E-deliberation 2.0 for smart cities: a critical assessment of two ‘idea generation’ cases

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Abstract: This paper elaborates on the importance of a user-driven approach in the design and development of innovative services and applications for smart cities. By reporting on two case studies situated in the city of Ghent (Belgium), that are part of larger projects, we illustrate how we have applied different user-centred innovation development methods and strategies in order to generate and evaluate innovative concepts and ideas for smart city applications. This paper discusses and compares the work conducted in these case studies by documenting for each case study (a) the policy context and strategy, (b) the problems addressed and the solutions achieved, and (c) the (e-)deliberation (2.0) approaches used. Furthermore, we assess the effectiveness and impact of both approaches and report on the results and the lessons learned.

Keywords: e-deliberation; smart city; ubiquitous city; digital city; ideation; idea-generation; crowdsourcing; open innovation; opportunity identification; brainstorming; user-centric methods; idea-evaluation.


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1 Introduction and structure of the paper

The world population has been steadily concentrating in cities. A ‘tipping point’ was reached in 2007 when the majority of people worldwide lived in towns or cities for the first time in history (United Nations, 2007). In addition, we also witnessed a substantial increase in the average size of urban areas. Although not as drastic or pronounced as in some other parts of the world, especially in developing nations (UNFPA, 2007), urbanisation is also unfolding in Flanders (the northern part of Belgium) (Van den Bossche, 2009). With urbanisation we refer to both the level of urban population relative to the overall population and to the rate at which cities are growing. Urbanisation highlights the increasing importance of cities which is – partly – reflected in their shift towards ‘smart cities’.

Concepts such as ‘ubiquitous’, ‘digital’ or ‘smart’ city are often used by cities themselves, to put themselves firmly on the map. Cities believe that innovative Information and Communication Technologies (ICT) infrastructures or mobile application software (‘apps’) will lever as a growth engine, both for bridging the digital divide and increasing the quality of life of its citizens (Caragliu et al., 2009; Dolente et al., 2010). Thus, the traditional conception of a city is evolving towards a new image in which the city becomes, through the use of ICT, a centre of excellence, optimising quality of life in every way possible and emphasising the development of knowledge and innovation (Hospers, 2003). Also, the increasing dependence on ICT forces us to reflect on how the digital era can be managed and on how cities can take optimal benefit of new opportunities. For that reason smart city projects or initiatives are set up all over the world.
This paper reflects on two of those ‘smart city’ projects situated in Flanders: the regionally funded project GreenWeCan and the European funded project SMARTiP. Both projects involve the city of Ghent as a (leading) partner and are (partially) situated in this city. We will describe and evaluate the (e-)deliberation 2.0 approaches used in these projects. First, the concepts smart, digital and ubiquitous city are addressed. Next, we point to the importance of e-deliberation in a smart city context and we introduce the projects GreenWeCan and SMARTiP. In the following section different user-centric and user-driven innovation strategies for the generation and evaluation of ideas for smart cities are described. In the fifth section these strategies are subsequently illustrated with the e-deliberation tools that we used in both projects. This section is followed by a critical assessment and comparison of both approaches. The paper ends with a concise discussion of the role and limitations of (e-) deliberation (2.0) approaches for innovation development for smart cities.

2 Smart, digital or ubiquitous city?

Recent literature about national urban development and improvement comprises various new concepts for labelling the integration of ICT in civic planning and management. The concepts ‘digital cities’, ‘ubiquitous cities’ and the more comprehensive ‘smart cities’ concept are frequently used to address the current (societal and political) desire to develop sustainable and participatory communities integrating the co-evolutionist perspective on the mutual shaping between society and communication technologies (Lievrouw, 2006). As the concepts of ‘smart’, ‘digital’ and ‘ubiquitous’ city are closely interconnected and have semantic similarities, it is necessary to formulate specific definitions for these concepts.

Loukis et al. (2011, p.144) define digital cities as information systems “that collect and organise the digital information of the corresponding ‘physical cities’ and provide a public information space for people living in and visiting them”. Other scholars stress the connectivity of the various stakeholder communities within the city environment (Ergazakis et al., 2011; Middleton and Bryne, 2011). According to Ergazakis et al. (2011) digital cities should offer innovative services targeting various stakeholders that are inherent to a city environment (administrations, citizens and businesses). Most definitions of a ‘digital city’ stress the network infrastructure and the channels or platforms to manage (disclose and exchange) the massive amount of information that is present in the network of digital cities. Similar to the notion of a digital city is the idea of the intelligent city, which aims at uniting, promoting, acquiring and stimulating diffusion of information and with that, the quality of life for all citizens. In order to realise this, an intelligent city should apply electronic and digital technologies and develop and embed ICTs in the city (Komninos, 2008).

Concrete initiatives of digital cities are the so called ‘U-cities’ or ‘Ubiquitous’ cities. Various cities around the globe are making efforts to set up ‘Ubiquitous city’ environments. Some examples are Helsinki’s Virtual Village, New York City’s Lower Manhattan project, the Californian Mission Bay project, the One-North project in Singapore and the U-Seoul project (Kwon and Kim, 2007; Shin, 2009). Kwon and Kim (2007, p.143) defined a U-City as “a next generation urban space” or as a “convergent form of both physical and online spaces”. Ko and Park (2008) describe the U-City as the
future city model that integrates urban innovations and includes urban management, life quality improvement and new industrial development. As the citizens, as end-users, play a crucial role in the co-creating process of the development of U-City services and applications, several researchers have studied the U-City concept from a user-centred perspective (Kwon and Kim, 2007; Choi, 2010). Kwon and Kim (2007, p.144) emphasised the importance of involving citizens in the user-oriented development process of U-City services by stating that “matching U-City residents key needs to the appropriate ubiquitous services is a critical success factor to progress the U-City implementation projects”. However, many of the former projects mainly focus on youth and specific user groups as the key players in the U-City services development processes (Choi, 2010).

The concept of ‘smart cities’ is adopted by many cities as a strategic priority that recognises the growing importance of digital technologies. At the same time the phrase is used as a marketing concept to envision a city of the future. The main focus is on cities being more ‘green’ and more accessible expressed in concepts such as ‘smart energy’, ‘smart environment’ and ‘smart mobility’, and on cities being more ‘liveable’, expressed in concepts such as ‘smart health’, ‘smart education’ and ‘smart living/working’. According to Giffinger et al. (2007), smart cities comprise six main dimensions: smart economy, smart people, smart governance, smart mobility, smart environment and smart living.

Caragliu et al. (2009, p.50) believe that a city is smart when “investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”. In engineering ‘smartness’ is often related to work on context-aware systems, ubiquitous computing and Internet-of-Things technologies (ITU, 2005). Central in all these technologies is the collection of information in a city through the use of public or private sensors. Information is made public and used in ‘smart city’ applications that transform and visualise this data on smart phones, on public/smart displays (Ojala et al., 2010) or on the web. Some examples include tracking crowds or objects in a city via Bluetooth signals (Van Londersele et al., 2009), executing parking management (Grush, 2008; Suhas et al., 2010) or obtaining ecological footprints of different regions in a city (Maisonneuve et al., 2010).

Figure 1  Visualising the conceptual overlap between digital, ubiquitous and smart cities
As Figure 1 shows, we conclude that the ‘smart city’ concept is much broader than ‘U-cities’ or ‘digital cities’ initiatives. The smart cities concept transcends the technological-deterministic discourse by actively involving all stakeholders that can provide substantial input for developing a more accessible, information based, interactive and participatory urban environment. Consequently, the co-creation of smart cities applications and services will also require user-driven research tracks to replete the purely technology-based initiatives. Ideally, smart cities will co-create and involve all relevant stakeholders from the very beginning on.

### 3 E-deliberation in a smart city context

We define e-deliberation in a smart city context as a reflective, open, fair, and rational communication process through the use of ICT. E-deliberation is an emerging body of practices that use the internet to foster such rational communication (Davies and Gangadharan, 2009; Zhang, 2010). Although the term ‘e-deliberation’ (or online deliberation) holds many different meanings and has been variously applied in a whole range of contexts (see e.g. Davies and Gangadharan, 2009) e-deliberation tools have been used to sustain participatory democracy, affording participation in agenda or budget setting, in preparatory decision or the actual decision making, in the acquisition of knowledge, citizen initiatives and so on. However, inconsistent results impede a conclusion about their positive or negative potential (Carpini et al., 2004).

Within the changing environment of cities we need to explore how we can develop innovative and inclusive services that enable community members to use ICT to connect to real-life or virtual peers, public organisations or other stakeholders. As a result, these services could leverage the general quality of life, contribute to the stimulation of social cohesiveness and facilitate the participation in democratic decision-making processes at various levels within urban environments (Ergazakis et al., 2011; Loukis et al., 2011). One of the key propositions for smart cities is to actively involve all stakeholders in new services development processes. We thus want to stress the importance of local people and their organisations taking ownership over the process of implementing and realising smart city tools or apps.

Hence, e-deliberation tools, providing citizens with a whole new set of opportunities or affordances to consult, communicate, network, interact or express their opinion, are very suited to explore how we can develop innovative and inclusive services for smart cities. In this paper, we will focus on the use of e-deliberation tools for the generation and evaluation of two different types of ideas for ‘smart city applications’. In the first project, GreenWeCan, the focus is on ‘smart’ green mobility solutions. The second project SMARTiP targets ‘smart’ city engagement ideas. Both the GreenWeCan and the SMARTiP projects have as final objective to develop mobile or browser-based future internet applications for ‘smart cities’.

In GreenWeCan (Green Wireless Efficient City Access Networks, see http://ibbt.be/en/projects/overview-projects/p/detail/greenwecan-2), a project funded by the Interdisciplinary Institute for Broadband Technology (IBBT), a ‘green’ dual wireless city access network infrastructure, consisting of a wireless local area network (WLAN) and a wireless sensor network (WSN), will be investigated. The WLAN part will be a community-based network, offering inhabitants the opportunity of sharing their internet

...
connection with the community, while the WSN part will make use of energy harvesters, able to aggregate and process (real-time) data. Both network parts will offer innovative services integrated into several geospatial applications by aggregating data from multiple sources. In addition, the community-based WLAN model has prospects to bridge the digital divide. Much attention will be paid to ‘green’ aspects such as human exposure to radiation and energy consumption savings. To validate and analyse this, a demonstrator network will be built. The primary objective of the first phase in GreenWeCan is the creation of the long list of potential ideas for ‘smart’ mobile applications.

SMARTiP (Smart Metropolitan Areas Realised Through Innovation & People, see smart-ip.eu) is a EU project funded under the CIP (Competitiveness and Innovation) framework programme. The idea of SMARTiP is to take the experience developed by a wide range of existing user-driven, open innovation initiatives in Europe and to apply this experience to the challenge of transforming public services by empowering ‘smart citizens’ who are able to use and co-produce innovative internet-enabled services within emerging ‘smart’ cities. The aim is to enable the adoption of open platforms for the co-production of citizen-centric internet-enabled services in five test-bed sites (Manchester, Ghent, Cologne, Bologna and Oulu). The objective is to enhance the ability of these cities to grow and sustain a ‘smart city’ ecosystem that can support new opportunities emerging from a dynamic co-production process. The focus is on a series of pilot projects, covering three thematic areas: Smart engagement, Smart environment and Smart mobility. The pilots aim to act as a catalyst to stimulate citizen engagement in becoming active generators of content and applications development, as well as being more informed and involved users of the developing internet-enabled services in ‘smart’ cities.

4 Innovative smart cities development strategies

We situate the exploration of how we can develop innovative and inclusive services in the methodological framework of the New Product Development (NPD) process (De Moor et al., 2010). The first phase in the NPD process is the opportunity identification process that aims to identify short- and long-term opportunities. This phase starts with idea-generation (ideation), followed by the evaluation and ranking of ideas. In this section, we will discuss two approaches, one based on crowdsourcing and one based on brainstorm sessions, for idea-generation. We will also elaborate on two methods for idea evaluation.

4.1 Idea-generation

Only recently, online crowdsourcing has emerged as a popular method for finding solutions to difficult problems and for generating ideas. Commercial as well as non-profit organisations are starting to use ‘Web 2.0’ platforms as tools (for example for the development of medicines against tuberculosis or for the design of solar technologies for rural regions).

Reichwald and Piller (2006) identify two different forms of user involvement in ‘crowdsourcing’: ‘mass customisation’ (enabling consumers and customers to create and buy a personalised product or service) and ‘open innovation with customers’
(a cooperative relation between a firm or organisation and its customers for developing new products or services). Poetz and Schreier (2012) position crowdsourcing as a process relying on self-selection among users willing and able to respond to widely broadcast idea generation competitions, against the active company-initiated search for specific types of users with the most promising ideas.

Crowdsourcing processes involve three different stakeholders: the individuals forming ‘the crowd’, the companies or organisations looking to benefit from the crowds’ input, and an intermediation platform, the so-called ‘crowdsourcing enabler’ (Schenk and Guittard, 2009).

Some well-known examples of ‘crowdsourcing enablers’ or platforms are CrowdSpring, Amazon’s Mechanical Turk or InnoCentive. Schenk and Guittard (2009) characterise crowdsourcing on two dimensions (selection and task characteristics) enabling them to differentiate crowdsourcing initiatives. Their first dimension ranges from integrative crowdsourcing to selective crowdsourcing. With the former, many individual inputs together afford the completion of a much larger task, thus bringing value to the firm or institution. In the latter case, the client firm chooses an input from a set of options that the crowd has provided. The second dimension in crowdsourcing distinguishes between routine tasks, complex tasks and creative tasks.

Another method for idea-generation is brainstorming. Brainstorming needs to take into account four ground rules: participants must refrain from criticism, they must hold themselves open to wild or unusual ideas and they need to build and expand on the ideas of others (Osborn, 1957; Reinig and Briggs, 2008). The modern translation of these four ground principles are represented as ‘idea killers’ (Byttebier and Vullings, 2007). The choice to start brainstorm sessions from a broad perspective is based on the widely held quantity-quality conjecture that an increase in the quantity of brainstormed ideas, might directly stimulate the production of more qualitative ideas and therefore raise the number of opportunities (Gallupe et al., 1991; Briggs et al., 1997). Even though the relationship is certainly not linear but rather curvilinear with a positive but decreasing slope (Reinig and Briggs, 2008), we are convinced that this positive relationship is an argument for brainstorm sessions with a wide ideation process as a starting point.

4.2 Idea-evaluation

A second phase in the innovation development process consists of the screening, evaluation and ranking of a wide range of potential ideas. The final deliverable of this phase should be a short list of ideas that can serve as input for the next steps in the smart city application development process.

Based on an extensive comparative study of R&D evaluation techniques, Poh et al. (2001) have looked into the various factors and characteristics of R&D evaluation methods that affect suitability. Especially interesting are weighing and ranking methods since they afford to compute relative weights and rank sets of ideas. Poh et al. (2001) concluded that, of the weighing and ranking methods, the scoring method is the most advantageous method for idea evaluation since this method integrates multiple dimensions and multiple stakeholders (both experts as potential end-users in this case). Moreover, scoring parameters can be construed in collaboration with various stakeholders.
Another method for the evaluation and ranking of ideas is the ‘voting up’ of the best ideas to the top. Implemented on a crowdsourcing enabler, this design pattern, known as ‘vote to promote’, also enables the filtering and structuring of ideas based on the generated ‘attention metadata’ in categories such as ‘most commented’, ‘most popular’ or ‘newest’. Evaluation and ranking of ideas through crowdsourcing shows how Web 2.0 platforms can be used to evaluate and rank ideas. Authors such as O’Reilly (2003), Boyd (2005), Warr (2008) and Hoegg et al. (2006) emphasise this supporting role of Web 2.0 sites and services. They state that ‘creating network effects through an architecture of participation’ (O’Reilly, 2005) and ‘mutually maximising collective intelligence’ (Hoegg et al., 2006) articulates the central principle of Web 2.0 and that all other Web 2.0 principles feed into this idea.

5 Illustrating innovation development strategies with two smart city case studies

Both the GreenWeCan project and the SMARTiP project employed user-centric and user-driven innovation methods for idea-generation and opportunity identification in order to design and develop applications for smart cities. Both projects are also situated in the same local cultural environment (the Flemish city of Ghent). While the former project relied on ‘offline’ brainstorming as an ideation protocol and (expert) evaluation by means of an online quantitative scoring tool, the latter project used an online crowdsourcing enabler for its innovation development process. This online ‘Web 2.0’ platform was used for bottom-up idea-generation as well as for idea-evaluation through a collaborative scoring process.

5.1 GreenWeCan’s user-driven innovation development strategy

GreenWeCan resorted to brainstorm sessions for the ideation phase and used expert evaluations and an end-user survey to assess and rank the generated ideas (see Figure 2).

**Figure 2** Innovation development strategies for GreenWeCan and SMARTiP
5.1.1 Idea-generation

For GreenWeCan we opted for brainstorming as an ideation protocol. In total, two brainstorm sessions with a heterogeneous group of potential end-users and four brainstorm sessions with project partners (software developers, hardware suppliers, experts and scholars) were conducted. To overcome the limited imaginative capacity of people in qualitative research, we used time-use frameworks and a set of predefined application clusters to provide the participants with some inspiration and facilitate the ideation process. For the prioritisation of certain application domains, we used the COCD box exercise (Byttebier and Vullings, 2007). Subsequent to the ideation phase in the brainstorm sessions, the participants are asked to allocate blue (now ideas), yellow (how ideas), red (wow ideas) and green (high GreenWeCan potential) markers to the generated ideas for potential applications. This enabled us to take a step towards prioritisation and evaluation. As a conversation trigger we discussed the feasibility and innovativeness of the ideas that were allocated the highest number of markers.

The output of this ideation phase was rather extensive: 267 ideas were generated in the six brainstorm sessions in which 38 people took part. After deleting the duplicates, merging similar ideas and making a first rudimentary selection based on project determined requirements the long list could be categorised into ten domains. Especially the domains ‘smart mobility’, ‘guiding applications’ and ‘social bonding applications’ had more ideas than average. The category ‘user specific services’ was the eye catcher with 23 generated ideas.

5.1.2 Idea evaluation

The second phase of the innovation development process in GreenWeCan consisted of screening, evaluating and ranking the wide range of potential ideas that were generated. The expert evaluation tool consisted out of a quantitative scoring tool. The ideas of the long list were rated (5 point scales) on 12 criteria: 8 criteria (location based, real-time, accessibility, green potential, potential for sensor technology, feasibility, innovativeness and valorisation potential) were allocated a higher weight because of their high relevance for the project. Four other criteria referred to the added value for the various stakeholders (residents, tourists, business users and governments). In total 38 experts filled out the evaluation tool, each evaluating 28 ideas. Their input resulted in an Expert Potential Index (EPI), ranking the ideas from an expert perspective. This EPI was later integrated into the final Confrontation Index (CI) (see Table 1).

Next, an online end-user assessment survey was disseminated. This survey integrated profiling questions (for segmentation purposes) and applications assessment questions (attitude towards the application, trial and usage intention, potential usage occasions, usage barriers/drivers and willingness to pay). As for the end-user assessment survey, 413 respondents each rated five applications via an online survey. An ‘End-User Potential Index’ (EUPI) was calculated and used for ranking the applications. The EUPI reflects the mean of nine assessment criteria (likeability, interest, trial, usage intention, potential to make life easier, personal added value, trendiness, newness, improvement of existing technology) that were assessed on 5-point Likert scales. The Cronbach’s alpha values of the scales exceeded 0.70, supporting the internal validity of the scales.
Eventually, a confrontation index (CI) was calculated, integrating both the Expert Potential Index (EPI) and the End-User Potential index (EUPI) (see Table 1). This CI integrated both the technical-oriented assessment from experts and the public interest-oriented assessments from (potential) end-users, thus ensuring that both technical/instrumental and socially- or public-interest oriented evaluation factors are taken into account.

In general, the results of the idea-evaluation phase for GreenWeCan show that the top three ideas consists of applications in the mobility & parking domain: the personal parking assistant, the ‘pick a bike’ bike rental service and the personal travel assistant (see Table 1). These applications have the highest Confrontation Indices but they also have the smallest gap between the expert evaluation and the end-user evaluation indices, which means that there is mutual agreement on the potential. For the personal parking assistant for disabled people and the environmental monitor, there is an average confrontation index, but there is a large gap between the expert and end-user evaluations. For the parking application for disabled this can be explained by the specific target group since the low end-user potential score can be allocated to the fact that there was no sub-sample of specific target group members to assess the application.

### Table 1  Top 5 GreenWeCan ideas with EPI (Expert Potential Index), EUPI (End-User Potential Index), CI (Confrontation Index)

<table>
<thead>
<tr>
<th>Application</th>
<th>EPI (weighed/100)</th>
<th>EUPI (/100)</th>
<th>CI (/100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal parking assistant</td>
<td>78.6</td>
<td>72.8</td>
<td>75.7</td>
</tr>
<tr>
<td>Pick a bike: location based bike rental</td>
<td>78.9</td>
<td>69.4</td>
<td>74.1</td>
</tr>
<tr>
<td>Personal travel assistant</td>
<td>72.6</td>
<td>75.3</td>
<td>74.0</td>
</tr>
<tr>
<td>Road works in progress: real-time and location based</td>
<td>71.5</td>
<td>73.1</td>
<td>72.3</td>
</tr>
<tr>
<td>Wait a minute: queue calculator</td>
<td>72.5</td>
<td>70.1</td>
<td>71.3</td>
</tr>
</tbody>
</table>

5.2 SMARTiP’s user-driven innovation development strategy

Figure 2 shows how SMARTiP implemented an online crowdsourcing enabler for both innovation development phases.

5.2.1 Idea generation

Similar to GreenWeCan, the goal of the work in SMARTiP was to create a list with a broad range of applications (including ‘wild ideas’) for smart (city) engagement. In contrast to GreenWeCan, we choose for an online idea generation approach based on a crowdsourcing process. In collaboration with the city of Ghent we launched an online crowdsourcing platform in the beginning of April 2011. The platform was based on proprietary software of UserVoice (uservoice.com). UserVoice provides hosted feedback forums, which allow customers to create, discuss, and vote for ideas. It encompasses an online forum structured around users providing actionable ideas and users ‘voting up’ the best ideas to the top (with an extra constraint of having a limited number of votes to spend, thus focusing people on what is really important to them).
The stakeholders involved in this crowdsourcing process were about 5500 internet users who learned about or discovered the website, the city of Ghent and research institution IBBT and the intermediation platform ‘Mijn Digitaal Idee voor Gent’ (My Digital Idea for Ghent). The question that the visitors of the website Mijndigitaalideevoorgent.be were asked to answer was: ‘How can ICT make it even more pleasant to live in Ghent?’ The crowdsourcing enabler was officially launched on 1 April 2011 at the weekly press conference of the city of Ghent. Although, the website’s launch got very little press coverage, our crowdsourcing website got ‘picked up’ in the conversations on Web 2.0 platforms and social networking sites such as Facebook, Twitter and LinkedIn. Furthermore, we disseminated the URL (to the crowdsourcing platform) via an electronic newsletter to students in the city.

5.2.2 Idea evaluation

Similar to GreenWeCan, the second phase of the innovation development process in SMARTiP consisted of the evaluation and ranking of the generated ideas. In contrast to GreenWeCan, that used a quantitative scoring tool to poll experts and an online survey to poll end-users, SMARTiP used the crowdsourcing enabler and the community of users that had gathered around it during the ideation phase, to evaluate and rank the submitted ideas. The crowdsourcing enabler encompassed by default an online forum and a voting module affording users to ‘vote up’ the best ideas. More than 1400 people registered their e-mail on Mijndigitaalideevoorgent.be, enabling them to submit an idea or cast votes on already submitted ideas.

For SMARTiP, a total of 128 ideas were submitted via the online crowdsourcing enabler. Idea submitters could choose a pre-defined category for their ideas. Especially the categories ‘E-government’, ‘Mobility’ and ‘Other’ received lots of ideas (more than 20). Categories such as ‘Houses’, ‘Security’ and ‘Sport’ only received a couple of ideas.

Table 2 shows the top 5 ideas for the SMARTiP project with the amount of votes and comments that each idea received. Especially the ideas ‘Multifunctional application or website’, ‘Digital information kiosks placed in the city’ and ‘ASUM: Automatic System for Unified Mobility’ proved to be very popular, not only in the amount of votes they received but also in the comments that were submitted on these ideas.

<table>
<thead>
<tr>
<th>Idea</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multifunctional application or website</td>
<td>812</td>
<td>54</td>
</tr>
<tr>
<td>Digital information kiosks placed in the city</td>
<td>662</td>
<td>91</td>
</tr>
<tr>
<td>ASUM: Automatic System for Unified Mobility</td>
<td>397</td>
<td>1</td>
</tr>
<tr>
<td>Digital opinion/feedback platform for urban projects</td>
<td>224</td>
<td>3</td>
</tr>
<tr>
<td>A mobile app for the Ghent street festival</td>
<td>222</td>
<td>15</td>
</tr>
</tbody>
</table>

6 Comparing two user-centric driven innovation development strategies

In order to evaluate whether or not the desired e-deliberation effects were reached, we created a framework of evaluation criteria. Based on Saebo et al. (2008) we included the following criteria for our evaluation efforts: (a) quantity of participation, (b) demographics
of participants, (c) tone and style in the activities. These criteria were complemented with two result-oriented evaluation criteria that were decided upon in agreement with all the participating project partners prior to the implementation and roll-out of the e-deliberation tools: (d) amount of ideas received: at least 100 for both projects, (e) relevance of ideas received (for GreenWeCan: ideas on ‘smart’ mobility, for SMARTiP: ideas on ‘smart’ engagement). We also decided to take into account the time and effort that both e-deliberation processes required for the project partners: (f) time needed to implement the (e-)deliberation tool. Based on these six criteria the e-deliberation processes in GreenWeCan and SMARTiP were evaluated.

6.1 Quantity of participation

The idea-generation phase in GreenWeCan, used a brainstorm technique and, hence, did not target a large amount of participants. After all, brainstorm sessions are, as a qualitative approach, rather focused on in-depth understanding of human behaviour and choices, on the why and how of people’s decisions (Neumann, 1994). Still, almost 40 stakeholders participated in six brainstorm sessions. GreenWeCan’s idea-evaluation process included more than 30 experts and 400 end-user respondents who participated through an online survey in the selection of the top ideas.

With regards to the SMARTiP project, quite a lot of people visited the crowdsourcing enabler (about 5500 internet users). However, only about one third of them was actively involved and contributed an idea or helped evaluating the ideas on the crowdsourcing enabler.

Although there were no goals in terms of the number of participants set in advance, these quantities of participation in the e-deliberation processes were evaluated by both GreenWeCan’s and SMARTiP’s project partners as sufficient and adequate.

6.2 Demographics of participants

One of the main differences between both projects is the insight that their e-deliberation processes provide in the (socio-)demographics of the participants.

In GreenWeCan participants for the brainstorm sessions and expert consultation could be clearly delineated and recruited. Also, its online evaluation survey to end-users encompassed questions on the (socio-)demographic profile of the respondents, thus enabling a clear picture of the participants in the e-deliberation process.

In SMARTiP however, little was known about the visitors of the crowdsourcing platform and the participants in the e-deliberation process. At best, some insights in the demographics of participants could be gained through the analysis of the server logs. However, participants needed to provide an e-mail to register on the crowdsourcing platform. Thus, further information about the participants can be collected later on – if needed – by contacting them via e-mail.

6.3 Tone and style in the (online) activities

GreenWeCan encompassed an ‘offline’ deliberation process: brainstorm sessions. Thus, the moderators could encourage participants to elaborate on certain ideas and could provide stimuli to overcome limited imaginative capacities. Brainstorm sessions also support dynamic real time face-to-face-interaction between people.
This was obviously not the case for SMARTiP. However, as already stated, the crowdsourcing platform supported online inter-personal interaction by means of comments on the submitted ideas. We noticed that certain ideas sparked some lively conversations on the crowdsourcing platform, with people commenting on other people’s comments and with some ideas receiving more than 50 comments. The tone and style of these conversations remained civil and polite; the crowdsourcing moderator did not need to remove or censor any of them.

6.4 Amount of ideas received

Comparing the two innovation development strategies shows that both afford the generation of a significant amount of ideas. GreenWeCan as well as SMARTiP wanted to obtain a long list of at least hundred ideas for mobility or engagement apps in smart cities. This amount was easily achieved. In GreenWeCan, based on six brainstorm sessions, 267 ideas were generated. SMARTiP generated, through ideation and idea-evaluation on an online crowdsourcing platform, 128 ideas.

6.5 Relevance of ideas received

An analysis of the type of ideas that were submitted illustrates the different scope of both projects. Although ideas on city mobility are well represented in both projects (suggesting that Ghent citizens want more help and assistance in navigating and travelling through the busy and bustling streets of the city), the submitted ideas in SMARTiP were closer related to topics on ‘liveable’ cities, while the generated ideas in GreenWeCan were more on greener cities and access to city services. Comparing the output of the two idea-evaluation strategies we notice that; while mobility (and to a lesser extent monitoring) solutions made up the top ranked ideas in GreenWeCan, the most popular ideas that emerged out of the collaborative filtering process on SMARTiP’s crowdsourcing enabler addressed issues related to living in a city and the engagement of citizens with the city.

6.6 Time or effort needed to implement (e-)deliberation tool

In contrast to the ideation phase in SMARTiP, conducting brainstorm for GreenWeCan required a lot of effort, energy and time. Implementing a crowdsourcing enabler for SMARTiP proved to be an easy, almost ‘out-of-the-box’ solution and required less effort. There were less practical and organisational issues to cope with compared to conducting brainstorm (such as finding a suitable location and available date, motivating participants to show up or to actively engage in the conversation …).

7 Discussion and conclusion

Although the ideation and evaluation methods in both projects differ, the outcome of both approaches has a common objective: to generate and deliberate valuable, qualitative potential ideas for innovation opportunities in a smart city context by means of stakeholder participation throughout the entire product development process. In general
the user-centric innovation development strategies of GreenWeCan and SMARTiP were evaluated positive for the six predefined criteria (quantity of participation, demographics of participants, tone and style of activities, amount and relevance of ideas received, and time or effort needed to implement the (e-)deliberation tool).

We conclude that both idea-generation and -evaluation strategies work and that they enabled us to create and rank interesting ideas for mobility (GreenWeCan) and engagement (SMARTiP) ideas or apps in smart cities. Both ‘traditional’ brainstorm sessions, online expert and end-user surveys, as well as online crowdsourcing, proved to be efficient methods for idea-generation and -evaluation. However, they both also have their limitations.

On a general level group discussion and brainstorm sessions have been criticised for ‘political correctness’ or ‘spirals of silence’ because social pressures can inhibit the expression of minority opinions and people may find it uncomfortable to disagree. Online expert- and end-user surveys and crowdsourcing, on the other hand, can be criticised, as electronic text-based interactions, for their superficiality and their tendency to encourage ‘enclave’ communication among very like-minded citizens (see e.g. Sunstein, 2001). They also ignore the ‘digital divide’ (Price, 2009).

In order to tackle these issues, ideally, both methods are integrated in the research design, so that the innovation development process can benefit of both offline qualitative, and online quantitative methods.

The results of the crowdsourcing enabler and the collaborative filtering that took place there, and the results of the GreenWeCan user-centric driven innovation development strategy, reveal that the participants especially emphasise generic tools or platforms: one-stop service points where they can find all the information they need on any subject. These one-stop service points should provide personalised information and should also offer social affordances to start a dialogue and direct interaction with the city council or with other citizens.

In this paper, we have focused on the importance of user-driven research in the development processes of new services and applications for smart cities. These new products and applications are one of the two main components in the smart city concept, next to the enrolment of an efficient network infrastructure. From a social scientific perspective, the importance of user involvement from the early stages in the new product development processes is indispensable since the development of products and services that take into account the end-users needs and preferences will stimulate positive user experiences and faster adoption rates by a diverse range of stakeholders in the urban community.

Future work in both GreenWeCan and SMARTiP includes the selection of several use cases for development and testing in a proof-of-concept context. Potential user segmentation and profiling analyses will provide both projects with more information on the target groups. In this way, we can involve not only the opinion leaders and lead users, but also other user groups that can provide valuable contributions throughout the entire product development process.

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References


