”Thanks for Your Input. We will get Back to you Shortly.” How to Design Automated Feedback in Location-Based Citizen Participation Systems

Andreas Sackl, Sarah-Kristin Thiel, Peter Fröhlich, Manfred Tscheligi

Abstract Location-based citizen participation systems have so far mostly been characterized by mediated human-to-human communication between citizens, authorities and other stakeholders. However, in the near future we will see more automatized feedback elements, which inform citizens about the expectable financial or legal implications of their requests. We conducted an experiment to provide research-driven guidance for interaction design in this application context. Thirty participants submitted tree planting proposals with an experimental prototype that varied along the dimensions immediacy, implicitness, and precision. They rated the different forms of provided automatic feedback with regard to satisfaction, and they ranked them in a subsequent card sorting trial. The results show that users have considerably high expectations towards the immediacy and precision of automated feedback, regardless of the inherently higher responsiveness compared to human-operated participation systems. With regard to interaction design, results indicate that the automatically processed information should be made available as early and as possible to users.

Andreas Sackl
AIT, Giefinggasse 2 Vienna Austria, e-mail: andreas.sackl@ait.ac.at

Sarah-Kristin Thiel
AIT, Giefinggasse 2 Vienna Austria e-mail: sarah.kristin.thiel@gmail.com

Peter Fröhlich
AIT, Giefinggasse 2 Vienna Austria e-mail: peter.froehlich@ait.ac.at

Manfred Tscheligi
AIT, Giefinggasse 2 Vienna Austria e-mail: manfred.tscheligi@ait.ac.at

1 Introduction

The research field smart cities investigates various aspects of modern urban systems to provide profound solutions for actual and upcoming issues and challenges like sustainable energy generation and consumption, mobility concepts. The integration of citizen in urban development processes is one of the key challenges in this research context. For this type of active citizen participation, location-based services (LBS) need to be designed and implemented in a way that the resulting user experience is high enough to encourage citizens to actively use the system. So, in this paper we want to address user-centric design issues and how these aspects should be implemented in LBS-based citizen participation systems.

Citizen participation has become a central aspect of modern societies, and there is an increasing amount of interactive computing systems that help innovate the way people discuss, contribute and influence public decisions [6]. However, as the recent history on eParticipation shows, the roll out of specialized platforms rarely scales and typically does not reach a large amount of users [23]. Studies have shown that citizens' satisfaction with participation technologies is, amongst other factors (e.g., user-friendliness of the application, trust in politics), determined by authorities' responsiveness to citizens [17, 20, 33, 11]. Also, receiving meaningful feedback from authorities helps increase citizens' internal political efficacy (i.e., their subjective belief that they understand community issues) [14]. These requirements of timely and meaningful feedback are clearly not sufficiently met in current digital participation services.

Although the paradigm of such services is slowly changing from one-way to more interactive participation forms [6, 18], there still seem to be significant barriers for responsiveness [30]. A central problem often mentioned by administrative staff who have to deal with citizens' initially posted contributions is that these are often perceived as ”naive” in terms of their administrative, legal or economic implications. In that respect officials wish for ”better qualified” complaints and proposals [3]. For example, suggestions for the location of a new bus stop may not take into account certain traffic regulations or road construction constraints. In such cases, much effort is needed to provide feedback to citizens on ”basic issues”, without actually gaining significant benefits for their urban planning work.

In order to provide solutions to this problem space, automatic feedback technology has been proposed that may enable citizens to probe and refine their ideas, which in turn should provide urban planners and city authorities with validated, 'useful' input [22, 32]. In order to provide meaningful feedback that allows for a higher level of participation (i.e. from consolidation to cooperation; see [29]), communication with authorities should go beyond currently available solutions of ”bots” that compile databases to help with automatizing customer services, tax return process [12], or voting procedures [21]. Rather, it should offer answers and ideally also comment to citizens' requests. For instance, when proposing the development of a new park at a certain location, the feedback should give an indication of whether that is in principle possible.

2 Related Work

In recent years e-participation platforms have been ported to mobile devices. With their manifold features and sensors (e.g. gyroscope, GPS), devices such as smartphones allow to augment citizens' input with valuable information making them even more meaningful for representatives [9]. Considering the wide penetration of mobile devices [cite stats], making use of this technology is anticipated to broaden the scope of involved citizens and potentially also encourage those previously eager to participate. With mobile technology facilitating in-situ location-based participation (i.e., collecting input directly from citizens on-site, [16]), this participation method further mitigates traditional participation barriers (i.e., spatial and temporal).

Albeit existing mobile participation services including affordances such as location-awareness [25], taking pictures and even augmented reality [1], it has been stated that available applications do not exploit the potential of pervasive technology such as mobile devices by far [7]. Previous research in the field of e-participation mostly focused on exploring novel interaction techniques [31, 27] as well as the integration of open data. While employing novel technology arguably attracts curiosity, we see relevance in addressing prevailing challenges of participation first. The one addressed with the study presented in this paper is associated with unmet expectations of e-participation. By capitalizing on open data, it is aimed to make content produced in participation platforms more relevant for both citizens and city officials as well as improving the responsiveness by providing automatic feedback. With the latter it is further envisioned to relieve city officials.

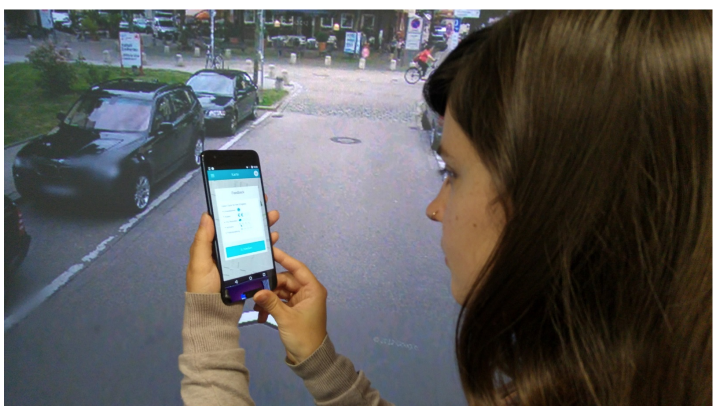

Fig. 1 Test user receives feedback on the clickable prototype & Google Street view is displayed in the background as context simulation to enhance involvement.

3 Goals and hypotheses

The location-based technology that could enable such levels of an informed dialog between the city and their inhabitants is still at a research stage [34]. Apart from questions related to the feasibility of semantic processing of open data, the interaction design space has so far not been explored. The main goal of the user study presented in this paper is to evaluate how automated feedback has to be implemented in a location-based, participatory application to match the needs of the users. Our main focus of interest is on the user experience in terms of satisfaction. The following section discusses the related hypotheses.

3.1 Immediacy (H1)

A critical success factor associated with personalized feedback is the time-lag between the complaint/request and the governmental answer [13, 34]. While automatic feedback is in itself significantly faster than the response by a human administrator, studies on system response time (SRT) in interactive systems (e.g. [15, 28, 24]) indicate that users may even be sensitive to small delays of one or more seconds. Hence, we assume that *fast feedback* (=low delay between sending proposal and receiving feedback) is crucial in our context (Hypothesis H1.1).

We also hypothesize that in correspondence to classical studies on system response time [15], users in this application context are also more tolerant regarding higher response delays, if *additional information* (e.g. ”data is transmitted to the server”) is provided while the data is processed at the server (Hypothesis H1.2).

3.2 Precision (H2)

A crucial aspect with regard to the feasibility of location-based, automatic feedback is the level of detail and accuracy that must be provided by the system. We posit that learning about costs of various proposals such as the planting of a tree will render citizens more sensible about the complexity of its implementation and value. We assume that *precise information about costs* are preferred compared to providing a range of costs or price probabilities (Hypothesis H2). However, we also expect that, in case of unavailability of precise data, the provision of less definite information are viable, such as a price range or probabilities.

3.3 Implicitness (H3)

Apart from the above discussed issues , guidance is also needed on how and at what point in the participation process to display information in the interface. Usability research and practice have shown that providing implicit feedback, such as using mouse-over effects (cf. [8, 19]), should be implemented, i.e., available information can be displayed without changing the screen state. Hence, instead of the classical way of subsequently providing the feedback *after* the user's suggestion, users may even want information on possible options *before* posting their suggestion. In this sense, our hypothesis is that citizens wish for a *highlighting of constraints* related to their proposals, e.g. when placing objects on a map (Hypothesis H3).

3.4 Social awareness (H4)

Citizen participation is a process of social exchange, and it has been demonstrated that knowledge about what the community is thinking is an important feature in such platforms. For example, it has been suggested that particularly for siting problems combining individually developed ”idea maps” can support the identification of physically and socially robust solutions [5]. Simão adds, that the indication of other users' contributions provides a strong sense of the public's feelings [26]. Moreover, social awareness is a condition of collective reflection, which enables citizens to broaden their knowledge and understanding of processes and specific roles in urban government [10]. Thus, also when developing automated feedback functions it is important to consider ways to embed social awareness in the interaction. Based on the above mentioned findings from standard participation platforms, we assume that information about existing proposals should be communicated *before the user submits* a new proposal instead of providing this information after the submission (Hypothesis H4).

4 Method

To test the above stated hypotheses, we conducted an experimental user study with 30 participants (16 males, 14 females) in an enriched laboratory setting. For the test participant selection, that was done by a specialized market research company, volunteer sampling was employed while taking care to achieve a balanced sample. Test persons were compensated for their participation. The mean age was 36.9 years, 10 (33%) participants were between 18 and 30 years old, 11 (36%) participants were between 31 and 45 years old and 9 (31%) participants were older than 45 years. Two of the participants (6.7%) had completed only the compulsory school. Seven persons (23.3%) owned a degree from a professional school or a apprenticeship. Five participants (16.7%) had a grammar school qualification. Six participants (20%) had either a vocational school or college degree; 33.3% of the study sample (ten persons) owned a university degree. All study participants were experienced with smartphone usage, and one third had used a digital participation platform before. Only one third of this user group received some kind of a feedback while interacting with this system. In terms of age and education level, our sample matches typical users of mobile e-participation platforms [2].

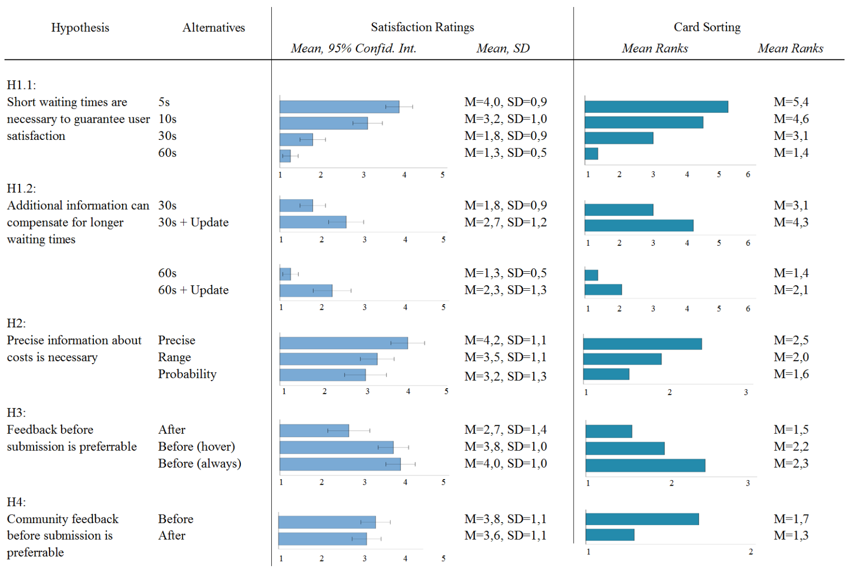

Fig. 2 Overview of Results. The middle column provides mean satisfaction ratings and 95-percent confidence intervals from the experimental part; 1 stands for "not satisfied" and 5 for "very satisfied". In the right column "Card Sorting", the means of the inverted ranks from the card sorting part are displayed; "1" represents the least preferred option and "5" stands for the most preferred option.

We focused on the concrete user task of proposing tree planting positions by means of a map-based mobile participation app, as this had been identified by city officials to be both relevant and representative for the exploration of the idea of automatic feedback in citizen participation. Participants used a clickable HTML5/JS-prototype on a smartphone to place a tree symbol on a 2D map to create a proposal about a new tree, which should be planted at the selected position. Then, the submitted proposal was processed on a server and feedback was transmitted to the smartphone and displayed, see Figure 1 for an example. Figure 1 also shows that the user was standing in front of a large projection of Google Street View. This context simulation was meant to enhance the immersivity of the laboratory setup (please see [4] for a detailed discussion about immersivity in laboratory settings).

In the experimental part of the study, there were four test blocks, which were corresponding to the four investigated issues (see Figure 2, left side). These blocks and the respective study alternatives within the block were presented to the participants in random order. Each condition was complemented by a short question about satisfaction ("How satisfied were you with the feedback related to the specific aspect?") with answering options ranging from "not satisfied" (=1) to "very satisfied" (=5). Furthermore, after each condition, participants were interviewed about the currently evaluated aspect to get further qualitative feedback.

In the sub-test related to immediacy, the conditions to test H1.1 were realized by presenting a default feedback page with different delays (5, 10, 30, and 60 seconds). To validate H1.2 there were two further alternatives which provided additional feedback during the loading phase (e.g. "Request is sent to the server", "Data is being analyzed"). For the precision sub-test (H2), information was given either as the precise costs ("6000€"), a range of costs ("between 4000€ and 8000€") or a probability ("6000€ (80% accuracy)"). In the implicitness sub-test (H3), one alternative included feedback *after* a submission and two further alternatives presented the respective information *before* the submission: always visible or only visible when hovering over the respective area. For the social awareness sub-test (H4), information about others' opinions were either provided *before* or *after* submission of the proposal.

After this experimental part, participants were asked to complete an adapted card sorting exercise, to gain a direct comparative view on user preference of the provided alternatives. The participants were asked to define their "perfect" interface for immediate feedback in the context of location-based citizen participation. All alternatives were printed out on cards and the users laid them in the order of their preference. Also the card-sort task was complemented with a short interview to better interpret and weight participants' responses.

5 Results

In Figure 2, bar charts and descriptive statistics, the satisfaction ratings from the experiment and the preference ranks from the card sorting activity are shown, grouped by the four sub-tests, their related hypotheses and experimental alternatives. For each of the above mentioned experimental alternatives, we calculated Kendall rank correlations between the mean satisfaction ratings and card sorting rank values that were derived from the experimental and the card sorting part, respectively. These correlations were significant (p¡0.05), except for the alternatives of H4. Thus, participants mostly provided consistent feedback about the satisfaction of the aspects (evaluated via the clickable prototype in the experimental part) and the individually selected interfaces (via card sorting). In order to derive evidence on the pairwise statistical differences between the experimental alternatives, we decided to calculate Wilcoxon signed-ranks tests, as normal distribution of our data could not be assumed. The significance threshold was p¡0,5, which was Bonferroni-adjusted in each test block to avoid alpha-error inflation.

Immediacy: The immediacy sub-test (see the related results grouped under H1.1 and H1.2 in Figure 2) resulted in significant differences for all comparisons. Satisfaction already diminished at short delays (H1.1) and continuously decreased with longer delays. Correspondingly, many participants said that waiting times of up to 10 seconds would be acceptable for them, based on their experiences with other mobile apps. In their responses, only few participants appeared to consider performance feasibility aspects of automated feedback systems, such as the processing of open data, and thus conceded 30 seconds to be still tolerable. The results for H1.2 also show that additional information about data processing compensated for longer waiting times to some extent: users were more satisfied even if they had to wait longer for the feedback. A participant explained this willingness to wait by arguing ”[...] when I see that something is happening and that there is an effort to get the necessary data then it’s okay to wait longer”. Another participant added that promptness surpasses additional information.

Precision: In the precision sub-test (H2 in Figure 2), displaying precise pricing information was rated significantly better than providing a range or probability. Comparing the preference for range and cost, no statistically significant difference was found. Some participants however stated that displaying a range of estimated costs, rather than the precise amount, would be more realistic and honest. Also it was stated that if inaccuracies cannot be avoided, the term ”ca.” could be used instead of displaying a range or probabilities, because among others ”you need to calculate the value to understand what the probability means”. Participants further stressed the importance of communicating that the provided value might not be exact and might vary to some degree.

Implicitness: With regard to implicitness of feedback (confer H3 in Figure 2), test participants significantly preferred getting information about alternatives (i.e. where it is generally possible or not to plant a tree) before an actual proposal was made, as opposed to receiving this feedback afterwards. Participants highlighted that they do not want to ”waste time by hazarding guesses” of where a tree might be plantable. In addition, many participants mentioned that an important feature would be to get information about the reasons why a certain tree cannot be planted in a certain area before submission is sent. There was no significant difference between the two approaches for offering feedback before the submission is transmitted, i.e., displayed when hovering vs. always displayed. Participants preferring the hovering approach highlighted its dynamic and playful interaction and better map visibility, while those favoring the persistent visibility liked to see all information without further need to act. The downside of the map becoming too cluttered was also uttered several times.

Social awareness: As regards social awareness (confer H4 in Figure 2), results on when community opinion should be disclosed to users was not consistent among participants. Some stated they would like to make their own decision and thus would not want to see the other users, while others participants saw the aspect of getting influenced as a positive feature. One of this positive aspects of being able to see other users’ proposals beforehand was based on the assumption that ”other users propose the planting of trees in regions they are familiar with”, hence increasing the meaningfulness of the suggestion. Related to that argument is the statement of another user who stated that s/he would not mind seeing the suggestions after submission in case s/he is familiar with the area; otherwise s/he would prefer to see them beforehand. The statistical analysis of the satisfaction scores revealed no significant differences, but the comparison preference ranks from the card sorting resulted in a significantly higher preference for displaying the community opinion *before*, rather than *after* proposal submission.

Relevance of feedback: In order to verify the assumed necessity of providing (automatic) feedback in context of public participation, we further asked participants to indicate how they perceive the impact of feedback. This was done after the experimental part of the study in the form of a short questionnaire using 5-point Likert scales. More than half of all participants fully agreed to the statement that it is essential for participation services to provide feedback (*M*=4,43, *SD*=.82). Only one participant indicated to not entirely agree. Aiming to explore the potential impact of feedback, we further assessed its influence on motivation and trust. Regarding motivation, 67% agreed to the statement that being provided feedback would increase their motivation to actively engage in participatory processes. Hence, feedback can be considered as a highly contributing factor to promote public participation. Participants however were more skeptic about feedback's impact on their trust in institutions such as city administration (*M*=3.70, *SD*= 1.40).

6 Conclusions

Referring back to our hypotheses, we can say that H1.1 was confirmed: user satisfaction is decreased if longer waiting times are experienced. Our observation, that already 10 seconds are regarded as a minimum quality threshold by the majority of users, points to an important requirement that designers should seriously consider in the conception of future location-based automated feedback features. The benefit of time savings compared to standard participation setups, where people often wait for days or weeks to receive feedback, obviously are overriden by expectations evoked by "fast" mobile apps and Web services. Our finding that longer waiting times can be compensated by displaying additional information about the feedback process confirms research hypothesis H1.2. We assume, that by using more advanced forms of progress feedback than we had in this experiment, expectations could be managed even to a better extent.

Also hypothesis H2 was verified, that is, precise information about costs of the submitted proposal should be communicated as often as possible. This implies even more demanding requirements on automated feedback technology for digital participation. However, our qualitative data also suggests that there remains a certain tolerance, i.e., some participants appreciated that authorities and companies are not always in the position to provide definite figures (e.g. due to liability concerns, insufficient data availability, etc.). Two of such alternatives to enhance "fuzziness" of information have been tested, but no clear preference between the price range and the probabilities could be found. We also discussed further suggestions with the test participants, such as using disclaimers like ”ca.”. Follow-up studies should seek to get more conclusive insight into the optimal trade-off between information precision and real-world feasibility in various contexts.

With regard to implicitness, we could also confirm hypothesis H3, as the presentation of available options before proposal submission led to higher user satisfaction than afterwards. Enabling social awareness is, not surprisingly, also highly important for the design of automated feedback in location-based participation systems. With regard to the question of when to present community opinions, parts of our data (the ranking results from the card sorting) support hypothesis H4: the community opinion should be provided before the proposal submission, rather than after the proposal submission.

7 Implications for location-based participation services

If we consider the study results as how to reflect on a conceptual level how ”a dialog with the city” should be realized, by means of location-based automated feedback interfaces, two general statements could be made: First, in order to comply with the identified severe performance and precision requirements with the current technological state, tasks should probably not be much more complex than the tree planting application tested within this study. These should encompass well prepared use cases with detailed and purpose-structured data in the background, in order to deliver fast and precise results. Second, as a reaction to our findings regarding implicitness and social awareness (H3 and H4), realizing a dialog with the city shall not be literally or idealistically envisioned as an interactive conversation, in the sense that users submit proposals, which are then iterated by citizens, systems and authorities. Rather, information should best possibly reduce interaction steps while still providing all relevant information. As we have found in our study, this is especially a challenge for mobile applications, where limited screen real estate may not allow for also providing all necessary rationale for decisions or constraints on the screen.

Regarding implications for location-based participation on a more general level, our study confirmed the importance of providing feedback as it might promote engagement and lead to more trust in the population. Yet, in order to achieve this, the feedback needs to be designed in a way that citizens perceive it as meaningful. Having investigated the design of specific aspects, this work lies a foundation for the development of more effective and efficient location-based participation services. Further studies are recommended to explore related design options for other contexts in the field of digital participation. In that respect, studies should also be conducted in real-life settings over a longer period of time in order to evaluate the presumed benefit for city administrations as well as dynamics arising from a large number of users interacting with the service.

References

1. Max Allen, Holger Regenbrecht, and M Abbott. 2011. Smart-phone augmented reality for public participation in urban planning. In *Proceedings of the 23rd Australian computer-human interaction conference*. ACM, 11–20.
2. Joachim Åström and Martin Karlsson. 2016. Will e-Participation Bring Critical Citizens Back In?. In *International Conference on Electronic Participation*. Springer, 83–93.
3. Morten Bohøj, Nikolaj G Borchorst, Susanne Bødker, Matthias Korn, and Pär-Ola Zander. 2011. Public deliberation in municipal planning: supporting action and reflection with mobile technology. In *Proceedings of the 5th International Conference on Communities and Technologies*. ACM, 88–97.
4. Marc Busch, Mario Lorenz, Manfred Tscheligi, Christina Hochleitner, and Trenton Schulz. 2014. Being There for Real: Presence in Real and Virtual Environments and Its Relation to Usability. In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational (NordiCHI '14)*. ACM, New York, NY, USA, 117–126.
5. Steve Carver and Stan Openshaw. 1996. Using GIS to explore the technical and social aspects of site selection for radioactive waste disposal facilities. [Online]. (1996). Retrieved September 14,2016 from http://eprints.whiterose.ac.uk/5043/1/96-18.pdf.
6. Maria Manta Conroy and Jennifer Evans-Cowley. 2006. E-participation in planning: an analysis of cities adopting on-line citizen participation tools. *Environment and Planning C: Government and Policy* 24, 3 (2006), 371–384.
7. Kevin C Desouza and Akshay Bhagwatwar. 2012. Citizen apps to solve complex urban problems. *Journal of Urban Technology* 19, 3 (2012), 107–136.
8. Alan Dix. 2009. *Human-computer interaction*. Springer.
9. Peter Fröhlich, Antti Oulasvirta, Matthias Baldauf, and Antti Nurminen. 2011. On the move, wirelessly connected to the world. *Commun. ACM* 54, 1 (2011), 132–138.
10. Eric Gordon and Jessica Baldwin-Philippi. 2014. Civic Learning Through Civic Gaming: Community PlanIt and the development of trust and reflective participation. *International Journal of Communication* 8 (2014), 759–786.
11. Mike Harding, Bran Knowles, Nigel Davies, and Mark Rouncefield. 2015. HCI, Civic Engagement & Trust. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. ACM, 2833–2842.
12. Jack Karsten and Darrell M. West. 2016. Streamlining government services with bots. [Online]. (07 June 2016). Retrieved September 12, 2016 from https://www.brookings.edu/blog/techtank/2016/06/07/streamlining-government-services-with-bots/.
13. Ian Kearns, Jamie Bend, and Beatrice Stern. 2002. *E-participation in local government*. Institute for Public Policy Research.
14. Soonhee Kim and Jooho Lee. 2012. E-participation, transparency, and trust in local government. *Public Administration Review* 72, 6 (2012), 819–828.
15. Olaf Kohlisch and Werner Kuhmann. 1997. System response time and readiness for task execution the optimum duration of inter-task delays. *Ergonomics* 40, 3 (1997), 265–280.
16. Matthias Korn. 2013. *Situating engagement: Ubiquitous infrastructures for in-situ civic engagement*. Ph.D. Dissertation. Aarhus UniversitetAarhus University, Science and TechnologyScience and Technology, Institut for DatalogiDepartment of Computer Science.
17. Mary Grisez Kweit and Robert W Kweit. 2004. Citizen participation and citizen evaluation in disaster recovery. *The American Review of Public Administration* 34, 4 (2004), 354–373.
18. Carolyn J Lukensmeyer and Lars H Torres. 2008. Citizensourcing: Citizen participation in a networked nation. *Civic engagement in a network society* (2008), 207–233.
19. Ronald L. Mace Molly Follette Story, James L. Mueller. 1998. *The Universal Design File: Designing for People of All Ages and Abilities*. NC State University.
20. Ananthanarayanan Parasuraman, Valarie A Zeithaml, and Arvind Malhotra. 2005. ES-QUAL a multiple-item scale for assessing electronic service quality. *Journal of service research* 7, 3 (2005), 213–233.

21. phoneia Technology & Entertainment. 2016. Politibot, the first bot Telegram to follow the elections 26J. [Online]. (10 July 2016). Retrieved September 12, 2016 from http://phoneia.com/politibot-the-first-bot-telegram-to-follow-the-elections-26j/.
22. Alenka Poplin. 2012. Playful public participation in urban planning: A case study for online serious games. *Computers, Environment and Urban Systems* 36, 3 (2012), 195–206.
23. Pedro Prieto-Martín, Luis de Marcos, and Jose Javier Martínez. 2012. A critical analysis of EU-funded eParticipation. In *Empowering Open and Collaborative Governance*. Springer, 241–262.
24. D. L. Rhodes and W. Wolf. 1999. Overhead effects in real-time preemptive schedules. In *Proceedings of the International Workshop on HW/SW Codesign*. 193–197.
25. Carolin Schröder. 2015. Through Space and Time: Using mobile apps for urban participation. In *Conference for E-Democracy and Open Governement*. 133.
26. Ana Simão, Paul J Densham, and Mordechai Muki Haklay. 2009. Web-based GIS for collaborative planning and public participation: An application to the strategic planning of wind farm sites. *Journal of environmental management* 90, 6 (2009), 2027–2040.
27. Fabius Steinberger, Marcus Foth, and Florian Alt. 2014. Vote with your feet: Local community polling on urban screens. In *Proceedings of The International Symposium on Pervasive Displays*. ACM, 44.
28. André J Szameitat, Jan Rummel, Diana P Szameitat, and Annette Sterr. 2009. Behavioral and emotional consequences of brief delays in human–computer interaction. *International Journal of Human-Computer Studies* 67, 7 (2009), 561–570.
29. Efthimios Tambouris, Naoum Liotas, and Konstantinos Tarabanis. 2007. A framework for assessing eParticipation projects and tools. In *System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on*. IEEE, 90–90.
30. Sarah-Kristin Thiel, Peter Fröhlich, and Andreas Sackl. 2016. Experiences from a Living Lab Trialling a Mobile Participation Platform. In *Real Corp '16: 21st International Conference on Urban Planning and Regional Development in the Information Society GeoMultimedia*. 263–272.
31. Nina Valkanova, Robert Walter, Andrew Vande Moere, and Jörg Müller. 2014. MyPosition: sparking civic discourse by a public interactive poll visualization. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*. ACM, 1323–1332.
32. Marek Vogt and Peter Fröhlich. 2016. Understanding cities and citizens: Developing novel participatory development methods and public service concepts. In *Proceedings of 21st International Conference on Urban Planning, Regional Development and Information Society*. RealCORP, 991–995.
33. Thomas Webler and Seth Tuler. 2000. Fairness and Competence in Citizen Participation Theoretical Reflections from a case study. *Administration & Society* 32, 5 (2000), 566–595.
34. Darrell M West. 2004. E-government and the transformation of service delivery and citizen attitudes. *Public administration review* 64, 1 (2004), 15–27.