

Too often smart cities have not reached their objectives because they did not take into account the needs of citizens and pushed technological solutions without taking into account the specificities of their territory and the people living in it (Dameri, 2014). Numerous participation methods have been put forward to enable the participation of citizen in smart city design (Simonofski, Asensio, De Smedt, & Snoeck, 2017). The concept of “citizen participation” (Arnstein, 1969) is not new, but technology shed a new light on the concept, which led to the concept of e-participation (Macintosh, 2007; Naranjo Zolotov, Oliveira, & Casteleyn, 2018). The latter is conceptualized as being dual (Lee & Kim, 2014; Porwol, Ojo, & Breslin, 2016). The first side involves government-initiated services, the second one citizen-initiated services. The most popular government-led participation method in smart cities are participation platforms as detailed by Berntzen and Johannessen (2016). These online platforms allow citizens to submit their own ideas, vote for their preferred ones, and discuss these ideas with each other. These platforms have several advantages for society and citizens. Thanks to citizen participation through platforms, governments can benefit from relevant information to design and improve their smart city projects (Simonofski, Vanderose, Clarinval, & Snoeck, 2018).

However, several challenges arise in the development and use of these platforms by citizens and public servants. Indeed, current platforms are not aligned in a representative way with the requirements of citizens nor the reality of the administration and the requirements of public servants. In order to address those challenges, we examine what characteristics an ideal participation platform should possess to be aligned with the requirements of citizens and public servants. Thereafter, we bundle their requirements into a framework to guide practitioners in their development and implementation of the platforms. This paper offers several contributions. First, we provide future researchers and practitioners an understanding of the requirements of citizens and public servants regarding participation platforms. Second, our framework updates and complements the founding framework of Macintosh and Whyte (2008). Third, the guidelines that constitute this framework allow mitigating the challenges faced by developers and public servants when respectively developing and implementing those platforms.

This paper is structured as follows. The background section explores the literature and presents an overview of the challenges faced in the implementation and use of participation platforms. The methodology section converts these challenges into concrete research questions and explains how we address them through a quantitative survey and interviews. The results section describes the findings from the survey and the interviews. Furthermore, we present our guiding framework that structures concrete guidelines for both developers and public servants. The framework is then validated by means of the case of the participation platform in the city of Leuven (Belgium): LeuvenMaaktHetMee. The discussion section addresses our limitations and possibilities of further research. Finally, the conclusion section summarizes the contributions of this paper.

# Background

We explored the existing literature about participation platforms to understand the impact these platforms have on governments, their advantages, limitations, and possibilities for improvement. The search was performed on three online databases (Google Scholar, Scopus and ScienceDirect) with the following keywords: “citizen participation”, “e-participation”, “participation platform(s)”. Through a search in the titles of the papers, we selected articles containing relevant discussions about challenges related to existing participation platforms, the impact of these platforms on different institutions, their advantages, limitations, and possibilities for improvement. Thereafter, we formalized the challenges with most occurrences in the selected papers. After this first iteration, we dove deeper into specific keywords related to challenges by combining them with the previous keywords (e.g. “social media”, “representation”). From this exploratory search, five challenges that underpin the relevance of this research were identified.

A first finding is that citizen-led movements on social media are not sufficiently incorporated in participation platforms (Challenge 1 **C1, Link to social media**). According to Porwol et al. (2016b), there is a need for infrastructure to enable decision-makers in accessing relevant information about ongoing citizens’ discussions on social media platforms. Ideal participation platforms should find a way to incorporate these discussions into the e-participation process. Porwol et al. (2016) suggest an ontology of e-participation platforms in order to decrease this duality. Some systems are able to integrate inputs from social media platforms and tend to receive researchers’ preference but these are not broadly used in practice (Dolson & Young, 2012).

Second, the users of the platforms may not be a representative sample of the population of the area (country, city, region) for which the platform was set up (**C2, Ensure representation**). For Bailey & Ngwenyama (2011, p1), the non-participation of  “*low-income, older and technology-challenged citizens*” leads to unrepresentative insights and thus possible bias. Citizens younger than 18 can be given incentives to participate in more creative ways such as gamification (Rexhepi, Filiposka, & Trajkovik, 2018). The lack of easy and proper usability maybe hinder this representativeness according to Thomas (2009).

Third, the motivation of citizens to use participation platforms is not properly considered, as well that what restrains them to use them (**C3, Address citizens’ drivers and blocking factors**). For Lee and Kim (2014) the participation of citizens can only prosper when their inputs are answered by the government with qualitative feedback. Porwol et al. (2016b, p1) state that self-development, career advancement, and better group status are the main motives for e-participation. The paper by Lee and Kim (2014) relies on social capital literature and states that trust in the platform, low social networks, and civic norms (or voluntarism) are the main drivers to use such platforms.

Fourth, participation platforms do not necessarily lead to increased participation (**C4, Increase participation level**). Sirajul (2008) mentions that participation platforms lead to increased informal communication between individuals instead of more involvement from new members. Achieving a high participation rate is rare (Tambouris & Gorilas, 2003). The performance of platforms is an important variable to consider. However, since there are no general measurements or KPIs, several research papers have developed their own method in order to evaluate platforms in the most accurate way possible. For example, Poplin et al. (2013) created a participatory cube to analyse online participation problems. A more qualitative approach is used by Tambouris and Gorilas (2003), who evaluated platforms by asking feedback of different users (citizens and operators). Lastly, Macintosh and Whyte (2008) propose an well-recognized and used evaluation framework for e-participation. However, the three frameworks previously described do not provide ex-ante guidelines for public servant and developers before the implementation of the platform.

Finally, cultural differences arise during the implementation of participation platforms (**C5, Address external influencing factors**). Each country or state has its own norms and cultures, which makes it difficult to implement one general model applicable for every socio-economic situation and country or state (Sirajul, 2008). Indeed, previous research showed that, when developing and implementing software, specific challenges can emerge depending on the norms or culture of the country (Ayed, Vanderose, & Habra, 2017).

While based on this literature review we cannot ascertain that these are the only challenges, we believe that these five challenges on their own are a sufficient motivation to investigate requirement of users and public servants more deeply, in particular because an overview of requirements is missing in current research.

# Research Methodology

The identified challenges show a discrepancy between current participation platforms and the features an ideal platform should possess. In order to address those challenges, we rely on the Design Science Research (DSR) approach to iteratively identify the requirements from citizens and public servants and build our framework (Hevner, March, & Park, 2004; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). This approach allows creating a technological or research artifact to serve human purpose. Furthermore, this methodology has been applied in previous studies to develop tools to support policy-makers in managing e-participation (Porwol et al., 2016; Simonofski, Asensio, De Smedt, & Snoeck, 2019).

First, in order to ensure **Rigor Cycle** of DSR, we identified and motivated the problem to be tackled through an exploration of the literature to ensure building on the existing theoretical knowledge base and be able to contribute to it. This cycle is summarized in the background section. Second, in the **Relevance Cycle** of DSR, we aim at identifying the objectives of the solution to tackle the problem identified in the practical environment. In our case, these objectives are the identification of requirements of citizens and public servants. To identify these requirements, we formulate the two following Research Questions (RQ):

* RQ1: What are the requirements of citizens regarding participation platforms ?
* RQ2: What are the requirements of public servants regarding participation platforms ?

Third, in the **Design Cycle** of DSR, we build and evaluate our artifact: the guiding framework destined to guide the development and implementation of participation platforms by developers and public servants respectively. The third research question is therefore:

* RQ3: How to optimally guide the development and implementation of participation platforms ?

The following sub-sections detail the rationale and related challenges as well as the methods for collecting and analysing data, for each RQ. This is summarized in Table 1. The data collection and analysis for the requirements’ identification phase ranged from November 2019 to March 2020 whereas the design and validation of the framework ranged from February 2020 to May 2020.

Table 1 – Research Questions and Methods

|  |  |  |
| --- | --- | --- |
| Research Question | Actions | LinkedChallenges |
| RQ1 – Citizens’ Requirements | Data Collection: Quantitative Survey (235 respondents)Data Analysis: Statistical relationships using SPSSOutput: Combining statistically significant requirements into framework  | C3, C5  |
| RQ2 – Public Servants’ Requirements | Data Collection: 5 Semi-structured interviewsData Analysis: Thematic Content AnalysisOutput: Combining most mentioned requirements into framework | C1, C2, C4 |
| RQ3 – Guidance framework (build part) | Output: Developed framework | C1, C2, C3, C4, C5 |
| RQ3 – Guidance framework (validation part) | Data Collection: 3 follow-up semi-structured interviews and Documents Analysis Data Analysis: Thematic Content Analysis, Design Science ResearchOutput: Validation on the “LeuvenMaaktHetMee” platform | C1, C2, C3, C4, C5  |

### Quantitative Insights from Citizens (RQ1)

By identifying citizens’ requirements for an ideal participation platform, we must consider and investigate what motivates citizens and what restrains them to use a participation platform (**C3**). Also, we need to explore cultural differences through a representative sample of citizens (**C5**).

In order to address this RQ, we chose to perform an online questionnaire, as it allows reaching an audience as large and representative as possible, spreading over all age groups and socio-economic situations (Sekaran & Bougie, 2016, p143). This survey was spread through e-mail and social media. Since most represented age groups on these platforms are those of 18-24 and 25-29 (Marketing Charts, 2019), we reached other age groups through complementary means. We collected data in public places such as train stations or the city hall and asked passers-by from a less-represented age group to fill in our survey. This snowball sampling (Naderifar, Goli, & Ghaljaie, 2017) enabled us to reach a part of the population that is otherwise more difficult to reach. This tactic allowed every age group to be significantly represented (n > 30).

To link the identified challenges from the literature to this research directed to citizens, several questions related to these challenges were included. Indeed, several characteristics, formulated as statements, were listed to which the respondents could answer on a 4-points Likert Scale ranging from “Not Important” to “Very Important”. Afterwards, it was also asked whether any other (unmentioned) characteristics were deemed important. For example, the respondents were asked why they would use such a platform in the future. This is mapped with Challenge 3 and several characteristics, identified from the literature, were used as basis for the questions. *User friendliness, Promotion, Accessibility, Representativity,* and *Government Usage* were collected from the ‘7Ps Sustainable E-participation implementation model’ from Sirajul (2008). Other characteristics like *Privacy*, *Same Idea Grouping,* and *Connection Safety* came from (Tsohou, Lee, Rebahi, Khalil, & Hohberg, 2012). The last characteristic, *Free Access for citizens,* was discovered in (Petre, Cohal, & Boncea, 2018). In order to understand their motivation to use those platforms, several options were identified from the literature, including *Increase of trust* and *Civic norms* (Lee & Kim, 2014) or *Qualitative feedback* (Porwol et al., 2016). To tackle Challenge 5, several questions were asked to identify specific mind-sets and cultural views of our respondents such as their interest in politics, their political satisfaction, political orientation, and time spent on social media.

Before releasing our survey to the broad public, it was decided to pre-test our survey with 9 participants (Reynolds, Diamantopoulos, & Schlegelmilch, 1993). This led to re-wording several sentences of the survey (e.g. "hacking" and "online" were not understood by older respondents). This survey was spread through e-mail and social media. Since most represented age groups on these platforms are those of 18-24 and 25-29 (Marketing Charts, 2019), we reached other age groups through complementary means. We collected data in public places such as train stations or the city hall and asked passers-by from a less-represented age group to fill in our survey. This snowball sampling (Naderifar et al., 2017) enabled us to reach a part of the population that is otherwise more difficult to reach. This tactic allowed every age group to be significantly represented (n > 30). To account for a representative result, only respondents who fully completed our survey were considered. In total, our sample encompasses 235 respondents. The final version of our survey can be found online[[1]](#footnote-1)

The software used for the data analysis was SPSS. Statistical relationships between the cultural variables and the citizens’ vision towards participation platforms were investigated. Furthermore, in order to rank the nine characteristics by importance, we performed pairwise comparisons between their means. Considering that we measured the characteristics' importance on a 5-point Likert scale, we have performed a one-sample t-test for each comparison following the guidelines of de Winter and Dodou (2010) and Harpe (2015). We wanted to categorize the defined characteristics into four value groups (*Very Important*, *Important*, *Less Important*, *Not Important*). Given two characteristics Ci and Cj, the null hypothesis is that the mean of the importance attached to Ci and Cj are equal. Rejection of the null hypothesis was decided upon the standard 95% significance level.

### Qualitative Insights from Public servants (RQ2)

Identifying the requirements of public servants allows understanding their view on the duality of e-participation and social media incorporation (**C1**), but also how they tackle the problem of representativeness (**C2**) and how they try to achieve a participation rate as high as possible (**C4**).

The requirements were retrieved by means of qualitative semi-structured interviews with Belgian public servants from the cities of Kortrijk, Antwerp, and Leuven. These cities were selected as they are comparable in terms of size, stakeholders involved, stage of smart city development, location (Belgium), and all implemented a participation platform. The three interviewees have different roles in their respective cities: neighbourhood manager (Leuven), area worker (Kortrijk), and participation expert (Antwerp). Furthermore, we interviewed a developer from Citizenlab, the most used participation platform in Belgium. Lastly we interviewed a political representative in charge of Urban Planning and Participation in the city of Mons. Semi-structured interviews were chosen since we can ask probing questions during the interview itself (Sekaran & Bougie, 2016, p123). The interview guide can be found online[[2]](#footnote-2). The method used to analyse the interviews transcripts was *Thematic Content Analysis* (Anderson, 2007). This method enables us to link similar themes from every interview to each other.

### Development and validation of the Guidance Framework (RQ3)

The development of the guidance framework is based on the insights from RQ1 and RQ2 and therefore relates to all five challenges (**C1-5**).

The most important criteria and characteristics of a platform are extracted from the findings of RQ1 and RQ2 following design science research’s best practices (Hevner et al., 2004). To validate the framework, it is then applied to the *LeuvenMaaktHetMee*-platform[[3]](#footnote-3) from the city of Leuven (Belgium). Insights on applying the framework were gathered through three follow-up interviews with the platform developer (from RQ2), the neighborhood manager (from RQ2) and the data processing manager of the platform (additional interview). Furthermore, the platform was explored with the three stakeholders and relevant documents (e.g. the final report about the platform as presented to political representatives, the preliminary notes for the political council before purchasing the platform, the vulgarized documentation presented to citizens) were analyzed. As interviews can be impacted by interviewee bias, triangulation with documents is crucial for increasing the validity of the research. The city of Leuven was chosen as the practitioners were open for collaboration and close interaction which allowed giving context to the platform and documents we analyzed.

# Results

## 4.1. Identification of Citizens’ Requirements

First, the sample description of the survey can be found in Table 2. Then, we explored the relationships between the characteristics and socio-demographic variables. However, no significant relationship was identified and this will thus not be further described in this paper. In terms of descriptive analysis, we can first note that 164 of the respondents (69.79%) were aware of the concept of citizen participation but only 87 (37.02%) heard about participation platforms. We can here mention that definitions of participation and participation platforms were included after these questions to provide a common understanding for all respondents.

Table 2. Sample Description

|  |  |  |
| --- | --- | --- |
| Gender | Male | 109 respondents (46.38%) |
| Female | 126 respondents (53.62%) |
| Education | None | 0 respondents (0%) |
| Primary | 9 respondents (3.83%) |
| High School | 60 respondents (25.53%) |
| Higher Education | 159 respondents (67.66%) |
| PhD | 7 respondents (2.98%) |
| Age | <18 | 20 respondents (8,51%) |
| 18-34 | 117 respondents (49,78%) |
| 38-50 | 32 respondents (13,62%) |
| 51-64 | 35 respondents (14,89%) |
| >64 | 31 respondents (13,19%) |

Following on the descriptive analysis, Table 3 lists the main motivators and demotivators of participation platforms that were expressed by the respondents. In the survey, respondents could select more than one option.

Table 3. Usage Motivators and Demotivators for Citizens

|  |  |  |  |
| --- | --- | --- | --- |
| Usage motivator | Percentage | Usage demotivator | Percentage |
| My ideas will be processed  | N=112 (47.66%) | The government does not pay attention to these platforms | N=128 (54,47%) |
| To get feedback on my idea  | N=111 (47.23%) | My ideas will not be processed or considered | N=110 (46,81%) |
| It enlarges mutual trust  | N=102 (43.40%) | Other | N=36 (16,6%) |
| It is my civic duty  | N=90 (38.30%) | I do not trust the government | N=24 (15,32%) |
| Other  | N=6 (2.55%)  | The government should develop good ideas | N=14 (10,21%)  |

In order to rank the characteristics, the results for each t-test are reported in the supplementary material online[[4]](#footnote-4). The goal is to form importance level categories grouping characteristics that do not have a statistically different mean. For example, the tests showed that the mean for free access and user friendly are not significantly different, therefore they were grouped under the same importance category.

Following this logic, we created 4 categories of Citizens’ Requirements (CR) that are represented in Figure 1. It should however be noted that government usage has a mean that differs significantly from all other characteristics. However, for ease of representation, we decided to limit the number of categories to four. Therefore, government usage was put into the "Very important" category, since its mean is closer to the characteristics from this category than those from the "Important" category. Following the same reasoning, representativeness was added to the "Less important" category. The privacy characteristic forms its own category, namely "Not important", as it has a significantly lower mean that all others

We can conclude that three requirements are extremely important for citizens*. Free access (CR1)*, *user friendliness (CR2)* and *government usage (CR3)* are three features that participation platforms should always possess in order to be used by the public. This means that platforms cannot charge any fee to participate, substantial effort should be spent on design for user friendliness, and (local) governments should also take the proposed ideas into account. This last one is especially important as it echoes the biggest motivator and demotivator of our survey. Two other characteristics, *accessibility (CR4)* and *connection safety (CR5)*, are found to be fairly important by the public. *Promoting the platform (CR6)*, the *grouping of ideas on the platform (CR7)* and the *representativeness of suggested ideas (CR8)* are mentioned but not pushed forward by citizens. Interestingly, *privacy (CR9)* is perceived as the least important characteristic. It seems that citizens do not mind whether their ideas are anonymous or not.

**Not Important**

**Less Important**

**Important**

**Very Important**

CR9: Privacy

CR4: Accessibility

CR5: Connection Safety

CR1: Free Access

CR2: User Friendly

CR3: Government Usage

3. Representativeness

CR6: Promotion

CR7: Idea Grouping

CR8: Representativeness

Figure 1. Importance of Citizens’ Requirements (CR)

Since our survey provided the option of suggesting extra characteristics, these must be considered as well. In total, 42 respondents provided us with an extra characteristic: *moderator for spam and discriminatory ideas* (CR10, 8 respondents), *accessibility from multiple devices and multiple languages* (Linked to CR4, 6), *including the ideas of technology-challenged people or immigrants* (CR11, 6), *rewards or clearly showing results, maybe through newsletters* (Linked to CR3, 5), *structured and up-to-date ideas with current problems* (Linked to CR2, 5), and *background information of topics on the platform* (Linked to CR2, 1).

## Identification of Public servants’ Requirements

Following the TCA, 14 categories of requirements were found but only the descriptions relevant to the second RQ were maintained, reducing the total to 10 key groups of Public servants’ Requirements (PR).

**Anonymity (PR1)**: the city of Kortrijk is pro-anonymity, as they “*do not want that citizens have to log in every time they want to share their ideas*”, and they “*want to have low barriers so that as many citizens as possible can participate*.” Leuven, Mons and CitizenLab both praise non-anonymity, but for totally different reasons. Leuven and Mons incentivize non-anonymity by enforcing the creation of accounts to give personal feedback and to incentivize civilized discussions while the CitizenLab platform is willing to create an online community and to collect data on the population of every city.

**Identity of the city (PR2):** It is important for Leuven, Mons and Kortrijk that the platform reflects their identity through a more personalized platform. An example is the offer of multiple templates for mails “*tailored to the client*” or different interfaces per cities.

**Back-end functionalities (PR3)**: Leuven discusses multiple functionalities that should be implemented in a platform. An infrastructure should be present to support internal discussion of all services before giving personal feedback to citizens’ ideas. This feedback should be tailored depending on the target users according to different demographic and behavioral variables (place of stay, age…). The ideas should be clustered into themes. The platform should encompass a variety of methods such as “*conduct surveys, polls, citizen initiatives, mapping, collection of ideas*”. Lastly, there should be an automatic coupling of ideas (by citizens) to policies of the government. This grouping should also be tailored depending on different demographic and behavioral variables. For all cities, these functionalities are the core of the platform and developers should invest more of their time to elaborate them, as they are “*too basic or absent nowadays*”.

**Inclusivity (PR4):** In order to have a larger audience and to have a more representative population, Leuven distributed sheets, on which citizens could fill in their ideas to reach more technologically challenged citizens. They provided feedback letters to the technology-challenged people as well. Reaching citizens who just arrived in Belgium is noticed to be a big challenge.

**Accessibility (PR5)**: The city of Antwerp desires the platform to be highly accessible so that a maximum of good ideas are generated. They want the platform to have “*short sentences and avoid too specific vocabulary*”, to use “*pictures or animations*”, and to “*provide explanation and context in an honest and clear way*”. The representative from Mons states that the “*wording of the platform must reflect the way citizens word their issues as well*”.

**Feedback (PR6):** It is important to Leuven and Antwerp to give quality feedback to every citizen idea. This should be facilitated by the platform because “*it is important to let citizens know why their ideas cannot be executed*”. Mons also performs this feedback but states that the lack of automatic visualization generation in the platforms makes it difficult to communicate the output citizens, but also other representatives from the political council. Kortrijk does not give personal feedback to the citizens and simply gives overall feedback after a participation campaign about the retained ideas.

**Incorporate data from social media (PR7):** The city of Leuven incorporates ideas found on social media, through hashtags and keywords into their platform. However, this is a “*continuous process and should always be monitored*”. On the contrary, the city of Kortrijk does not incorporate data from social media as “*social media does not belong on the platform*”. The idea of CitizenLab is to have a wider picture of the population by combining multiple datasets through open Application Programming Interfaces (API). The city of Mons underlines the need to check if “*the themes discussed on the platform indeed reflect the preoccupations of citizens on social media*”.

**Data Processing (PR8)**: Data processing is important and must be manageable by means of the platform and by public servants. The political representative from Mons underlined its importance to “*identify recurring tendencies from the population to put in the political agenda*”. This basic processing could be done through charts and graphs, and if desired, further statistical analysis should be possible. However, processing all ideas is not easy and techniques such as Natural Language Processing (NLP) might help with this. The data processing is viewed as a big challenge for the future of participation platforms as we can expect millions of participants for important debates in highly populated countries. According to the CitizenLab developer there is a “*need to have transparency on how this processing is done*”.

**Platform as a neutral partner (PR9)**: The city of Kortrijk needs a platform to be neutral, “*Otherwise, there could be some mistrust about the veracity of the results*.”. It is also important that a trusted partner is accountable for data security and anonymity when it comes to e-participation. For the city of Mons, it is also very important that the platform’s choice is not politically-oriented.

**Support from the platform to public servants (PR10)**: The platform developer has to give support in terms of the overall participation process (from structuring and animating the platform to analyzing the results). According to the developer of Citizenlab, platforms should share their “*expertise on how to correctly get citizens to participate and how to use the data gathered*”.

The importance of the categories found in each interview is not scalable as this is a qualitative result, but we estimate that the cited categories, on which all the interviewees agreed, are the most significant. The most promising are the three categories cited by four out of five interviews: “***identity of the city***” (PR2), “***back-end functionalities***”(PR3), and “***inclusivity***” (PR4).

## Participation Platform Framework

From the citizens’ and public servants’ requirements, we extract the main findings and bundle them into a guiding participation platform framework taking the form of 33 guidelines (G). This framework is divided into two parts: one to guide the development by developers and one to guide the implementation by public servants as different requirements were destined to different target groups. The requirements (PR or CR) leading to each category of guidelines are detailed. It should be noted that several categories can address the same requirement (e.g. the manual and automated incorporation of social media data both address PR7). This framework should be used as a checklist for verifying whether all important characteristics are implemented on their own platform. There is a link between the two sides of the framework: all the functionalities in the category ‘Platform Use” need to be enabled beforehand by the developers. If developers and public servants experience budget constraints, we advise developers to always implement the precondition to offer “minimal” functionalities (marked in black in Figure 2). For public servants, no real priorities are defined, but investing in creating a participation culture would affect the other characteristics the most, since a higher participation rate would be observed, as well as more awareness by the public.

Figure 2. Participation Platform Guiding Framework

### Developer-Side Framework

For the developer-side, it was decided to split the framework into the front- and back-end functionalities an “ideal” platform should contain according to the identified requirements.

#### Front-End Functionalities

*Offer personalization for cities:* Developers should create a platform, implementable by everyone, but leaving enough room for cities to adapt feedback systems or messages to their needs. An effective way to do this would be to include several templates so that public servants can write feedback by means of these personalized templates (G1).

*Ensure user friendliness for citizens:* Developers should heavily focus on user experience, creating a highly user friendly and readable interface so that citizens achieve their tasks with as few clicks as possible (G2). Any possible confusion for citizens must be eliminated (Cr3) and the political and administrative jargon must be avoided (G4).

*Ensure user friendliness for public servants:* Most public servants are not IT professionals and digital skills should not be assumed. Thus, easy and intuitive ways to manage the collected data and the platform in general must be created (G5). Furthermore, jargon about the data processing should be simplified as well (G6).

*Offer 'Platform Use' possibilities for public servants:* This category of is a precondition to all the functionalities on the public servant-side in the category ‘Platform Use’ (G7).

#### Back-End Functionalities

*Ensure connection safety:* Developers must ensure that no breaches in the connection are possible by providing secure communication between devices and the platform (G8) and encrypt connections for registered users (G9). This requirement is further developed in (Tsohou et al., 2012).

*Implement clustering & grouping:* In order to provide a comprehensive view of ideas on the platform, there should be investments in automating clustering of ideas (G10) and to filter the ideas based on demographics (G11).

*Offer variety of participation channels:* A wider variety of participation channels on the platform enables public servants to launch more diverse projects and possibly more accurate information can be obtained by using specific channels adapted to project characteristics (surveys, polls, etc.) (G12).

*Data processing:* The data needs to be processed by the platform to ensure its usefulness for the public servants. This should be done through charts and graphs, but more detailed techniques are welcome to help the public servants (G13). The processing should be easily manageable for the cities (G14). Automating data processing through NLP and Artificial Intelligence (AI) should be explored (G15). This processing should be transparent to let everybody see how this data is processed and with which tools or methods (G16).

*Incorporate data from other sources (automated):* An ideal platform should *automatically* incorporate data from social media, as well as from other sources (G17). According to the CitizenLab interviewee “a platform would be ideal with the technology to cross multiple datasets, allowing to put together the demographic data with social media data and the platform’s data” (G18). The automatic inclusion of social media data might result in many low-quality ideas (e.g. social media data with relevant keywords but not constructive).

### Public Servant-Side Framework

#### Platform Use

*Presence of moderator:* The platform should have the presence of a moderator to check for spam, discriminatory ideas or inappropriate behaviour (G19). Investments should be made in the automation of moderation (e.g. automatic deletion of spam) (G20). Furthermore, a report system should be implemented to ban users from the platform (G21).

*Provide feedback to the participants:* The provision of (even a simple) feedback message could create a better sense of inclusivity for participating citizens (G22). If there are too many citizens for individual messages, feedback can be provided per categorized idea (G23). An “idea status management system” can be implemented to give updates to citizens in a transparent way (G24).

*Incorporate social media data (manual):* This characteristic focuses more on manual incorporation of social media data, so that every tweet, Facebook or Instagram post with specific keywords or hashtags is added (G25). As ideas from social media tend to be less constructive, filtering these ideas requires continuous monitoring and deciding whether to incorporate an informal idea or not (G26).

#### Other Characteristics

*Accessibility through different ways:* In order to allow citizens unable to afford IT infrastructure at home or older citizens to participate, alternative ways of participation should be provided. The accessibility to the platform through multiple devices should be possible (G27), as well as multi-linguality, so that non-native citizens or immigrants do not feel left out (G28).

*Create a participation culture:* Our respondents reported a large amount of scepticism towards government usage, which indicates that local governments should do everything to show that they indeed use the input from these platforms (G29). Furthermore, citizens should be kept interested about the participation platform (e.g. by organizing conferences, by showing the output of the participation process in a clear and visual way, etc.) (G30).

*Invest in awareness:* Public servants should mention their local platforms in newsletters, billboards, and their websites, to reach an audience as large as possible (G31). In a complementary manner, advertising (through social media or traditional mail) should be targeted to less represented parts of the population (G32).

*Participation as means, decisions as goal:* Cities need to process the ideas of the platform, and not just try to get as many respondents as possible. Ideas should be used to enrich the policy-making process at different steps (policy formulation, alternatives development, implementation or evaluation) (G33).

## Validation of the Framework: Leuven

To validate our framework, we apply it to the LeuvenMaaktHetMee participation platform by interviewing three relevant stakeholders. From these interviews, two main uses of the framework have been highlighted as relevant by the respondents:

* Ex-Ante use: before investing in a participation platform, public servants can use our framework as check-list and governance tool to help develop their strategy. It enables them to be aware about the implications of using such platforms effectively. For instance, the investment in participation culture is an element respondents found relevant to have clearly mentioned in the framework. Furthermore, developers can use it as check-list to guide the platform design.
* Ex-Post use: after investing in a participation platform, diverse stakeholders can use our framework to evaluate the efficacy of the platform and improve it. Furthermore, it can also be used to compare the features of several platforms on the market. This comparison can be performed by public servants wanting to evaluate in which platform to invest in a public procurement process, or by developers wanting to perform a market study.

To illustrate the ex-post use of the framework, we rate this platform based on the guidelines, used as checklist or criteria, from the framework. Each guideline will be scored, based upon the number of concrete solutions implemented by the platform. The total score represents the number of guidelines implemented by this platform. A score of “0” indicates that this criterion has simply not been considered or implemented by this platform. A score of “0,5” refers to a partial implementation. A score of “1” tells us that this platform has fully implemented the specific criterion (all concrete solutions) and is now benefitting from all its advantages and the effect on citizen participation. The full evaluation using the framework can be found in Appendix 1. The main insights from the evaluation can be found below.

**Front-End characteristics**: Within the CitizenLab platform, the possibility for users to write feedback themselves does exist; however, without concrete templates, which was identified as a shortcoming by the public servants. The developer was nonetheless able to create a very high amount of user friendliness for citizens through avoidance of jargon and intuitive navigation. We consider this as well as user friendliness for public servants, since confusion was always avoided, and a clear communication was ensured. The platform use criterion is satisfied as well, which indicates that CitizenLab cares about their public servants and tries to create as much value as possible with their platforms.

**Back-End characteristics**: Two back-end characteristics are fully satisfied by CitizenLab, to which we cannot give any remarks: connection safety and variety of participation methods. However, the option of clustering of ideas is not yet implementable. We noticed that the *LeuvenMaaktHetMee*-platform also struggled with processing the data and had to create its own unstructured methods to keep an overview (e.g. customized graphs). Lastly, no other data is being automatically incorporated from other sources, such as demographic ones. This can be largely attributed to the technology not being able to automate this incorporation yet.

**Platform Use characteristics**: The *LeuvenMaaktHetMee*-platformcurrently has no moderator who monitors every entered idea. However, during our interview, they mentioned that they oblige citizens to register on the platform with their full name and e-mail address in order to reduce spam. Leuven values the feedback-system a lot and provides very concrete feedback to its citizens. Nonetheless, the Leuven public servants acknowledge a shortcoming of not being able to personalize their feedbacks. Leuven continuously monitors the ideas posted on social media and incorporates them on the platform. However, no automation of social media ideas is implemented.

**Other Characteristics**: Leuven invested highly in incorporating older and technology-challenged citizens into their platform. However, Leuven noticed that reaching migrants is very difficult, which might result in a problem of representability. The platform currently features two possible languages (Dutch and English), but since a lot of French-speaking students from Wallonia live in Leuven as well, we advise incorporating French as well. A significant amount of work should be done to create a participation culture, since the youth and students very rarely submit ideas into the platform. They make up a large amount of the population, and thus there is a need for new initiatives so that this culture is shared under students as well. A perfect score was reached for awareness, since substantial promotion and advertising was done in newspapers etc. Numerous citizens have registered on the platform but not all of them are actively participating. A perfect score is also reached for using participation only as means. Since the outcomes are clearly defined on the platform and the complete process is transparent, every citizen can see what will happen.

# Discussion

In this discussion, our discovered results are compared to the challenges identified in our literature study. Afterwards, our guiding framework is compared to one of the most influential framework of the field (Macintosh & Whyte, 2008). Lastly, the limitations of this paper are addressed, and recommendations for further research are given.

## 5.1. Theoretical Contributions

In the literature, five important challenges were identified. Challenge 1 told us that there must be an incorporation of ideas from social media. This phenomenon is also observed in our interviews with both the developer and public servants, where it was told that they are striving towards the enablement, but that important steps still must be made through automation and NLP, among others.

Challenge 2 told us that participation platforms do not represent all users in the population. This has been observed both in the survey and in the interviews. Public servants mentioned that they try to reach as many different citizens as possible through different ways, in order to give everybody a chance to participate. It was observed however that migrants are less included. This can be linked to both Challenge 5 and the topic of *inclusivity* found in the interviews. In our framework, it was advised for cultural differences to be avoided by incorporating multiple languages, creating a high amount of user friendliness, and including different participation methods.

Challenge 3 underlined the importance of the motivation of citizens to use a participation platform, as well as what restrains them. These questions were incorporated into our survey. What we found was that one part of the citizens trusts the government and would like to use these platforms, in order to get answers (feedback) on why their ideas would not be realized (incorporated into framework). However, another part of the citizens is very sceptical towards the government, which is what restrains them from using a platform. Therefore, the “create a participation culture” criterion is included into our framework. We believe that if the government shows their active input and results, scepticism will decrease, and a larger amount of trust will result.

Challenge 4 mentions that participation platforms do not necessarily lead to increased participation rates. To achieve possible higher participation rates, our framework included the “invest in awareness” criterion, that would increase awareness by targeted advertising of the platform. We also believe that by the categories of guidelines “creating a participation culture”, “participation as means, decisions as goal” and “user friendliness for citizens”, higher participation rates will be achieved.

Most of our discovered results are thus confirmed by our literature study and other research on participation platforms. However, little literature is found on some characteristics in our framework. For instance, the “offering personalization for public servants” is not covered in the existing literature. The elicitation of insights about what type of personalization to offer is needed. Another subject of participation platforms, heavily mentioned within our interviews resides in the use of Artificial Intelligence and automation to analyse and cluster the huge amounts of ideas submitted. This theme is covered in the opinion mining literature (Maragoudakis et al., 2011, p12). However, the application of Artificial Intelligence to participation platforms remain scarce. Automation can also facilitate the tasks of a moderator, through automatically deleting those ideas with discriminatory jargon. This extra research would be especially helpful when participation platforms grow even further, and as thousands of ideas from citizens cannot be handled manually anymore.

## Update of Macintosh and Whyte’s Framework

To demonstrate the quality and completeness of our framework, we compare it to a framework from the literature. It was chosen to perform a comparison with the evaluation framework introduced by (Macintosh & Whyte, 2008)[[5]](#footnote-5) being the most influential and cited framework in the e-participation field. Both the structure and the guidelines of the two frameworks will be compared. Each perspective of the Macintosh and Whyte Framework has its own guidelines that must be followed to have a successful platform. Figure 3 summarizes the mapping between the elements from the two frameworks with the new elements introduced in this research highlighted in italic.



Figure 3. Comparison between Macintosh and Whyte’s Framework and Our Framework

As seen in Figure 3, the 16 categories of guidelines of our framework can be mapped to the 15 categories of guidelines mentioned in the Macintosh and Whyte Framework. 9 categories of guidelines of our framework either match or update the Macintosh and Whyte Framework. For instance, “conflict and consensus” aspect was already identified previously but concrete leads for solutions are suggested in our framework. The two elements Macintosh and Whyte (2008) explores further are user friendliness for citizens and accessibility.

Furthermore, 7 new categories are identified in this study: “Data processing”, “Implement clustering and grouping”, “Incorporate data from social media (manual)”, “Incorporate data from social media (automatic)”, “Create a participation culture”, “Invest in awareness” and “Offer platform use possibilities”. Indeed, our framework digs deeper into the back-end aspect of platforms, since most of the technologies were still in their infancy-stages or non-existent in 2008, such as social media incorporation or data processing. These back-end aspects constitute a promising research lead and some of which were already researched in other studies (e.g. Lago et al. (2019) focused on data processing). Furthermore, several categories have been researched specifically in other studies It is important to note that no contradictions between the two frameworks were discovered. Therefore, the framework developed in this paper updates and complements the framework from (Macintosh & Whyte, 2008) with new features developed in recent years.

## Limitations and further research

During our research, we have reduced the potential threats to validity of the framework. We ensured the content validity of the framework by extracting the information about the requirements from different sources. Nonetheless, this paper has some limitations. There might be a confirmation bias as we only interviewed public servants that are convinced of the benefits of participation platforms. Interviewing more cities, especially the ones not convinced by the use of platforms could have resulted in more information about different requirements of public servants Furthermore, as the interviews were done in Belgium, the results reflect the ideal requirements for this country. As seen in Challenge 5 (cultural differences arise during the implementation of participation platforms), the requirements should be investigated in other socio-economic regions to generalize the results to a larger scale. Further research is thus necessary and highly recommended to provide generalization.

This study also introduces leads for further research. First, we explored citizens’ requirements towards platforms through a representative sample but external factors impacting those expectations should be investigated as well. No significant relationship with socio-demographic characteristics were identified in this study but other external factors, that were not our primary focus, should be considered (e.g. familiarity with the concept of participation, digital literacy, previous experience with participation). The citizens’ motivation to engage on such platforms would deserve a specific in-depth study to extend our findings, using more fine-grained constructs from (Wijnhoven, Ehrenhard, & Kuhn, 2015). Furthermore, the public servants’ motivation to use such platform was left out of scope for this paper as the related literature was too scarce to support the formulation of questions. Further research should investigate those motivating factors in an exploratory manner to enable theory-building on the topic. Second, further research is also needed to shed light on the link between participation platforms and social media. Lots of relevant information is displayed on social media but it is still unclear if and how social media shapes participation platforms. The incorporation of social media into the platforms is a first step, but a thorough study on the link between them should give a better perspective on how to correctly use social media to improve participation platforms. Several papers researching this topic exist, such as (Porwol et al., 2016), but we still advise more research to be done (e.g. about the presentation of social media outputs on the platforms). Third, further studies should also consider how artificial intelligence and automation can benefit participation platforms. More specifically on how to automate the clustering and grouping of citizens and ideas, and potentially automating the moderation processes that citizens desire. Our interview with the developer revealed that they are working on automating these processes, but that this development is still in its infancy-stage. Lastly, further research should investigate the relevance of our framework for the concrete development of a participation platform and the impact on its performance. Indeed, for now, the framework was validated ex-post to evaluate an existing platform but the ex-ante use, as explained in Section 4.4, remains to be explored.

# Conclusion

As smart city projects may fail without proper citizen participation, it is essential to involve citizens in their design. Participation platform constitute a promising method to do so if they are aligned with the requirements of the citizens submitting the ideas and of the public servants processing them. In this paper, we investigated citizens’ (RQ1) and public servants’ (RQ2) requirements towards participation platforms to guide the development and implementation of participation platforms (RQ3). A survey distributed to 235 citizens and 5 qualitative interviews for public servants and a developer revealed several requirements that, if correctly implemented and monitored, create an ‘ideal’ participation platform.

In total, 11 requirements for citizens and 10 requirements for public servants were identified. For citizens (RQ1), the most important requirements are *free access*, *user friendliness,* and *government usage*. The second most important are *accessibility* and *connection safety*. The interviews (RQ2) revealed that, despite some differences in the expectations, certain characteristics were revealed to be universal. These are *the representation of the identity of the city*, *back-end functionalities*, and *inclusivity*. The characteristics were combined into our guiding framework (RQ3) composed of 33 guidelines that should be used as a checklist by both developers and public servants. The framework is then applied to the *LeuvenMaaktHetMee* platform with data collected through 3 follow-up interviews and analysis of relevant documents.

The understanding of the requirements constitutes a solid basis for future research to build upon and for practitioners to develop improved platforms. We believe that when developers take these characteristics into account in the development process, public servants will have more possibilities to operate better platforms, as well as further engage citizens and provide them with personal and more qualitative feedback. Furthermore, by using the framework and following our guidelines, the public servants can quickly address their shortcomings and improve participation platforms.

# References

Anderson, R. (2007). Thematic Content Analysis (TCA): Descriptive Presentation of Qualitative Data Using Microsoft Word. *Descriptive Presentation of Qualitative Data*, 1–4.

Arnstein, S. R. (1969). A Ladder Of Citizen Participation. *Journal of the American Institute of Planners*, *35*(4), 216–224. https://doi.org/10.1080/01944366908977225

Axelsson, K., & Granath, M. (2018). Stakeholders’ stake and relation to smartness in smart city development: Insights from a Swedish city planning project. *Government Information Quarterly*, *35*(4), 693–702. https://doi.org/10.1016/j.giq.2018.09.001

Ayed, H., Vanderose, B., & Habra, N. (2017). Agile cultural challenges in Europe and Asia: Insights from practitioners. In *Proceedings - 2017 IEEE/ACM 39th International Conference on Software Engineering: Software Engineering in Practice Track, ICSE-SEIP 2017* (pp. 153–162). https://doi.org/10.1109/ICSE-SEIP.2017.33

Bailey, A., & Ngwenyama, O. (2011). The challenge of e-participation in the digital city: Exploring generational influences among community telecentre users. *Telematics and Informatics*, *28*(3), 204–214. https://doi.org/10.1016/j.tele.2010.09.004

Berntzen, L., & Johannessen, M. R. (2016). The Role of Citizen Participation in Municipal Smart City Projects: Lessons Learned from Norway. In *Smarter as the New Urban Agenda* (pp. 299–314). Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-319-17620-8

Bibri, S. E. (2018). *Smart sustainable cities of the future: the untapped potential of big data analytcs and context aware computing for advanced sustainability*. Berlin: Springer.

Bibri, S. E., & Krogstie, J. (2020). The emerging data–driven Smart City and its innovative applied solutions for sustainability: the cases of London and Barcelona. *Energy Informatics*, *3*(5), 1–42. https://doi.org/10.1186/s42162-020-00108-6

Chourabi, H., Nam, T., Walker, S., Gil-Garcia, J. R., Mellouli, S., Nahon, K., … Scholl, H. J. (2012). Understanding Smart Cities: An Integrative Framework. In *Proceedings of the 45th Hawaii International Conference on System Sciences (HICSS-45)* (pp. 2289–2297). Maui, HI, USA: IEEE. Retrieved from http://www.computer.org/csdl/proceedings/hicss/2012/4525/00/4525c289-abs.html

Dameri, R. P. (2014). Comparing Smart and Digital City: Initiatives and Strategies in Amsterdam and Genoa. Are They Digital and/or Smart? In *Smart City: How to Create Public and Economic Value with High Technology in urban space* (pp. 45–88). Switzerland: Springer. https://doi.org/10.1007/978-3-319-06160-3

de Winter, J. C. F., & Dodou, D. (2010). Five-Point Likert Items: t test versus Mann-Whitney-Wilcoxon. *Practical Assessment, Research and Evaluation*, *15*(11), 1–16.

Dolson, J., & Young, R. (2012). Explaining variation in the e-Government features of municipal websites: An analysis of e-Content, e-Participation, and social media features in Canadian municipal websites. *Canadian Journal of Urban Research*, *21*(2), 1–24.

Harpe, S. E. (2015). How to analyze Likert and other rating scale data. *Currents in Pharmacy Teaching and Learning*, *7*(6), 836–850. https://doi.org/10.1016/j.cptl.2015.08.001

Hevner, a. R., March, S. T., & Park, J. (2004). Design Science in Information Systems Research. *MIS Quarterly*, *28*(1), 75–105. https://doi.org/10.2307/25148625

Lago, N., Durieux, M., Pouleur, J.-A., Scoubeau, C., Elsen, C., & Schelings, C. (2019). Citizen Participation through Digital Platforms: the Challenging Question of Data Processing for Cities. *SMART 2019 : The Eighth International Conference on Smart Cities, Systems, Devices and Technologies*, (August), 19–25.

Lee, J., & Kim, S. (2014). Active Citizen E-Participation in Local Governance: Do Individual Social Capital and E-Participation Management Matter? In *Proceedings of the 47th Hawaii International Conference on System Sciences* (p. 10).

Macintosh, A. (2007). e-Democracy and e-Participation in Europe. In *Digital Government: E-Government Research, Case Studies, and Implementation Series* (p. 18). https://doi.org/10.1007/978-0-387-71611-4

Macintosh, A., & Whyte, A. (2008). Towards an evaluation framework for eParticipation. *Transforming Government: People, Process and Policy*, *2*(1), 16–30.

Maragoudakis, M., Loukis, E., & Charalabidis, Y. (2011). A review of opinion mining methods for analyzing citizens’ contributions in public policy debate. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *6847 LNCS*, 298–313. https://doi.org/10.1007/978-3-642-23333-3\_26

Marketing Charts. (2019). Social Networking Platforms’ User Demographics Update 2019. Retrieved from https://www.marketingcharts.com/digital/social-media-108184#:~:text=Hispanic (51%25) and Black,65 and up (8%25)%3B

Naderifar, M., Goli, H., & Ghaljaie, F. (2017). Snowball Sampling: A Purposeful Method of Sampling in Qualitative Research. *Strides in Development of Medical Education*, *14*(3), 1–6. https://doi.org/10.5812/sdme.67670

Naranjo Zolotov, M., Oliveira, T., & Casteleyn, S. (2018). E-participation adoption models research in the last 17 years: A weight and meta-analytical review. *Computers in Human Behavior*, *81*, 350–365. https://doi.org/10.1016/j.chb.2017.12.031

Osman, A. M. S. (2019). A novel big data analytics framework for smart cities. *Future Generation Computer Systems*, *91*, 620–633. https://doi.org/10.1016/j.future.2018.06.046

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, *24*(3), 45–77. https://doi.org/10.2753/MIS0742-1222240302

Petre, I., Cohal, A., & Boncea, R. (2018). e-Participation Platform for Facilitating Citizens Involvement in Smart City Initiatives. *Romanian Journal of Information Technology and Automatic Control*, *28*(2), 5–14.

Poplin, A., Pereira, G. C., & Rocha, M. C. F. (2013). *The Participatory Cube: A Framework for Analysis of Online Participation Platforms*. *Lecture Notes in Geoinformation and Cartography*. https://doi.org/10.1007/978-3-642-37533-0\_23

Porwol, L., Ojo, A., & Breslin, J. G. (2016). Social Software Infrastructure for e-Participation. *Government Information Quarterly*, *35*(4), S88–S98. https://doi.org/10.1016/j.giq.2016.01.002

Rexhepi, A., Filiposka, S., & Trajkovik, V. (2018). Youth e-participation as a pillar of sustainable societies. *Journal of Cleaner Production*, *174*, 114–122. https://doi.org/10.1016/j.jclepro.2017.10.327

Reynolds, N., Diamantopoulos, A., & Schlegelmilch, B. (1993). Pre-Testing in Questionnaire Design: A Review of the Literature and Suggestions for Further Research. *International Journal of Market Research*, *35*(2), 1–11. https://doi.org/10.1177/147078539303500202

Sekaran, U., & Bougie, R. (2016). *Research methods for business: a skill-building approach* (7th ed.). Chichester : John Wiley & Sons. https://doi.org/10.23912/978-1-910158-51-7-2790

Simonofski, A., Asensio, E. S., De Smedt, J., & Snoeck, M. (2017). Citizen participation in smart cities: Evaluation framework proposal. In *Proceedings - 2017 IEEE 19th Conference on Business Informatics, CBI 2017* (Vol. 1, pp. 227–236). https://doi.org/10.1109/CBI.2017.21

Simonofski, A., Asensio, E. S., De Smedt, J., & Snoeck, M. (2019). Hearing the Voice of Citizens in Smart City Design: The CitiVoice Framework. *Business & Information Systems Engineering*, *61*(6), 665–678. https://doi.org/10.1007/s12599-018-0547-z

Simonofski, A., Vanderose, B., Clarinval, A., & Snoeck, M. (2018). The Impact of User Participation Methods on E-Government Projects : The Case of La Louvière , Belgium. *Media and Communication*, *6*(4), 175–186. https://doi.org/10.17645/mac.v6i4.1657

Sirajul, I. M. (2008). Towards a sustainable e-Participation implementation model. *European Journal of EPractice*, *5*, 1–10.

Tambouris, E., & Gorilas, S. (2003). Evaluation of an e-democracy Platform for European Cities. In R. Traunmüller (Ed.), *Electronic Government: Proceedings of the 2nd [IFIP WG 8.5] International Conference, EGOV 2003* (Vol. 2739, pp. 43–48). Prague, Czech Republic. Retrieved from http://www.springerlink.com/openurl.asp?genre=article&id=B50RVHFGCWBVJL02

Thomas, P. (2009). Bhoomi, Gyan Ganga, e-governance and the right to information: ICTs and development in India. *Telematics and Informatics*, *26*(1), 20–31. https://doi.org/10.1016/j.tele.2007.12.004

Tsohou, A., Lee, H., Rebahi, Y., Khalil, M., & Hohberg, S. (2012). *Ubiquitous participation platform for policy making (UbiPOL): Security and identity management considerations*. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (Vol. 7449 LNCS). https://doi.org/10.1007/978-3-642-32287-7\_29

Wijnhoven, F., Ehrenhard, M., & Kuhn, J. (2015). Open government objectives and participation motivations. *Government Information Quarterly*, *32*(1), 30–42. https://doi.org/10.1016/j.giq.2014.10.002

Zhuhadar, L., Thrasher, E., Marklin, S., & de Pablos, P. O. (2017). The next wave of innovation—Review of smart cities intelligent operation systems. *Computers in Human Behavior*. https://doi.org/10.1016/j.chb.2016.09.030

# Appendix: Evaluation of the "Leuven Maakt Het Mee" Platform

|  |  |  |  |
| --- | --- | --- | --- |
| **Developer** | Evaluation Categories | *Guidelines for LeuvenMaaktHetMee* | Score |
| ***Front-End*** |
| *Offer personalization* | * G1: Public servants write feedbacks themselves (but without templates)
 | 1/1 |
| *Ensure user friendliness for citizens* | * G2: Realizes the goal with as few clicks as possible
* G3: Eliminates any possible confusion
* G4: Avoids political or technical jargon
 | 3/3 |
| *Ensure user friendliness for public servants* | * G5: Implements easy and intuitive data managing methods
* G6: Avoids jargon
 | 2/2 |
| *Offer the 'Platform Use' possibilities for public servants* | * G7: All basic platform use functionalities are enabled
 | 1/1 |
| ***Back-End*** |
| *Ensure connection safety* | * G8: Secure communication between mobile devices and the platform
* G9: Encrypted connection for registered users with SSL certificates
 | 2/2 |
| *Implement clustering & grouping* | * G10: No clustering of ideas
* G11: The grouping of citizens based on demographics is possible
 | 1/2 |
| *Offer variety of participation channels* | * G12: There are a multitude of channels available for the different projects
 | 1/1 |
| *Data Processing* | * G13: Creates a transparent process
* G14: Data is processed through graphs and charts
* G15: The processing is not easily manageable for public servants
* G16: No automatic processing observed
 | 2/4 |
| *Incorporate data from other sources (Automated)* | * G17: No automated social media incorporation
* G18: No incorporation of other useful sources
 | 0/2 |
| **Total: 13/18** |

|  |  |
| --- | --- |
|  | ***Platform use*** |
| *Presence of moderator* | * G19: No person appointed to check daily for spam
* G20: No automated moderator
* G21: No report system
 | 0/3 |
| *Give feedback to the participants* | * G22: Not able to personalize feedback
* G23: Presence of feedback per categorized idea
* G24: Implements *idea status management system*
 | 2/3 |
| *Incorporate social media data***Public servants** | * G25: Integrates useful social media ideas into platform through hashtags or keywords
* G26: Only relevant ideas are included through constant monitoring
 | 2/2 |
| ***Other Characteristics*** |
| *Accessibility through different ways* | * G27: Several languages (Dutch and English), French might be needed
* G28: Allows access on mobile systems
 | 2/2 |
| *Create a participation culture* | * G29: No active input, new initiatives needed
* G30: Limited part of citizens is interested
 | 0/2 |
| *Invest in awareness* | * G31: High amount of promotion and advertising
* G32: Targeted advertising
 | 2/2 |
| *Participation as means, decisions as goal* | * G33: Decisions are taken depending on the results and impact the policy-making process
 | 1/1 |
| **Total: 1 Total: 9/15** |

1. <https://zenodo.org/record/4291804#.X79lHc1Kg2w> [↑](#footnote-ref-1)
2. [↑](#footnote-ref-2)
3. <https://leuvenmaakhetmee.be/nl-BE/> [↑](#footnote-ref-3)
4. <https://zenodo.org/record/4291816#.X79nac1Kg2w> [↑](#footnote-ref-4)
5. The framework from (Macintosh & Whyte, 2008) will hereafter be referred to as the Macintosh and Whyte-Framework. [↑](#footnote-ref-5)