Chapter 12
Play It to Plan It? The Impact of Game Elements on Usage of a Urban Planning App

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Abstract Public participation experts and scholars alike are experimenting with gamification in their quest to motivate citizens to participate in urban planning. This chapter investigates the impact specific game elements can have on citizens' motivation in a mobile participation application. We present findings from a long-term field study with a gamified mobile participation prototype where we explored participants' awareness, acceptance, and experiences of using gaming elements in the application. Our results indicate that the effects of gamified participation are limited as it seems to only be an effective strategy to increase participation for those who are affine to games. For others, the majority who is usually already intrinsically motivated, gamification has little to offer. Yet, when gaming elements offer added value to their engagement, our participants approved of these elements. This work contributes to both gamification as well as to the burgeoning field of mobile participation in urban planning by providing insights about the effect of specific game elements and recommendations for the use of gamification in urban planning applications.

1 Introduction

Electronic participation (e-participation) refers to the use of information and communication technologies (ICT) with the goal to reduce traditional barriers of participation such as physical presence at a specific place at a specific time. e-Participation opportunities started out as web-based. Aiming to increase the overall level of their citizenry's participation, municipalities all over the world have developed their own e-participation platforms. As of now, this goal has not been met yet [1, 25, 45]. One could argue that the main reason for these efforts not having fruited yet, is because of their novelty: citizens struggle to keep track of their

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governments' "latest" engagement tools [29]. Other evaluations of e-participation tools have shown that merely offering information (a one-way interaction channel) is not engaging enough for people to start using them. To address this situation, several practitioners and researchers have turned to gamification [40]. But can game elements in participation applications actually meet the goal and promote public participation? gamification has proved successful in influencing user behavior (i.e. increase engagement) in several domains [17, 44], including education, business, or health. By introducing gameful aspects potentially tedious tasks have been made more enjoyable (e.g. [14]). In this chapter, we investigate whether such positive effects can be replicated for urban planning mobile applications.

Today, citizens have the opportunity to engage in urban and political affairs using mobile applications, commonly denoted as mobile participation. Undoubtedly, the biggest asset of mobile participation is situated engagement and ubiquity: citizens can participate on-site whenever they transit a planning location [11, 26]. For instance when walking through a park, a citizen could deem that it should include a playground and instantly submit this idea to the city administration. The proliferation of mobile phones coupled with their cost-effectiveness, simplicity, and convenience of using applications has led to unprecedented numbers of urban governance applications [7, 13].

This contribution investigates if and how game elements impact participation with mobile urban planning applications. Based on previous results from gamification studies it could be posited that game elements will boost people's motivation to participate in urban planning applications. Despite an rapidly growing body of literature on the subject, little empirical research yet exists explaining how gamification works. Attempting to shed light on which specific implementations work best (or better) in certain scenarios [30], apart from effects on motivation, we examine the effects of individual game design elements [8]. While youth is commonly assumed to be quite open-minded towards anything game-like, less is known about other generation's attitudes towards game elements, particularly in the context of public participation. Departing from previous findings that "usual suspects" are usually older and the older generation not particularly being in favor of games [43], it is possible that the current users of e-participation systems might not appreciate game elements in this context. On the other hand, this notion is about to change as nowadays elderly start discovering and enjoying games [23]. It is hence relevant to explore citizens' attitudes towards gamefulness in public participation contexts. And in case gamified participation is accepted among (some part of) the population, the next step is to explore which of the mechanics and elements characteristic to games can effectively promote public participation. It is hence relevant to explore citizens' attitudes towards gamefulness in public participation contexts.

We present findings from a 5-months-long field trial conducted with a urban planning application in the city of Turku, Finland. The platform served as an official channel to contact local authorities and it was openly communicated that the trial was part of a research project. The research team repeatedly encouraged officials to provide feedback to citizens' input. The application itself was uniquely designed to

respond to issues the municipality wanted to address. Our findings are reflective of the specific conditions under which we tested the application and therefore might only to a limited degree be generalizable to other digital participation tools (i.e. web-based platforms) or to other contexts.

2 Background

Research on e-participation is well established, but gamified electronic participation is yet in its infancy. In contrast, gamification and gaming elements are very common in mobile applications for entertainment, edutainment, health and other disciplines (see [22] for a review). There are few studies that fit the context of our case study; most of which are small-scale trials testing the digital participation tools. We begin this section with a short overview of how gamification and public participation in urban planning can be defined and combined into gamified urban planning apps.

2.1 Adding Game Elements to Influence Motivation to Participate

The most commonly accepted definition describes gamification as the use of "game elements in non-game contexts" [9]. Gamification is most commonly applied to proclaim the usage of services. By adding concepts characteristic to games (achieving mastery or autonomy), gamification attempts to add a gameful layer to a system rather than building an entire new game [20]. The main objective of applying gamification is to influence users' motivations. In that respect gamification differs from persuasive technologies, which aim to change attitude or behavior directly (see [32]).

Gamification can be described as adding a hedonic layer to purely utilitarian systems [21]. Hedonic refers to the entertainment aspect that ought to arise when engaging with the game. As users in that moment are anticipated to forget or suppress the external objectives of the service (utilitarian aspect), the game part plays on users' intrinsic motivation to engage (and keep engaging) with the service.

Before gamifying a system it is important to understand what game aspects exist and how they link with other components of the system. In both games and gamification research, several models and frameworks exist that describe and structure game aspects. While providing a conceptual structure, these frameworks can further be used to examine the effect of individual game elements.

MDA (mechanics, dynamics and aesthetics) framework is among the most popular models for games [24]. The MDA model describes the interactions between the rules of the game (mechanics) and the system (dynamics) to generate the gameful experience (aesthetics). Hunicke et al. describe games as a collection of

mechanics and dynamics that together trigger aesthetics in players [24]. Mechanics describe the components of a game on a data and algorithm level, referring to the actions, behaviors and control mechanisms afforded to players (e.g. shuffling and betting in card games). Dynamics are the run-time interactions and player's behaviors that are induced by mechanics (e.g. time pressure, opponent play). Dynamics also evoke specific emotional responses (aesthetics) in players (e.g. fellowship, competition).

The MDA model provides a good starting point for describing what makes a game gameful. At the same time, it lays a foundation for understanding the influence of a particular game element on the gameful experience as well as on the player's behavior. It thus presents a good structure for investigating the effect and effectiveness of specific game elements.

We use the term "game element" to describe visible implementations of a game aspect or component that uses or builds on one or more game mechanics. In short, game elements represent interface-based artifacts with which users can interact either directly (e.g. avatar that can be played with) or indirectly (e.g. earning points awarded for in-app activities). The inclusion of the game element concept extends the MDA model, allowing us to refer to an established theory of game research in order to present the key measurements and link experiences to game mechanics.

2.2 Public Participation in Urban Planning

Traditionally, public servants engaged citizens in urban planning through established face-to-face participation methods like public hearings, citizen panels, and deliberations. With the adoption of ICTs, e-participation became an umbrella term for everything from e-voting, e-petitioning to online budgeting. In urban planning, Geographic Information Systems (GIS) gained traction and finally established themselves as a preferred public engagement method for planners. However, especially early on, electronic tools were highly specialized and citizens lacked the skills to use them effectively. In fact, while the digital divide with the increasing proliferation of digital devices loses significance, lack of sufficient skills to use e-participation tools still remains a major barrier to participation (see second-level digital divide or generational divide).

The jury is still out for what might be considered effective public participation in urban planning. A common understanding is that involving diverse groups of citizens yields better plans [5]. This statement lies on the assumption of crowd intelligence, postulating that large and diverse groups of individuals outperform small groups of experts. Again this implies that e-participation platforms succeed in engaging a broader population, hence going beyond the "usual suspects" of public participation. For this gamification might be a promising approach [3, 39].

Brown and Chin advocate two types of criteria for evaluating the effectiveness of public participation: process and outcome criteria [4]. Process criteria evaluate how a participatory tool has been constructed and implemented; outcome criteria

evaluate the results of the public participation process. For example, representativeness (understood as representative sample of the population), involvement in the design of the participation, and convenience are assessed as process criteria. Workable solutions, consensus or participants' satisfaction are, among others, considered outcome criteria. Public participation has been extensively researched in political sciences too. From this perspective, "effectiveness" of participation includes educating citizens, impact on policy, deliberation, and increased trust.

For e-participation tools to make a valuable contribution to public participation they need to effect either process or outcome criteria. When experimenting with gamification in urban planning, the balance between participation and engagement needs attention: the goal is to increase participation (the number of users and contributions) as well as engagement (the quality of the discussion, deliberation and argumentation). In terms of enjoyment and fun, the game elements need to be smoothly integrated so as not distract participants from the "seriousness" of urban planning. As mentioned, citizens' choice of how to participate (which tool, when and where) is also part of evaluating public participation effectiveness. Next, we introduce gamified urban planning and unravel the reasons for gamifying citizen participation.

2.3 Gamified Urban Planning

While gamification itself has not received much attention in the domain of citizen participation, simulation games have a long history in urban planning [16]. Building on the success of commercial simulation game *SimCity*, research dealt with the development and evaluation of serious civic games designed to support and simulate urban planning.

The rationale behind this approach is grounded in the argument that games facilitate learning processes [10]. While playing games that simulate urban planning processes, it is anticipated that citizens learn about planning procedures and instruments as well as about the roles of various stakeholders involved [18]. Civic games are employed to train urban planners but also to support decision-making. In this context civic education refers to the provision of an environment in which citizens can broaden their understanding of urban and political issues, deepen and enrich their substantive knowledge about key actors and the government's role in the planning process [37]. With regards to learning processes, it is further distinguished between collective reflection and collective exploration [10, 18]. Collective reflection refers to citizens improving their civic skills by way of collectively reflecting on spatial issues in their environment. Features allowing for social interaction between participants can support collective reflection.

Drawing on the success of social networking sites, features enabling social interaction are often integrated in participation tools [21]. This practice has become so popular, that social features have almost become an integral part of gamification strategies. The second concept, collective exploration, refers to processes where

citizens playfully investigate various options until achieving consensus. While research on simulation games has grown into a research discipline, introducing playful activities into participatory processes and gamified participation are only now starting to be explored. In practice, the norm are so called "reporting apps" (e.g. *FixMyStreet*), allowing citizens to fill in service requests which the city administration then attends to. Gamified urban planning apps are still few and as a consequence, research on the effect of game elements for urban planning is in its infancy.

2.3.1 Notable Examples of Gamified Participation Tools

Albeit not classifying as public participation as we define it (i.e. involving two distinct stakeholders, where one is an public institution), *DoGood* supports civic engagement the mobile application allows sharing and coordination of good deeds. A user study showed that especially the game elements linked to social aspects (e.g. social influence, social recognition) were able to tap into the intrinsic motivation of participants.

Love Your City! [38] is a mobile application that includes game aspects like emoticons, profiles, statistics and a fading date for contributions (i.e. determining when the contribution will be removed from the app). The app facilitates visualizations for urban planning sites by using augmented reality. Other examples resemble the popular simulation game SimCity. Apps like *NextSuisse* and *StreetMix* provide users with online spaces for creativity (addressed in the previous chapter as game aesthetics). *NextSuisse* allows citizens of cities in Switzerland to explore opportunities for a future development of their neighborhood in two phases. In a first phase, citizens can develop their home town by placing assets (e.g. trees, public transportation, housing) from a tool box on the scene representing their home town. In a second phase, citizens can test their design against developments (e.g. population growth) that are based on real-world data as well as calculated factors such as living quality. Shifting to a smaller scale, *StreetMix* focuses on one street at a time. The app allows users to design a street by adding or removing lanes for public transport, bike lanes or widening sidewalks. To the best of our knowledge, the gaming aspects of these apps haven't been evaluated.

On the contrary, Poplin evaluated how serious games could be used as means for solving complex urban planning issues. Among her findings of the evaluation of *NextCampus* [33] was the critique of the game being too complex; therefore, she suggested to reduce the number of game elements, which would provide a clearer structure to the game. With *NextCampus* essentially being a game, Poplin was confronted with the question of whether results from this system can be considered serious opinions from players or just results of the game-play. In a notable example, *B3-Design your marketplace* was evaluated by two user groups [34]. Both university students and the elderly appreciated the game aspects and were enthusiastic in learning about their environment. However, the elderly did not comment directly

on the integrated game elements, which raises the question whether this group had actually taken note of the game aspects.

Thiel and Lehner evaluated a first version of the present prototype [41]. In contrast to the study presented here, the study only lasted one afternoon and took place without the municipality's involvement in the trial. The study did not investigate the effect of individual game elements but rather looked at the gamification strategy as a whole. Participants' reaction towards gamified participation were explored and whether adding gamification to a participation platform yields in different usage patterns and topics/themes addressed. No significant differences were found regarding posted contributions and thematic focus. Some participants raised concerns that game aspects might devaluate the process as some people might attempt to "play" the system. Overall, game elements were regarded as a sideshow to voicing their opinion.

Detailed evaluations of the effects of gamification on planning apps are scarce [40]. As noted, the majority of previous work has focused on the development of serious games or civic games, which were then evaluated with regards to the general acceptance of game aspects. In summary, the evaluation of specific game elements for civic participation is missing in both research and practice. This study addresses this research gap.

3 Examining Game Elements in Täsä

In order to gain insights into the potential impact of game elements that were incorporated in urban planning apps, we analyzed the results of a long-term field trial. In close cooperation with the local municipality of Turku in Finland, a sophisticated mobile participation prototype was introduced as an official communication channel for the duration of 5 months. During that time, the application (named Täsä) was available for download from all major app stores (Android, Apple, Windows). Instructions for using the application were provided on a separate website.

3.1 Data Collection and Assessment

Our methodology to collect data from this user study consists of three parts: (1) an in-app pre-survey, (2) usage of the app logged in the backend and (3) a post-survey distributed via e-mail. To keep the registration process light-weight, we did not inquire any demographics upon registration. Users could voluntarily answer an in-app questionnaire (1), which consisted of socio-economic background variables (age, education, gender, mobile phone skills, etc.) as well as a set of political questions (trust in institutions and efficacy). It was mainly modeled after questions asked in the ESS (European Social Survey). 185 users completed this pre-survey, giving us some indication about our user base. After the trial, we send all registered

users a post-survey (3) to which 129 out of our 800 registered users answered. This questionnaire contained some 30 questions evaluating user experiences with the app: motivation, social interaction, technical features of the app, desired improvements. Each question in the survey was optional as a measure to counter-fight general low response rates of questionnaires. This resulted in some of the responses in the survey being incomplete (17%). Some participants skipped all closed questions and only answered the open-ended questions that asked for additional feedback and comments. This suggests that our users truly reflected on the opportunity of mobile participation for urban planning. We asked app users directly to rate their perception of the influence of game elements. In doing so, we believe that the responses are more reliable than asking indirectly.

This study reports on a batch of questions (i.e. blocks) that evaluate participants' awareness, perception and experiences with the game aspects included in the application. The first block inquired whether certain game-related aspects in the application influenced participants' motivation to use the participation platform. Looking into this is of great relevance as it provides us insights on what aspects (e.g. elements of the technical realization or the nature of the participatory process) make people participate. There is yet a lack of studies on e-participation that evaluate the user experience. We argue that taking the user perspective into account is at least equally than focusing conceptual aspects of participation methods such as their connection to policy implementation. Therefore we added two more user experience relevant aspects to our investigation. Apart from asking about the influence of (all) game elements in general, we further asked about the effect of the aesthetic competition and achievement (see Table 12.2). If not stated otherwise, responses were measured on a five point Likert-scale from 1= "not at all" to 5= "very much". A second block assessed participants' awareness and appreciation of the included game elements and mechanics. Here answers were measured based on four items combining the factors awareness and appreciation (4-point Likert scale from "I did not notice" to "I noticed and liked"). The third block inquired how the game aspects affected participants' usage behavior (dynamics). We measured this block using Boolean values (yes or no; see Table 12.5). Towards the end of the trial we further conducted semi-structured interviews with 12 participants, who had up to this point not become active in the participation app.

3.2 Täsä: The Mobile Participation Application

The prototype had been developed in an iterative user-centered process and hence was tested in various smaller scale studies (e.g. [41, 42]). It builds on the participatory sourcing approach, where citizens' voluntary input is used for deliberation, ideation and feedback processes. Central to the concept are contributions, which are geo-referenced pieces of content. Ideally, a contribution would include all possible fields in the template: location; classification (Idea, Issue, or Poll); picture; title and description; tag (infrastructure, transportation, architecture, urban planning, recycling, innovation); emoticons; attached to (name of mission).

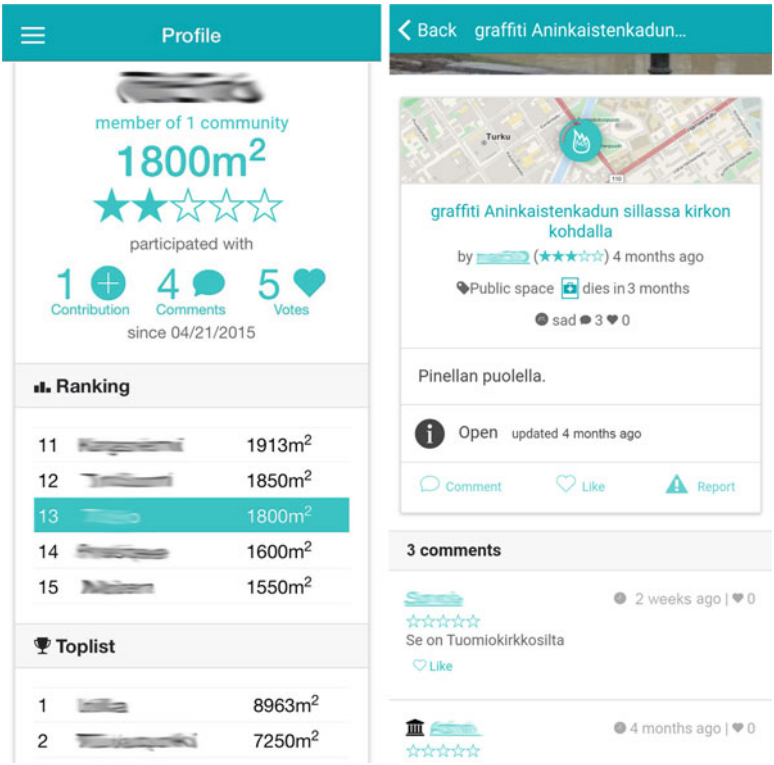

Fig. 12.1 Screenshots of the prototype (*left*: profile; *right*: a contribution)

The image on the right side of Fig. 12.1 shows an example of a contribution. Contributions are publicly visible on both a map and as a list. They can be commented and voted upon by other users. The detailed contents of contributions are outside the scope of this chapter. In short, contributions belong to three categories: urban environment (river banks, market square, service requests), transportation in the city (public and private transportation, parking, biking, including safe areas to cross streets), and leisure activities (green areas, public spaces, sports and events). Civil servants responded to those contributions, discussing suggestions with citizens who uploaded contributions and providing status updates. The servants requested feedback on upcoming plans or controversial topics themselves, known as missions in the Täsä app.

This form of communication between a city and its citizens shall not only give city administration a better understanding of citizens' wishes and opinions, but also give citizens the opportunity to become involved in processes and decision-making regarding plans that affect their life. Participation therefore holds benefits for both parties. People are more likely to be supportive of the implementation of related policies, projects as well as collective efforts if they have been involved in the planning process [19, 35].

We integrated a series of game elements in the Täsä prototype with the goal to cast a wider net of participants as well as increase its usage. We started by identifying mechanics characteristic for games that served as a pool for designing the gamified elements in Täsä. The final selection of game elements was based on (1) interviews with users of location-based and pervasive games, where we explored the motivations to engage with such systems [27]; (2) experience reports of participatory processes from practitioners; (3) review of existing gamified public participation platforms [40].

A first version of the prototype was evaluated in two user studies, where the first was an internal test focusing on usability and technical problems [42]. The second study was designed as a 1-day field trial in which the general concept and the acceptance of the game elements were evaluated [41]. In the context of that study, ten participants were instructed to freely walk through a city district and post about anything they came across and found worth suggesting or reporting to the city administration (e.g. opportunity to turn an abandoned park into a playground; fix a broken street lamp) using the application. Participants of this study appreciated the game elements and reported to have had fun engaging with the system. In the following paragraphs, we describe the game elements (all caps) integrated in the final version of Täsä detailing their implementation and the associated game aesthetics. In order to enhance readability, game elements are capitalized and aesthetics italicized. Table 12.1 summarizes the game elements incorporated into the mobile participation platform.

As mentioned, contributions are the core of Täsä. The danger of being spammed is omnipresent, particularly when allowing for social interaction (i.e. commenting other people's posts). We therefore developed a mechanism that automatically controls the quantity of input while at the same time taking quality into account: the LIFETIME element. Upon creation, all contributions start with an initial LIFETIME, which decreases over time. In-app activities such as commenting and voting prolong the LIFETIME of a contribution. Without such activities, a

Table 12.1 Summary of game elements included in the Täsä prototype

Element	Description	Aesthetic
Lifetime	Each contribution has a limited lifetime that can be prolonged by commenting or voting on it	Challenge
Points	In-app activities (e.g. comments, votes) are rewarded with points	Achievement and competition
Profile	Overview of a users' in-app activities and status	Expression
Progress overview	Overview of for which in-app activities a user has been awarded points	Progress
Missions	In-app tasks relating to a specific topic that can be answered by assigning contributions to them	Challenge
Reputation system	Number of stars awarded reflects the prominence of content	Achievement

contribution dies, meaning they disappear from the system (i.e. the post becomes invisible to users but is archived in the backend). The LIFETIME element is a form of *challenge* with the goal to keep contributions alive over time. The mechanics behind this aesthetic is further known as time constraint or as subordinate concept scarcity. Our implementation is based on the assumption that people are more likely to be interested in and hence interact with contributions that they consider relevant and ignore those irrelevant.

All in-app interactions earn users POINTS, which are displayed in individual PROFILES. These POINTS are measured in square meter and symbolize a user's area of influence that he or she has gained through active participation. Different activities earn users a varying amount of POINTS. Posting a contribution for instance as active and deliberative activity is awarded with more points than expressing one's interest by voting on a comment or contribution. This further reflects recent arguments rating voting as a "watered-down form of participation" [15], equal to slacktivism. POINTS are characteristic for *achievement* systems, where users are rewarded with either virtual or physical artifacts. Apart from personal satisfaction of having achieved a certain amount of POINTS or receiving visual and quantifiable feedback for their participation, POINTS are not connected to a universal meaning. They do however allow for *comparison* and *competition* among users. This is facilitated through a HIGHSCORE list and a LEADERBOARD, both displayed in a user's PROFILE. We decided to include two distinct visualizations of user-rankings with the aim to (1) engage those who have been active in the application for a long time and those over-achieving, and (2) encourage those who have recently joined the platform. New users might not have seen their names on the HIGHSCORE list, but users ranked above and below their own achievement. They could still set themselves the goal to overthrow the user ranking directly above him or her. In this case, the competition between users could turn into mini-challenges. The PROFILE further contains an overview of a user's past ACTIVITIES, detailing when and for what activities he or she has received POINTS. This allows users to reflect on their PROGRESS (also referred to as progression).

Posting contributions, thereby proposing own ideas is essentially a bottom-up process, where citizens make use of their democratic rights by starting their own initiative. The prototype further allowed for top-down initiatives. By creating in-app tasks (so called MISSIONS), the municipality and urban planners could receive targeted feedback from citizens. In such missions, the city administration but also citizens may ask for input on specific topics. For instance, inquiring suggestions regarding the placement of further bike racks across the city or for suggesting temporary uses of buildings and urban areas. We argue that these missions represent *challenges* when formulated in a way requiring users to provide suggestions or solutions regarding a particular topic. Missions can be responded to by assigning contributions to them. We aimed at creating a balanced app, part of which was enabling citizens to create Missions in the same way public servants did. Findings from an earlier evaluation showed that users appreciated MISSIONS, as they gave the application and discussions a certain focus [41].

The REPUTATION system is a game-related feature that was only introduced near the end of the trial. Instead of being based on quantity (i.e. number of in-app activities such as POINTS), this game element reflects the (perceived) quality of participation/posts. The more valuable the community rates a user's generated content (user's comments and contributions), the more stars this user is awarded. The REPUTATION level is determined by the total number of votes a user has received for his or her content. Contributions are richer in content than comments. Thus votes for contributions are counted double in the computation of a user's REPUTATION level. Whenever a user performs an activity her REPUTATION level is displayed alongside his/her username. The amount of stars (zero to five stars) indicates the relevance of the content posted by the respective user. As such, it can be seen as status symbol. Further, a PROGRESS bar in the user PROFILE informs how many votes a user has yet to receive until receiving another star. In that respect, the REPUTATION system also implements the game aesthetic *achievement*.

Social aspects have become common for games and gamification [20]. Yet, it is still debated among game researchers and also other scholars about whether social interaction actually qualifies as game element or even belongs to the game context. Magerkurth et al. note that particularly for pervasive gaming, social interaction is an important component [28]. Social aspects include social interaction, social influence and social relationships (i.e. teamwork, fellowship). Although the application did not allow users to send each other private messages, it still enabled social interaction through commenting features. Social influence of a user could be dependent on a user's REPUTATION level and social relationships be formed through taking part in discussions (from which *collaborations* could arise). Following this argument, we argue that Täsä was built for social interaction or provides opportunity for socializing on urban planning topics.

3.3 Overview of Täsä Usage

From June 2015 to October 2015, 780 people registered with the Täsä app, which was free to download from three major app stores (i.e. Apple App Store, Google Play and Windows Phone Store). We informed the citizens about the existence of the app as an official communication channel with the municipality and local newspaper and flyers. As part of the marketing campaign, posters with QR codes were physically placed at locations that asked questions (MISSIONS) by the city authorities. With the having been accessible only in the Finnish, Swedish and Austrian[1] app stores, in theory only smartphones linked to these app stores could download the app. This entails that also people not living in Turku (= the trial site) could interact with Täsä (e.g. tourists). We had no way of ensuring that the app was exclusively used by residents of the City of Turku—neither did we want to

[1]Institutions from these countries formed the consortium of the respective research project.

exclude temporary visitors to Turku as they might introduce different perspectives. Unless they filled in the questionnaire, we have no way of knowing where they were residing. Our sampling method can hence be described as voluntary sampling. While this self-selection can result in the sample not being representative it does reflect a real-world scenario of how other e-participation systems acquire their user base.

According to the in-app survey data, most of the respondents who participated in the trial were young professionals (20–30: 36%, 31–40: 34%), highly educated (62% had an academic degree) who were both curious about testing the app as well as interested in urban planning (see [12]). The gender distribution was balanced even though men participated slightly more than women (f: 41%; m: 59%). Participants indicated a relative high interest in politics and a very high interest in urban planning. A third of the participants stated affinity to games, another 28% reported to play games often or constantly. More detailed insights on who participated and what motivated them as well as the influence of attitudes towards politics on participation are summarized in other papers [2, 12].

We did not use any monetary incentives to compensate for participation. Participant data was generated voluntarily by active participants of the app, who agreed to be part of this study (i.e. accepting a disclaimer in the app). Participation varied significantly over the 5 months (see Fig. 12.2). The participation pattern exhibits a long-tail of activity distributed until the end of the trial without changes after the introduction of the reputation system. As it happens with most digital tools, the vast majority of registered users were lurkers, people who only read the content without contributing (cf. [31]).

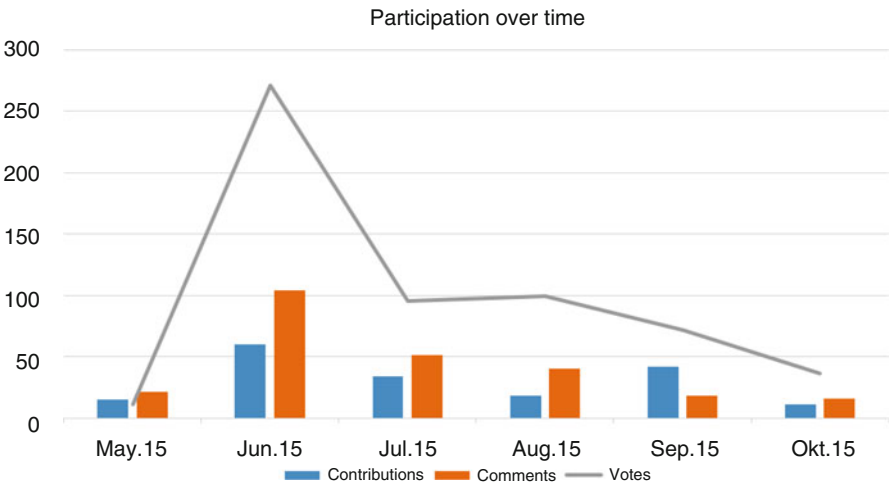

Fig. 12.2 Participation reached its peak in June 2015. Overall, most in-app activities were votes on content

4 Results

We structure our results around the game aspects components identified in the Mechanics-Dynamics-Aesthetics model [24]. In the mechanics section, we report on users' awareness of integrated game aspects. In the dynamics section, we provide insights as to how participants interacted with these game aspects. The aesthetics section describes how participants perceived the influence of the game aspects on their experience of using the mobile participation platform.

Without specifying specific aspects or elements, we asked participants whether the inclusion of game elements impacted their motivation (see Table 12.2). The results show that the game elements did not influence (hence neither increased nor decreased) participants' motivation to take part (M^2=1.63). About 60% of the respondents replied that game elements did not affect their motivation at all. Only seven participants (6%) indicated that the game elements had some or a considerable amount of impact.

4.1 Mechanics

One question asked participants to state to which extent the possibility to earn points impacted their motivation to use the mobile participation platform (cf. Table 12.2). Similar to the overall impact of game elements, collecting points had close to no influence on motivation for 60% of the respondents. Again, merely four users (3%) said the points motivated them "much" or "very much" to be active in the application.

Apart from inquiring about the impacts on people's motivation, we were further interested in the awareness and acceptance of individual game elements (cf. Table 12.5). From interviews during the trial, we had learned that some game elements had not been noticed as such by participants. We therefore wanted to investigate how many participants were unaware of some or even all game-related elements. A post-survey question thus asked on a multivariate scale whether users were aware of the respective elements and in case they were, whether they liked them (see Table 12.3). This scale was used for the elements LIFETIME,

Table 12.2 Influence of game aspects on users' motivation (1 = "not at all", 5 = "very much")

To what extent did the following influence your motivation to use Täsä?	M	SD
Game elements of the app influenced my motivation	1.63	0.90
Possibility to earn points when using the application	1.66	0.93
Ability to compete with other users for points	1.41	0.75

[2]In this chapter "M" refers to the mean values of assessed measures.

Table 12.3 Awareness and acceptance of game elements included (1 = "I did not notice", 2 = "I noticed, but did not like", 3 ="I noticed, but was indifferent", 4 = "I noticed and liked")

Game element	1	2	3	4
Contributions disappeared from the app when their"life" ended	68%	7%	18%	7%
Lifetime of contributions increased by voting and commenting on them	71%	4%	11%	14%
Earning reputation stars when others liked content you created	53%	7%	24%	16%
Being able to judge the relevance of content based on reputation stars	54%	9%	30%	7%
Being able to browse own and others' profiles	48%	11%	30%	11%
Keeping track of one's progress in the game	62%	14%	21%	2%

REPUTATION SYSTEM, PROFILE and PROGRESS. For the game elements LIFETIME and REPUTATION SYSTEM, we inquired two aspects. For LIFETIME, whether users noticed (1) that contributions disappeared from the application when they had run out of lifetime and (2) the possibility to prolong contributions' lifetime by voting or commenting on them. The two aspects of the REPUTATION SYSTEM asked participants' awareness regarding (1) earning reputation stars by receiving votes for their content and (2) judging the relevance of other users' input based on their respective reputation level.

Across all four elements, 62% of respondents to the post-survey noted that they had not taken notice of at least one of the elements. In fact, 36 users indicated that they had not noticed any of the listed game elements. The most noticed element (51% of our respondents) was the PROFILE. The element that had been overlooked by most users was the LIFETIME and to be more concrete, the fact that the lifetime of contributions could be prolonged by voting or commenting on them. In case they had been aware of the features/game elements, participants were asked to state on a three point Likert-scale (1 = "did not like"; 2 = "indifferent"; 3 = "did like") whether they had liked the respective feature. The feature rated negative the most was the PROGRESS information (16%). The game element, which got the most positive votes was the ability to earn REPUTATION STARS (13%). The possibility to prolong the LIFETIME of contributions was noticed least among all game elements (25%). 5% of respondents noticed the LIFETIME but did not like the element, 10% noticed it but were indifferent and 15% noticed and like it. Hence, the limited effects of the LIFETIME effect are partially due to the elements' design, which should have been more clear.

We further asked those participants who used our gamified participation tool to rate the appropriateness of including game elements in the domain of citizen participation. We measured the responses again on a five point Likert scale (1 = "Not appropriate at all" to 5 = "Very appropriate"). Slightly more than half of the respondents did not view it appropriate to add game elements to public participation ($M = 2.57$, $SD = 1.08$). 21% of these respondents believed that gamification and public participation shouldn't be merged. Only 16% rated gamifying participation as somewhat appropriate. As few as 4% perceived it as very appropriate. Another third (32%) reported to be indifferent.

Table 12.4 Correlations between selected game mechanics and level of participation

Variable 1	Variable 2	r	p
Appropriateness	Game affinity	0.346*	0.000
Appropriateness	Interest in urban planning	0.056	0.697
Appropriateness	motivation by game elements	0.468*	0.000
Game affinity	motivation by game elements	0.338*	0.000
Activity count	Appropriateness	−0.601	0.509
Activity count	Game affinity	0.058	0.525
Activity count	Interest in urban planning	−0.265*	0.000

*$p < 0.001$

In order to investigate how the three aspects (motivation, acceptance and experience) as well as attitudes are connected and might determine a citizen's engagement within a digitally mediated participation process, we calculated correlation indexes (= r, see Table 12.4). We found a moderate, positive correlation between perceived appropriateness of gamified participation and game affinity ($r(120) = 0.346$, $p = 0.000$) suggesting that those liking games in general were also in favor of adding game elements to public participation. The latter was not found to hold when conducting the test with interest in urban planning. While perceived appropriateness of gamified participation did not associate with liking individual game elements included in the app, perceived appropriateness did correlate with being motivated by them, $r(121) = 0.468$, $p = 0.000$. Moreover, being affine to games correlates with being motivated by the included game elements, $r(121) = 0.338$, $p = 0.000$. Controversially, neither game affinity nor being motivated by these game elements did yield in participants liking them. Being able to increase the lifetimes of contributions is the only exception here, as those motivated by it also liked this feature $r(120) = 0.240$, $p = 0.000$. Summarizing, these findings suggest that gamefulness in this context can motivate people that have an intrinsic interest in games to engage in public participation. This group was also found to be in favor of the concept of gamified participation.

Previous studies found that hedonic aspects drive actual use [21], yet our data cannot confirm this tendency for game-related attitudes. For instance, the belief that gamified participation is appropriate did not lead to increased participation ($r(121) = -0.601$, $p = 0.509$). Conversely, interest in urban planning positively correlated with the level of participation ($r(180) = 0.265$, $p = 0.000$). This finding supports Hamari and Koivisto's claim that attitudes do not directly affect actual use but that utilitarian and social aspects have an effect on use intentions through attitude [21].

We further analyzed whether liking individual game elements led to an increased participation. Our results show that in this trial, appreciating specific game elements can lead to increased participation. Liking the mechanic of slowly dying

contributions positively correlated with activity counts' of participants, $r(122) = 0.367$, $p = 0.000$, resulting in more contributions, comments and votes. In contrast, being aware and liking the opportunity to prolong the lifetime of contributions merely resulted in more comments, $r(120) = 0.255$, $p = 0.005$. This suggests that implementing a method that controls the quantity of content posted (here the LIFETIME element), leads to more content being posted. For gaining reputation stars, we could not find any correlation with the level of participation, $r(122) = 0.175$, $p = 0.054$. Yet, being able to judge the relevance of posts based on reputation stars awarded to users yielded in more comments, $r(122) = 0.195$, $p = 0.032$. It remains unclear whether participants commented more because they wanted to improve their own reputation or whether the fact that the relevance the community attributed to a specific user increased their motivation to reply to this user's posts.

4.2 Dynamics

According to Hunicke et al., dynamics define the player's behavior and how these work to create aesthetic experiences [24]. As these dynamics describe how users react to game elements, third block of questions in the post-survey asked participants to rate items on a list of statements that applied to their experience of using Täsä.

One common critique of gamification is that users might "game" the application, that is either manipulate the system or cheat in the game. With regards to gamification, we argue that there is a difference in manipulating and cheating. While "manipulating" refers to acts that are motivated by the objective to achieve something in the non-game context, "cheating" is an approach to progress in the game. In the context of our gamified application, the LIFETIME of the contributions can be tampered with. Voting and commenting on relevant contributions in order to keep them "alive" is an encouraged activity within Täsä, one that is rewarded with points. Keeping irrelevant or one's own contributions alive is not encouraged, particularly if the only motivation is to gain more points. 93% of participants indicated that they have not actively tried to keep contributions alive, 9% tried to do so by voting and commenting. These findings serve as indication that the majority of participants neither tried to manipulate nor cheat the system.

Another point of critique assumes that gamification might increase usage of a system by only encouraging participation (reach) but not engagement (depth of participation). In this field study, neither participation nor engagement was directly rewarded (e.g. no vouchers as compensation). Indirect or emotional rewards such as feelings of altruism and having a say in how the city is planned, were subject to the individual participants. Given the lack of incentives for participating, the only motivations to become an active contributor can be associated with genuine interest in urban affairs or with voicing one's opinion, gaining social influence or recognition within a community and, finally, the fun of playing a game.

Table 12.5 Participants' experiences of succeeding in the game while using Täsä

Statement	No	Yes
I actively tried to keep posts in the application alive	93%	7%
I tried to keep contributions alive by posting and voting on them	91%	9%
Sometimes I posted content only in order to succeed in the game	99%	1%
I tried to get more points by posting content	98%	2%
I repeatedly checked my points	98%	2%
I was aware of other users' points	93%	7%
I felt a competition between the users	94%	6%
I attributed more relevance to posts from people with a higher reputation level	86%	14%
I felt discouraged by seeing how many points other users had already gained	97%	3%
Seeing other users' progress encouraged me to become active as well	95%	5%

We asked participants if they sometimes posted content only to succeed in the game (binary scale, see Table 12.5) to find out how prevalent the motivation of advancing in the game was. With 99% of participants denying having done so, we are confident that the percentage of people who took part only because of the game, is vanishingly small. As an inference, we can also claim that participation came from motivations beyond playing the game. At this point, it is important to remember that these results are based on self-reported data, meaning that a considerable amount of participants might have still tried to game the system but did not want to admit in doing so.

The question as to whether participants tried to gain more points through in-app activities such as posting content and voting yielded in a 98% negative response rate. Keeping track of one's points was an activity that only 2% of the participants pursued. Although participants seemed disinterested in their own profiles, 7% of all participants indicated to have been aware of other users' points.

4.3 Aesthetics

Another block in the post-survey aimed to address the aesthetics of the participation platform. Aesthetics are brought about by the integrated game elements. In contrast to game elements which can be "used" by interact with them (e.g. writing contributions to earn points), aesthetics arise when interacting with a gamified system (or playing a game). They aim to evoke emotional responses in users and players [24]. Table 12.1 lists the aesthetics in Täsä and matches them with the respective game elements that brings them about.

We asked participants to what extent the ability to compete with other users for points had an influence on their overall motivation to participate. Our goal was to investigate how allowing for and creating *competition* between participants was in increasing engagement in public affairs. As with the other measurements, we used a

five point Likert scale (1 = "not at all"; 5 = "very much"). Responses showed that *competition* with fellow users did not affect participants' motivation at all ($M = 1.41$, $SD = 0.75$). 22% said that being able to compete for points only had a minor impact on their motivation. This shows that participants were not out to compete with their fellow citizens. In fact, only 9% of the participants felt some kind of competition between the users.

We further explored whether the *achievement* system (here points) had a positive (encouraging) or negative (discouraging) effect on users (see Table 12.5). 97% participants responded that they did not feel discouraged by seeing how many points other users had already gained. The same magnitude (95%) disagreed with the statement that seeing other users' progress encouraged them to become active as well. 87% of participants were indifferent to keeping points (e.g. neither discouraged or encouraged).

We inquired what role the opportunity to interact and exchange ideas with other users had on engaging in public affairs because we were interested in the effect of social interaction among participants. For over one third of our participants, the ability to socially interact with others somewhat impacted their motivation to use Täsä ($M = 2.69$, $SD = 1.06$). Almost half (45%) indicated that social interaction had little or no influence, whereas for 20% of participants being able to interact with others did at least impacted their motivation to a great extent.

Apart from direct social interaction (e.g. communication with other participants), there are also other behaviors and experiences that are evoked by being exposed to a community (i.e. publicly posting one's opinion). As participants of Täsä could stay completely anonymous by choosing a pseudonym instead of their real names, the application offers few possibilities to people's personalities and attitudes. The REPUTATION SYSTEM was introduced as a way to give participants an indication of another user's reputation by summarizing the overall quality of his or her previous posts (e.g. star level). The idea was that users would attribute more relevance to posts from users with a higher reputation level and therefore be inclined to also engage in discussions this user was involved in or initiated him/herself. 14% of the participants confirmed this tendency (see Table 12.5).

5 Discussion

Based on the results of our case study, we discuss the effectiveness of game elements in mobile urban planning applications structured around three themes: motivation, participation, and appropriateness. As our results are based on the evaluation of a specific mobile application with a distinct selection of game elements, results should be considered carefully and with this context in mind. Where we deem it appropriate, we try to generalize aspects beyond the scope of our field trial and draw conclusions for the design of future participation applications.

In the Täsä Trial, Game Elements Contributed Little to Motivate Citizen Participation

Our results show that the game elements we included in our mobile participation prototype did not succeed in raising participants' motivation to engage in discussions about urban planning.[3] Particular elements (e.g. points) supporting competition do not seem to stimulate engagement in the context of public participation.

Information and feedback are commonly considered very important elements in applications, particularly so in games. Therefore it is somewhat surprising that most of those users who had been aware of the progress information (i.e. activities they had gained points for), had been either indifferent (17%) or did not like this display (16%). Hardly any of the participants repeatedly checked their score, which further indicates an indifference to points in general. With almost none of the participants being interested in gaining points, we conclude that points were not an effective method for increasing the motivation to participate in our trial. Moreover, the aesthetic of competition, which can be stimulated by the comparison of points, seemed to have little impact on the vast majority of users. In fact, only very few actually felt a competition between users. Even if there had been competition going on, responses to the post-survey indicate that participants would not have been influenced by it. This suggests that competition as an aesthetic is rather ineffective in motivating people to participate in urban planning. A reason for this might be that democratic principles (e.g. every opinion should carry the same weight) do not align with mechanics such as competition. On the other hand, being able to contact fellow citizens is not a strong motivation either. It seems that when engaging in urban affairs, people are not looking for opportunities to interact or compare themselves with others. While introducing the point system almost had no encouraging effect on participants in terms of group dynamics, seeing other users' progress did not discourage them either. For the vast majority keeping track of users' success or failure (e.g. in leaderboards or highscore lists) had no impact on their participation. This leads us to conclude that point systems are at least not harmful in the context of public participation. Overall, public participation can be described as an individualistic activity, which is supported by the idea of democratic actions that should also not be influenced by others.

A finding that mitigates the statements above concerning the effectiveness of gamification in mobile urban planning applications, is that over 70% of our participants indicated to be at least somewhat interested in politics (71%) and 94% in how the city of Turku (trial location) is physically planned. This supports our argument that our participants were already enough intrinsically motivated and thus did not need or care for another motivational aspect. The lack of support for gamification in the trial may be the result of citizens' perception of urban planning being a "serious matter" (35% were primarily interested in urban planning). It appears that for the citizens in our trial, matching the seriousness of urban planning with the fun of game elements eluded. We had no way of anticipating who

[3]Here participation refers to activities in the application (i.e. posting contributions or comments).

the users would be and what they would find interesting. We planed for gamification as an aid to boost participation. If anything, our findings suggest that when prior motivation is in place gamifying a participation app (except for lifetime and reputation) has little effects on participation. The question then becomes: why were citizens in our trial unresponsive to game elements? Perhaps game aspects are still a hot topic for researchers that citizens are unknowledgeable about. Furthermore, gathering points in our trial was not associated with any incentives and merely showed how active a user was. This lack of meaning of collecting points might have been the reason for the ineffectiveness of motivating users to engage more. On the other hand, incentivizing and hence encouraging citizens' participation for monetary gain in the context of urban planning might not be very sustainable nor leading to truthful or thought-through contributions (i.e. gaming the system in the quest for points).

LIFETIME Increased Participation and REPUTATION Was the Most Meaningful Game Element

Täsä participants have not realized that contributions can be revived by actively engaging with the content, commenting and voting. We interviewed participants half-way through the trial, and they seemed confused and surprised when asked about the lifetime feature. They did not seem to know what (game element) we were referring to. From these discussion, we also learned that some participants (who had taken note of the specific design of the contribution icons) mistook these icons as loading bars, signaling that the data for that particular contribution was still being loaded. Only when we showed them the interface element and explained its purpose, did they understand and noted that this mechanic was actually a good idea to avoid irrelevant content and spam. Contrary to these opinions, results from the post-survey suggest that even if they did notice the lifetime feature, only a few users (5) indicated that they liked both aspects of the lifetime element, namely contributions disappearing as well as the possibility to prolong lifetime with in-app activities.

The lifetime mechanic, albeit overlooked by most, was the most effective in terms of increasing participation. Those participants who liked the lifetime mechanic contributed more than those who indicated that they have not noticed nor liked this element. This result shows that the lifetime mechanic can be a powerful tool both for auto-regulating the content of the application and also encouraging participation. In addition, it shows that this game element should have been explained in more detail (e.g. make the design more explicit). Based on our findings, we argue that lifetime—or in broader terms scarcity—is an element that can potentially promote citizen engagement.

In contrast to the other gaming elements, the reputation system was introduced rather late in the trial (1 month before end) and therefore participants had less time to grow accustomed with the feature. Nevertheless, the reputation system was the third most noticed element in the application. In light of the late deployment, its positive ranking by 12% of participants is remarkable. Furthermore, 12% of the participants indicated to have responded to particular posts because of the reputation system,

making reputation—or in broader terms social status—by far the most effective game element.

Compared to other gaming elements, the profile received good ratings from participants. In contrast to the reputation system, the high rating of the profile stems from many users being indifferent about the profile. The profile mainly provided information about a user's game progress (number of contributions and comments posted, points gained) but no personal information. As such it would appeal to those participants affine to competition or curious about other users' activities and let those inspire their level of participation. Our conclusion is supported by the fact that social interaction was not an important aspect of the application.

In summary, our findings illustrate that presenting users with an opportunity to see the achievements of other users can be an effective aspect in the quest to entice people to become active as well. It is noteworthy that this interest in others' progress is not induced from a competitive mindset, but more to orient oneself around others, their ideas and maybe also to find one's place in a community. In this respect, our conclusions reflect previous results noting that people do not want to directly compete in the context of doing good deeds [36]. According to our results, the same holds true for public participation in urban planning applications.

Albeit Skeptical, People Are Not Adverse Towards Imbuing Public Participation with Game Elements

Concerning the perceived appropriateness of using game elements in the context of public participation, participants were divided. Most saw the integration of game aspects as neutral; others had a more critical stand. In the context of public participation, reward-based gamification might not be a viable choice as participants ignored earning points and were not interested in competing with fellow citizens. Whenever game elements provided added value in relation to their engagement (e.g. relevance of other posts, star level and increased lifetime), participants were in favor of those elements. Our findings further showed that none of the elements was distinctly disliked by participants. Instead the vast majority was indifferent to them. These results (liking/disliking of game elements) are obviously overshadowed by the vast majority of post-survey respondents not having been aware of the respective elements.

Overall, our findings concerning the appropriateness of applying gamification in urban planning context suggest the existence of at least three user groups: (1) one that disapproves of the use of game elements, (2) one that is indifferent to them and (3) one that values them in retrospect for facilitating their own participation. With slightly more than half of the participants believing the inclusion of game elements in urban planning apps to be inappropriate, we believe that gamification in this context does alienate a large user group. A practical implication of this finding would be that using gamification should only be the last resort in trying to increase participation. Moreover, if applied, the choice of game elements and how they are integrated needs to be considered very carefully. One suggestion could be to let users decide whether they want to augment their participation with a gameful

experience as advised by self-determination theory: providing users autonomy of their actions and activities in an application will have a positive effect on their intrinsic motivation [6].

6 Limitations

One limitation of this research ties in with the self-reported data from users who responded to the post-trial survey (120; i.e. 15% of the 800 total users). While these respondents reflect quite closely the application's population in terms of activity and demographics, the representativeness of our users is skewed when compared to the population of Turku overall. Täsä attracted young professionals with high educational attainment (see [12]). Given these findings, we caution when attempting to generalize our findings. Even with such a sample, we position ourself at the top-end of mainstream HCI research who test technologies with under 50 participants.

Another factor that limits our findings is the fact that we did not explicitly inform Täsä users of the existence of game elements and therefore did not follow the example of commercial apps. It could be argued that especially for applications that aim to engage users in democratic processes and activities ("democracy apps"), the design should be more transparent and inform citizens about the concepts used in the application itself (e.g. gamification to boost motivation). We did not actively encourage competition between users (i.e. rewarding points) in an attempt to not alienate those not in favor of games. Our results taught us that gamification might indeed have supported the recruiting/onboarding phase. The question of whether points without explicit competition or incentives motivate participation and activity within apps is something we encourage gaming experts to explore further.

We deliberately chose to not conduct a more experimental design, meaning to create two different versions of the application—one with and one without gaming elements. In this research project, given constraints of time and uncertainty about who would use the app, we opted for a single application design. Reasons further included that we wanted to avoid confusing and displeasing citizens by giving away two apps. We feared that we would need to explain this setup and why as well as how we chose who received what versions. In our opinion, employing two different methods for voicing one's opinion would go against democratic principles. Moreover, our reasoning included a quite practical fact. As the apps were free to download from the app stores, it would have been difficult for us researchers to control who downloaded what version.

7 Conclusion

We presented results from the Täsä field trial, in which a mobile participation prototype including a selection of game elements was tested by both citizens and authorities in Turku, Finland over 5 months. We investigated the effects

specific game elements can have on participation when incorporated into mobile urban planning applications by inquiring participants' awareness, acceptance and experiences regarding their use of the Täsä app.

In contrast to previous work on gamification, which has primarily focused on evaluating the acceptance of gamification in general in various domains, the objective of this research was to get insights into which game elements have what kind of impact on users' motivation and hence likelihood to engage with a system. In the context of e-participation, earlier work has mostly concentrated on the design of full-fledged games rather than applying gamification or analyzing the impact of specific elements.

The main result found is that the positive impact of game elements in this case study was very limited. Merely those affine to games reported to be motivated by game elements as well as approved of the concept of gamified participation. Rating gamified participation as appropriate also correlated with being motivated by game elements. However, the majority, which was highly genuinely interested in urban topics and might not need further reasons to engage, was not motivated by the included game aspects. As such, they were also not particularly responsive to nor interested in game elements.

Participants were not looking for opportunities to socially interact with fellow citizens or competing with them, but rather just wanted to voice their opinion. Applying gamification to public participation is a tight-rope walk, as it seems to only reach and be effective for a specific group: those interested in games. Yet, even this group does not approve of all game elements. On the other hand, those unmotivated by game elements do not approve of the concept of gamified participation. While we would not argue that our findings draw the entire gamification approach into question, we recommend to integrate game aspects in such a way that the engagement itself is supported. For instance, we found that when game aspects provide added value to their political engagement, people welcomed these elements and led to increased participation. This was the case for the lifetime elements and the reputation system as it allowed users to rate the relevance and the quality of contributions. Future studies should investigate how and why people notice or neglect gaming elements in participation processes and whether our results would have been different for other game elements. From a methodological perspective, we found that the MDA framework provided a good model to describe different aspects in user experience with gamified applications.

This research contributes to gamification research as it advances insights on how specific game elements can affect people's behaviors and motivations in different contexts. Additionally, we contribute to e-participation engagement as it provides useful insights about what strategies might be effective to increase the level of participation.

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