Reality Sensing, Mining and Augmentation
for Mobile Citizen–Government Dialogue

FP7-288815

D2.1

Conceptual documentation on issues, organization and stakeholder assessment

Dissemination level:	Public
Contractual date of delivery:	Month 6, Aug 2012
Actual date of delivery:	Month 18, Jul 2013
Workpackage:	WP2 Policy Modelling and Visualization for Mobile-aware dialogue
Task:	T2.1 Ontology for mobile eParticipation
Type:	Report
Approval Status:	PMB Final Draft
Version:	2
Number of pages:	85
Filename:	D2.1v2.docx

Abstract

Deliverable D2.1 targets three aims: first, it is specifying the methodological approach of the Live+Gov project. This is based on the definition of Citizen Participation with its three elements transparency, public participation, and collaboration. Second, their advantages and issues, organisational elements and central stakeholders are analysed as well as the crucial impact of mobile technology. Lessons learned from best practice examples are added for deriving the core functionalities of the Live+Gov toolkit and the requirements of the single components. Third, functionalities and requirements are formalised in an ontology explicating the concepts and their interrelation. Concepts, functionalities, and requirements serve the purpose to guiding the further development of the software components within the Live+Gov (WP4) as well as coming up with a blueprint for the use-cases (WP5) and every further application outside the project for how to introduce effective mobile eParticipation (Citizen Participation).

This work was supported by the EU 7th Framework Programme under grant number IST-FP7-288815 in project Live+Gov (www.liveandgov.eu)

Copyright

History

Version	Date	Reason	Revised by
1	08.05.2013	Draft Revision	Harald Keuchel Matthias Thimm Heinrich Hartmann
2	14.06.2013	Draft Revision	Laszlo Kovats
3	2013/05/29	Revise Deliverable D2.1, alpha version	Laszlo Kovats Jon Vazquez Alvarez
4	2013/06/15	Revise Deliverable D2.1, beta version	Laslzo Kovats Mathias Lorenz
5	2013/06/28	Internal Review D.2.1 Gamma version	Laura Niittylä Pieter Minnigh
6	2013/07/04	Internal Review Delta version	Thomas Gottron
7	2013/07/09	Revise Deliverable D2.1, final version	Laszlo Kovats Harald Keuchel

Author list

Organization	Name	Contact Information
EuSoc	Laszlo Kovats	laszlo.kovats @eurosoc.de
EuSoc	Harald Keuchel	Harald.keuchel@eurosoc.de
EuSoc	Mathias Lorenz	Mathias.lorenz@eurosoc.de
Yucat	Pieter Minnigh	P.a.Minnigh@yucat.com
UKOB	Matthias Thimm	thimm@uni-koblenz.de

Executive Summary

Deliverable 2.1 specifies the conceptual approach of the Live+Gov project. The starting point is an explanation of the core problem in Section 2, which has been identified in the project proposal: the emerging gap between the citizens and the state institutions. D2.1 briefly depicts their reasons and argues why mobile eParticipation (here: Mobile Citizen Participation) is a fruitful strategy to tackle this issue. Identifying the roots of the problem is essential for the fundamental trajectory of the Live+Gov project because they spotlight on the central needs and demands of the main stakeholders in a participatory process: the citizens and the public authorities. These demands and needs pre-define the technical functionalities for meeting their demands in the Live+Gov context and beyond.

D2.1 continues with Section 3 specifying the methodological approach of the Live+Gov project by determining its range and the scope. In this respect, Live+Gov follows and adopts the strategy of the "Open Government Partnership" initiative, which aims at achieving improved citizen participation by more transparency of governmental activity, more direct participation in public decision-making and collaboration between the citizen and the public authorities, when it comes to executing public tasks like e.g. maintenance of public infrastructure. This tripartite of Citizen Participation is defining three distinct relationships between the citizens and the public authorities and refer to distinct functionalities. Collaboration, in particular is a highly innovative aspect of Citizen Participation with much development potential in the municipal context. It has not yet been fully acknowledged in the academic literature and is rarely implemented in real world situations. One best practice example is, however, the city of Eindhoven in the Netherlands, which greatly builds on a collaborative system for maintaining the city.

Subsequently, D2.1 elaborates further about the three pillars of Citizen Participation in Section 4. It analyses in detail their advantages and issues and explicates the clear improvements through information and communications technologies in general and mobile technology in particular. Combining the insights of this analysis with the lessons learned from the best practices, each subsection infers guidelines for the Live+Gov project. The guidelines are summarised in tables and presented in specific visualisations and serve as a direct input for the software architecture in WP4 and actual configuration of the use-cases in WP5. WP4 includes the requirements and functionalities derived from the conceptual approach in the general requirements and planning of the general software architecture; WP5 will, in close cooperation with WP2 come up with feasible and concrete organisational requirements for making the software solutions work. WP5 will generalise these lessons learned from the final use-case setup for as far as possible and process the results.

The following section 5 presents the formal Ontology of eParticipation as understood and implemented by the Live+Gov project. It is based on the conceptual approach presented in section 2 and 3 and the guidelines for each pillar of Citizen Participation from section 4. The ontology consists of two basic parts: it defines first general concepts making up for the basis of the Live+Gov approach and being identical for each use-case as well as for each future application of the Live+Gov output (toolkit and policy modelling package). The second part formalises the concepts and interrelations referring to specific functionalities, technical, organisational and presentation requirements that are being developed in the Live+Gov

context. On the one hand they are geared towards the use-cases on the other hand they are representing concepts that can be implemented in a wide range of applications and in multiple context covering core areas of responsibility of most municipalities. Furthermore, the same section 5 adds a brief description of the use-cases and anticipates the workflow processes, which will be developed in the context of future deliverables.

Section 6 concludes and briefly recapitulates the relations between deliverable D2.1 the remainder of WP2 and its alignment with WP4 and WP5.

Table of Contents

Abbreviations and Acronyms

AR augmented Reality

OGP open government partnership

DoW Description of Work

OECD Organisation Economic Cooperation and Development

NGO Non Governmental Organisation

PDA Personal Digital Assistants

GPS Global Positioning System

ICT Information and Communication Technology

List of tables

1 Introduction

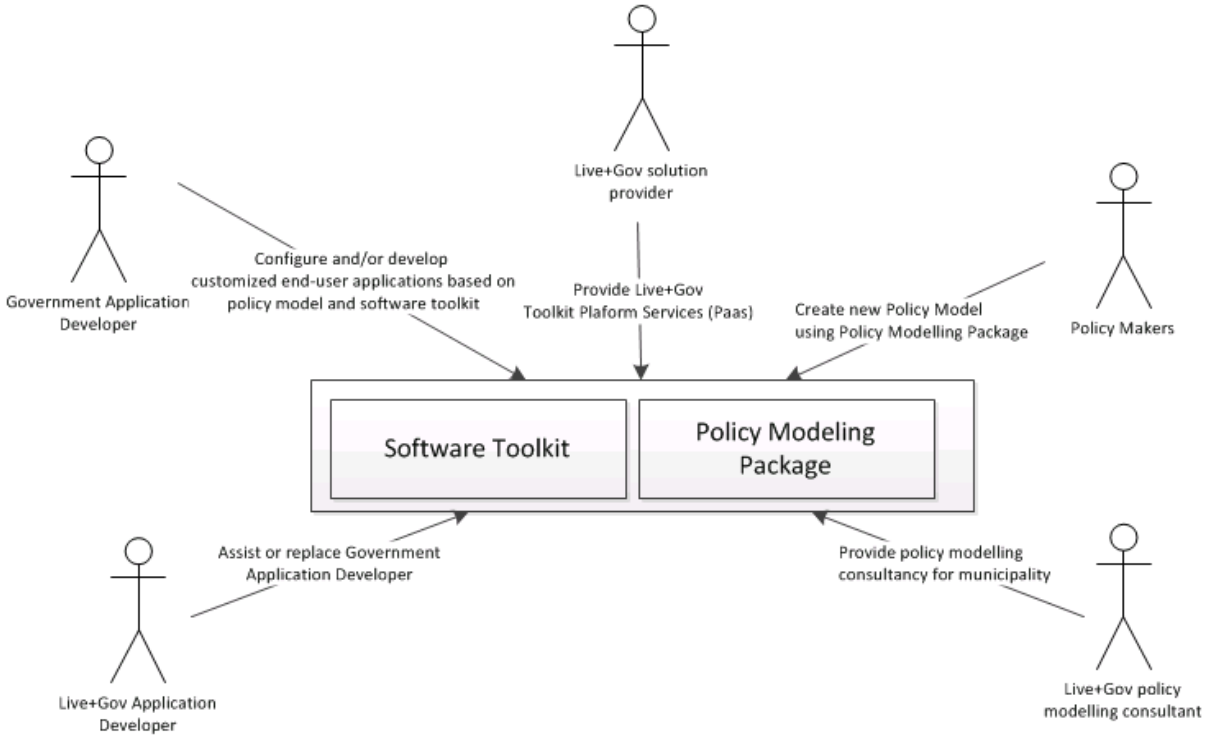
The ambition of the Live+Gov project is to develop solutions for closing the emerging gap between the citizens and the policy-makers by the help of mobile technology. Accordingly, citizens' mobile devices (smartphones) represent an effective and efficient means of communication, informing the citizens about governmental debates and processes and informing the public authorities about issues and the mood among the citizens of a municipality and the community.

The core advantage of mobile technology as compared to other more traditional communication processes is that they are reducing the costs for both the citizens as well as for the public authorities in an extent making it attractive for public authorities to engage in improved transparency, participation and collaboration processes to a reasonable cost. The core challenge is, however, identifying the core needs and demands of the citizens and the public authorities, developing the necessary technical tools meeting these demands and aligning organisational processes in public decision-making arenas to newly developed software solutions. Accordingly, the value-added of the Live+Gov project is the holistic perspective including the citizens' part and the government part in one coherent project design.

Accordingly, software development and their inclusion in an organisational and administrative environment are largely intertwined and developed in parallel as illustrated in the following figure 1.[1] It shows the two main outputs of the Live+Gov project the software toolkit and the policy-modelling package. It shows also how the different stakeholders can access both outputs: they can either introduce them as identical applications as they are implemented in the Live+Gov use-cases, they can take the basic software components and develop add-ons on top of them, and can also take the policy-modelling package alone as a blueprint for developing own solutions for mobile Citizen Participation.

[1] Figure 1.1 is taken from deliverable 4.1

Figure 1.1 Conceptional relations between Live+Gov components



Besides the coherent project design, the core advantage of this approach is that it provides a wide range of possibilities how to utilise the project's outputs. Municipalities outside the Live+Gov use cases will be able to reuse all the components developed in this project in different ways: first, they can, of course resort to the similar tools as the Live+Gov use-cases and therefore adopting their approach one-on-one. Second, they can pick those elements they deem necessary for improved Citizen Participation in their municipality. This possibility includes resorting to the theoretical conceptualisation and the organisational requirements as developed in the policy-modelling package and developing own specific application on their own.

Therefore, the initial step in the Live+Gov development process is to identify the central needs and demands of the citizens and the administrations. As will be argued in the background sections two and three the citizens in advanced, industrialised democracies are in a process of constant modernisation, which is having important repercussions on the way people want to be participated in the political system. In particular, they demand improved information, better and more direct involvement in public decision-making and possibilities for public engagement offside the traditional trajectories of the representative state (e.g. via political parties and monolithic interest representations like labour unions).

After laying the argumentative foundations in section 2, section 3 is defining the scope of the Live+Gov project and is identifying the basic conceptual pathways, which are determining the Live+Gov functionalities as well as their technical implementation. Accordingly, Live+Gov understands the term 'mobile eParticipation' as referred to in the DoW (e.g. in the abstract

in part A, p. 5) as a mobile software solution, which are allowing advanced forms of transparency, public participation (in decision-making) and collaboration and is therefore complying with the aims and objectives of the world-wide 'Open Government Partnership' initiative.

Section 4 discusses these three pillars of Citizens Participation in great detail. Its three subsection recapitulate the advantages, challenges and issues, which a municipality has to tackle if they are about to implement advanced transparency measures, public participation measures, and collaborative measure. Subsequently, the section underlines the potential of mobile technology for improving their application and outreach and is presenting best practice examples of modern participation solutions.

These subsections derive guidelines for Live+Gov, which will be tackled in the course of the project. They contain requirements and functionalities serving as a clear input for the software architecture in WP4, the implementation of the use-cases in WP5, and, of course for the remaining research within WP2:

- the technical requirements inferred from each concept of Citizen Participation (transparency, public participation, collaboration) and as described in the tables one, two, and three will be included to and referenced to by the general architecture of the Live+Gov project. This connects the methodological and conceptual approach as laid down in D2.1 with the concrete functionalities that are being implemented technically.
- The use-cases receive important input from D2.1 as well: after defining their technical and functional requirements in deliverable D5.1 the impact of D2.1 is to refine their content and add functionalities that have not necessarily been envisaged originally. In particular, the clear and communication facilities in the context of mid-to-long-term planning are tackled here. Therefore, the actual shape of the final use-cases is developed in an iterative process deriving functionalities inductively from actual practical requirement as well as deductively from a theoretical concept.[2]
- WP 2 will base its further work on the output of D2.1, namely the conceptual approach as formalised in the ontology and will tackle, in particular the organisational requirements for effective Citizen Participation. In close cooperation with WP5 and the further development of the use-cases, the remainder of WP2 will come up with concrete solutions for the use-cases as well as with general rules for as far as this is possible. The lessons learned in the use-case contexts will be reflected in the Live+Gov methodology (also WP5) as well as the training concept for public administrations (WP2).

In this context, we would like to pinpoint on the concept of collaboration, which is representing a new and highly innovative field of mobile participation. Advanced collaboration between the citizens and the public authorities is actually still in its infancy but is presently evolving rapidly, in particular outside the governmental realm. Therefore, Live+Gov will refer to first existing collaborative solutions and, more importantly, propose possibilities how these could still be enhanced.

[2] This idea is crucially revisited in deliverable D4.1

Section 5 of the deliverable then presents a formal ontology incorporating the fundamental requirements of a running Live+Gov system as well as some specifications relating to the specific applications. The ontology serves the purpose of concretising the conceptual demands to the system and sketching the issues that need to be tackles in the project as well as in future applications. Therefore, it defines the tasks that need to be accomplished for introducing mobile eParticipation (Citizen Participation) according to the Live+Gov methodology. In other words, it defines all the elements that need to be combined in a specific municipal context for improving eParticipation (Citizen Participation) with the help of mobile devices. The same section will also give a short overview of the use-cases showing where to be located in the Live+Gov context.

Section 6 concludes and gives a short overview how the results from D2.1 will be utilised in other work packages (WP) of the project as well as a brief reference to the successive research process in WP2. In particular, the guidelines for transparency, public participation and collaboration from Section 4 and the formal ontology are paving the way for setting up the software architecture in WP4 and therefore implementing the Live+Gov use-cases.

2 Conceptual Background: General Issues, Structures and Stakeholders

There is currently a lively discussion going on about the relation between the citizens and the state in representative (Western) democracies. Under the impression of sweeping technological developments providing communication and information facilities to an unprecedented extent, the question has arisen how to utilise these technical innovations to better involve the citizen in political and administrative decision-making and in public activities in general. Apparently, there seems to be a widespread feeling that a gap has emerged between the respective demands of the citizens and what the states are able to offer in terms of participation. This can be observed if asking citizens of Western democracies and OECD countries about their sentiments towards their states: surveys by Nye (1997) reveal that overall trust of US American as well as Japanese citizens towards their respective public authorities has been massively declining in the recent decades. Surveys in the United Kingdom, as reported by Stoker (2010) point to the same direction: British citizens are increasingly 'disenchanted' with their political system if compared to the 1950s and 1960s. In particular, they are less proud of the political system and have the impression that they have lost their influence on political decisions and are dissatisfied with the responsiveness of their representatives. Polls in Germany reveal similar patterns and show that Germans are increasingly suspicious towards their societal elites and lose their trust in them (Kaina, 2008).

At the same time, citizens are decreasingly ready to take part in the traditional political life. Core indicators for this are declining numbers of political party membership or the active participation in large, traditional civic organisations and interest representations like trade unions (von Winter, 2010). In particular, however, most authors are deeply worried about receding voter turnouts in (European) national, regional, and local elections (Gallagher, 2006). As Robert Putnam concludes in his influential book "Bowling Alone": "declining electoral participation is merely the most visible symptom of a broader disengagement from community life. Like a fever, electoral abstention is even more important as a sign of deeper trouble in the body politic than a malady itself" (Putnam, 2000: p.35). This view is shared by European authors like Anna and Brundin who state that the "declining interest among citizens in joining political parties and becoming involved in their local communities has been identified as a potential risk to the political system in terms of losing its legitimacy" (Anna and Brundin, 2010, p.7).

There is, however, an alternative view on these empirical data. According to Dalton (2004, 2006, 2008), political participation is not generally declining but rather shifting away from traditional forms like voting and party membership to protest, community action and support for smaller scale civic movements. Dalton (2008) calls this a shift from "duty-based citizenship" to "engaged citizenship" (ibid. p.76). He argues further that this phenomenon is not as worrisome as stated by other authors as it shows that the democratic mindset of the people is still intact and therefore the foundation of the democratic state.

Nevertheless, even Dalton agrees that citizens are not fully content with the functioning of the state, its institutions, and representatives. Accordingly, citizens are becoming "dissatisfied democrats (Dalton, 2006: p. 252) or "critical citizens" (Norris, 1999: p. 269) – "people who are dissatisfied with political institutions but supportive of democratic

principles" (Somerville, 2011: p. 420; see also: Pierre, 2009). So, remains the question why citizens are becoming increasingly dissatisfied with their state institutions notwithstanding the fact that democracy has reached its widest proliferation today and has mostly lead to peace and higher levels of prosperity? Authors like Dalton argue in the tradition of postmaterialists like Inglehart and Welzel (2007) and Blühdorn (2009) when explaining this paradox. Following their line of argumentation the societies of advanced, industrialised democracies are in a process of constant modernisation, which is marked by increasing societal and political individualisation and differentiation. They argue further that the liberal conception of representative democracy has paved the way for an explosion of individual opportunities and possibilities to lead and organise the personal life. Traditional societal forces are waning and are exerting less and less pressure on the individual to follow certain societal rules or to subdue to certain societal traditions. People are free to choose their individual way of living in a universe of moral, ideological, and ideational possibilities and are less willing to adhere to accustomed rules of behaviour. As Blühdorn (2009) notes, "the process of modernisation is chipping away at all existing normative yardsticks […]" (ibid: p. 25). Additionally, as Stoker (2005) finds, group affiliations are rather short-term oriented and not lasting. This relates to the same tendency of increased individual diversity: people are free to question any form of hierarchical organisation; hence, they commit their (political) participation as long as they fully consent with the aims and goals but quit, attach to other organisations, or simply detach from organised political communication, as soon as they are unhappy with some kind of organisational decision. The mantra of individual and personal freedom legitimises this behaviour.

The core problem is, however, that turning to alternative forms of political participation other than the traditional ones means giving up on political influence and power. The current representative state is fully geared towards the traditional monolithic political organisations like political parties, large and/or highly professionalised interest groups. This means that real political power in terms of having the possibility to influence the concrete political output can only be exerted through these organisations. One could say that they have monopolised political power and operate as central gate-keepers for political innovation both in terms of personnel and policies.

Hence, it is increasingly difficult if not impossible for core organisations of the representative state (political parties or individual representatives) to reach out for the whole population and account for every detail of the society. Therefore, citizens in a modernising society tend to favour "citizen-initiated and policy- oriented forms of political activity", such as citizen-action groups, community participation, direct democracy and protest (Dalton, 2006: 73). The problem is, however, that the political system is little responsive to these forms of political participation. Their impact is generally in doubt as the state is lacking the appropriate communication channels, which are transporting the input from the alternative political action into the decisive decision-making arenas in the national, regional, or local parliaments or assemblies. Public awareness of this fact leads consequently to growing dissatisfaction with state institutions notwithstanding the question if the political output has indeed deteriorated or not. According to the most influential political theorist of the representative state, Hannah Pitkin, this is enough to create the feeling of being badly represented or not being represented at all. As she puts it: "a man is represented if he feels that he is, and not if he is not" (Pitkin, 1967: p.10).

Thus, the Live+Gov project advocates a middle position between pessimists and optimists in the context of the future of democratic societies. On the one hand, we argue that the democratic foundations of democratic societies are still sound and that citizens are still convinced democrats. This is reflected by the general political activity of the people that continues to be on a high level. However, we see the danger that citizens are turning hostile towards the democratic state if public authorities and political decision-making elites remain unresponsive towards their new forms of political engagement. Therefore, we see the urgent need that the states develop strategies, which integrate these forms in the political process and allow for a more immediate Citizen Participation. We argue that this is the central precondition for closing the often-claimed gap between the state and the citizens and increase the satisfaction with the state institutions. Therefore, the Live+Gov project tackles this issue by enhancing Citizen Participation on its three dimensions:[3] first, the state has to become more transparent, disclose public data and grant access to internal decision-making procedures. Second, the citizens need to be granted more possibilities for direct participation in public deliberation. This means that their opinion and their interests need to be enquired and incorporated in decision-making procedures in institutionalised processes. Therefore, public participation in legislative and executive decision-making must not be random or dependent on specific personnel in charge but should become a regular component of every political process. Third, the state has to take account of the principal willingness of the citizens to shape their own environment according to their individual expectations. Therefore, it has to introduce possibilities for public-private collaboration in maintaining and shaping the public infrastructure.

Live+Gov project focuses on the local level and on the increase of Citizen Participation in municipal decision-making. Thereby the three pillars of Citizen Participation as understood in the Live+Gov project relate to increased transparency, public participation, and collaboration.

[3] According to the definition of the Open Government Partnership initiative (see: www.opengovpartnership.org)

3 Methodological Approach of the Live+Gov project

Conceptualising best practices in Citizen Participation is an intricate endeavour because of the sheer fact that there is no clear and shared understanding of the terminology and on definitions. In particular, the definitions are often so broad and unspecific that it is difficult to derive concrete tasks to accomplish. Therefore, this section commences with clarifying the central terminology, which is used throughout this deliverable and the whole Live+Gov research process. This will also contour the central aims and objectives of the Live+Gov project and locate the project in the universe of Citizen Participation and specifically on the intersection of traditional (offline) and more advanced (online) formats. Please note that we have adapted the terminology as compared to the DoW. There, the task is to conceptualise best practices of consultation procedures. Consultation is, however, only a sub-field of Citizen Participation and the solutions being developed in the Live+Gov project will have a much wider applicability than mere consultation. Therefore, the deliverable as well as the project as a whole aims at improved Citizen Participation, which includes but is not restricted to consultation.

Therefore, as stated in the description for this deliverable in the DoW, this document considers "best practices in consultation procedures" (DoW, p. 8). This terminology does, however, not live up to the ambition and the scope of the Live+Gov project. Consultation processes are certainly trying to involve citizens and public decision-making but are not necessarily giving the citizens any leverage to co-decide and to collaborate in policy-making in any meaningful way (Fung, 2003; EIPP, 2009). However, mobile eParticipation as is also referred to in the DoW (see: DoW, abstract) is often used as a broad term covering all sorts of democratic and political participation including participation in general elections through electronic devices (eVoting) or the formation of protest or pressure groups by the means of modern ICT. This understanding is, however, also often connoted with another term – eDemocracy - which is covering all sorts of political activity via digital media and information and communication technologies (ICT). Yet, eDemocracy is also related to the services of the democratic state and is often not clearly distinguished from eGovernment – providing state services like issueing drivers' licences or any other administrative act. Then however, most advanced forms of eGovernment rely on mobile technology and are therefore termed mobile Government (mGovernment) or mobile participation (mParticipation). Accordingly, we are already facing a first problem here: which terminology is most accurately describing the aims and objectives of the Live+Gov project? Furthermore, there needs to be a clear understanding about the legal status of the Citizen Participation. Should people have to power to express legally binding instructions like in direct democratic political orders? Or are citizen contributions rather to be understood as discourses in a representative state with the elected representatives keeping concrete decision-making power?

The scope of the Live+Gov project

According to the traditional definitions the Live+Gov project is having elements from mobile Citizen Participation and mGovernment (e.g. following the definition of Nanz and Fritsche, 2012 and OECD, 2011). The Citizen Participation component relates to the fact that people will have improved opportunities to interact with their public authorities, will be provided

with information about administrative processes and policy-related decision-making procedures and have a direct communication channel to express their opinions and declare their demands or suggestions. Nevertheless, Live+Gov is not only about participation and communication. The concrete applications will also have integral policy-support features, which are enabling governments and public authorities to improve the quality of their services and optimise their processes. This refers mainly to additional data that are generated by the applications and additional information about the state of the municipality that are provided for the administration. This increases the efficiency and the effectiveness of public authorities' service delivery. Therefore, the Live+Gov system complies also with the understanding of the OECD of mGovernment: "Mobile technology is significantly expanding governments' capacity to produce benefits and deliver outcomes for governments, citizens, businesses, and to impact positively national overall economic growth" (OECD, 2011). Accordingly, the Live+Gov system corresponds to this by developing data-analysis solutions for mining the sensor input of the mobile devices both in terms of automatic sensing (movement profile of the citizens through GPS localisation, compass course, gyroscope) as well as active citizen input (pictures, comments, feedback) for patterns, which are illustrating the opinions, attitudes, and sentiments among the citizens of a municipality and help public authorities to become more responsive to citizen demands and therefore improve the quality of their service delivery.

As a matter of fact, the differences between Citizen Participation (as defined by Nanz and Fritsche, 2012) and mGovernment (as understood by the OECD, 2011) are void. This is due to the fact that "innovative public sector governance models" (OECD, 2011: p.3) in Live+Gov's understanding are crucially dependent on the input of the citizens and therefore on their cooperation and the collaboration. They are the ones who deliver the necessary data for retrieving more detailed information about the state of the municipal (traffic-) infrastructure. Therefore and in general terms, the Live+Gov project fits well to the approach of the "Open Government Partnership" (OGP), which has been initiated by the governments of the United States of America and Brazil on September 20th, 2011. In the meantime, 58 countries worldwide have committed their participation or have declared their interest to participate, 17 of which are European Union member countries. The main objective of the OGP is to improve transparency, public participation and collaboration in the member countries and is therefore in line with the core aims of Live+Gov. Accordingly, we place the scope of the Live+Gov project in the context of Citizen Participation with the three elements / pillars transparency, public participation and collaboration. However, as will be pointed out later in greater detail, Live+Gov stretches the definition of transparency a bit in order to account for the element of public services.

Box 1: Fundamental concepts of Citizen Participation

- **Transparency** – the degree to which information is available to outsiders and enables them to have informed voice in decisions and/or to assess the decisions made by insiders.
- **Public Participation** – the possibility for citizens to communicate with public authorities about policy options and alternatives and to contribute to actual decision-making processes.
- **Collaboration** – the responsibility that is jointly taken for the urban communities by citizens and administration.

→ *All three dimensions will be tackled by the Live+Gov project as only their combination is meeting the demands of citizens in the representative European democracies.*

In principle, Citizen Participation is not restricted to a certain state or government level: whether national, regional, or local policies Citizen Participation can be improved on every level. However, the higher the legislative or executive level and the more far reaching the respective decisions, the more important are formal requirements that need to be met in order to guarantee representativeness and legitimacy of the decision. This relates mainly to the higher number of people that need to be involved and accounted for. As a general rule, the higher these requirements the higher the cost for these measures. However, the Live+Gov project focuses on the local level and increase Citizen Participation in municipal decision-making in order to keep the formal requirements as simple as possible and achieve them as easily as possible. It should be noted, however, that there is principally possible to apply the developed solutions in higher-level contexts as well. The mobile components can remain largely unchanged but need adaptation in the mining part for implementing the special informational needs of regional or national participation processes.

4 Analysing and Modelling Mobile Citizen Participation: Guidelines for the Live+Gov Project

As argued in the background section, improved Citizen Participation has the potential of closing the emerging gap between citizens and state authorities because deliberative and participatory governance is better able to satisfy the demands and claims of citizens in modernising societies in advanced, industrialised democracies. It has been argued further that the three pillars of Citizen Participation as understood by the Live+Gov project relate to increased transparency, public participation, and collaboration. In the following, the section will discuss the effects and advantages of these three forms of Citizen Participation and present best practices being used and implemented in real-world situations.

Furthermore, it will discuss the specific potential of mobile technology for such participatory purposes. In general, the advantages relate to two central facts. First, using mobile technology and more concretely mobile devices like smart phones is enabling participation through adapting to the actual context of a citizen and supplying adapted participatory formats: citizens obtain information that they actually need and are probably interested in and are confronted with participatory formats in the moment they express their interest (and do not have to wait until they reach other formats). As a result, citizens will participate more. This leads directly to the second important effect: more participation leads to more input for the public authorities. If analysed carefully the citizen input can serve as a valuable source of information about the state of the municipality and the way the citizens see, evaluate and assess the actual situation. Public services can therefore be adapted to these needs and be improved.

The section adds up the lessons learned from the literature and the best practices to develop the principal guidelines for the Live+Gov project: they determine the functionalities, technical and organisational requirement for the software architecture in WP4, the implementation of the use-cases in WP5 and, or course the development of a running organisational system for mobile Citizen Participation in WP2:

- The technical requirements that are summarised in the tables one, two, and three are directly introduced into the software architecture in WP4, and in particular deliverable D4.1. Accordingly, Live+Gov consequently connects the conceptual approach and the actual software development for meeting the needs of both the citizens and the public authorities.
- The organisational requirements, which are held rather generic in D2.1 will be further elaborated on in close cooperation between WP5 and WP2 when concretising the use-cases and introducing running systems. Lessons learned there will help to fill the organisational concepts with real-world applications in tangible organisational contexts.
- WP2, in particular will generalise these lessons learned for as far as possible and include this to the Live+Gov methodology and the training material for public administrations

4.1 Transparency

The sweeping development of modern information and communication technologies has lowered the price for and the cost of information and communication to an unprecedented extent and has made it extremely difficult to restrict information and keep it secret. Therefore, one could argue that the world has never been as transparent as today both in the private as well as in the public spheres. Nevertheless, transparency is still having core significance for the relationship between the state and its citizens, in particular. Having adapted advanced forms of communication facilitated though the internet and broadband mobile communication, the citizens expect the government to comply with this general trend. They demand from the government to disclose internal documents and grant access to decision-making processes via these electronic facilities.

The guiding definition illustrating which transparency measures implemented by the Live+Gov project comes from Ann Florini (2007). She is referring to transparency as "the degree to which information is available to outsiders that enables them to have informed voice in decisions and/or to assess the decisions made by insiders" (Florini, 2007: p.5). Accordingly, we aim at transparency measures that increase the ability of citizens to form an opinion about public/municipal matters and use this information for their participation. We argue that modern ICT has the great potential to provide transparency to public activities and contribute to improving both the functioning of the state and the understanding how the state is working. Furthermore, by disclosing analytical capacities of the public authorities, we understand public service delivery in the context of providing real-time data to the citizens as a transparency measure as well.

4.1.1 Advantages of transparency

The presented definition goes straight to the very purpose of transparency in a democratic state: it helps solving or reducing the so-called "agency problem" occurring automatically if responsibility and power are delegated by a principal (a voter or shareholder) to an agent (a representative or manager). This begs the question how the principal can safeguard that the agent is acting according to the principal's interests and is not exploiting the acquired informational advantage for following the personal interests possibly at the expense of the principal. Stated very bluntly, such agency problems are the root of corruption both in the private as well as the public sector and can have disastrous consequences for private companies, entire economies and the state, respectively.

Accordingly, the agency problem lies at heart of every democratic state in which citizens delegate sovereignty to representatives: how can it be ensured that political decisions are in line with the will of the people? One answer is that transparency measures should balance the informational asymmetries between the representatives of the state and the citizens. Citizens should then have the possibility to use this information and punish or reward the candidates for political positions and actions in the upcoming elections.

Thus, the literature names two fundamental arguments why transparency is essential in a democratic state. First, it is a principle of democratic government and necessary for holding elected representative accountable. Furthermore, transparency has important repercussions on the legitimatory basis of a political entity "by clarifying how authority structure has been constituted, by demonstrating the concrete benefits of institutional actions, and by

cultivating the belief that citizens have a fair choice to influence institutional decisions and evaluate results (Harrison, 2012: p.87). High quality information about the legislative and executive action of the state is therefore essential for citizens in every democratic setting for effectively controlling the government and holding the elected representatives accountable to the majoritarian will and the fundamental principles of the state. Therefore, they need to have access to official documents and data and be informed about political decision-making processes. More concretely, they must be informed about the budget, audits, policies and executive action (see: Harrison, 2012). Additionally, the citizens need to obtain access to structural information about the decision-making procedures and means to influence political processes. In sum, transparency is highly important for input-legitimacy (informing the people about decision-making processes, disclosing information about the participants to a decision-making process as well as their positions) and for output-legitimacy (informing people about the outcome of the political process and bringing forward a work performance record).

Second, transparency is central for the effectiveness and efficiency of government. It is not only countering corruption but increasing the quality of decision-making even if decision-makers are driven by the best intentions: “transparency gives more people the capacity to spot bad analysis or contribute data not already contributed by public agencies” (Roberts, 2007: p. 321) Furthermore, transparency enables control, analysis and evaluation of past decision-making processes revealing problems and issues, identifying responsibilities and providing all information for improving decision-making in the future.

Thus, transparency is the most fundamental facilitator for any meaningful Citizen Participation. This is not a novel finding: having parliaments for discussing and taking fundamental legislative discussions publicly and therefore exposing oneself to the public scrutiny is the very basis of a democracy. However, in a modernising world with more responsibility and participation possibilities given to the citizens, information about how to act, where to become active, and the past activities and experiences (both by the state and private bodies) becomes even more important. Therefore, transparency is not only an end in itself but a core facilitator for all following participatory processes.

4.1.2 General concerns with transparency

However, one needs to refrain from naïve assumptions about the effect of transparency. While transparency is, without doubt, highly important for the input and output legitimacy of the state, one has to pay close attention to the manner in which transparency is provided. In particular, the information and the related messages should reach the people effectively. Otherwise, transparency is pyrrhic and has no effect on the political process whatsoever. In this respect, it is very easy to drown the information and the messages in complexity either in terms of hardly understandable and traceable information or in the sheer quantity of the published data. This is amplified by the fact that citizens with a medium interest in political processes in general and municipal issues in particular have a limited capacity of digesting the presented information.

Therefore, we argue that a modern state has the obligation to respond to this circumstance and pre-select the information and choose easily understandable but valuable formats. However, we consider it highly important that additionally, the citizen is given the possibility to access more detailed and possibly more technical information revealing also how they

could possibly participate in the decision-making process or become active in another meaningful way. Such "pro-active" transparency, which is taking the natural limitations of citizens to acquire information seriously signals to the citizens that their participation is wanted and that the state is ready to render them assistance in their effort.

Public authorities should also pay attention to what they publish for strategic reasons. Documents may be sensitive or containing privacy issues and can therefore not be shared with the public. But even if they are not sensitive legally, publishing information without further commenting them or dealing with the public response can become problematic. Then, the interpretation of the published material is left exclusively to organisations mediating between the state and the public like pressure- and lobby groups, other non-governmental-organisations (NGOs), or the media in general. Those, however, may follow their particularistic opinions and not interpret the disclosed information in an objective way. They may distort the information and try to push for their very subjective interests (see: Harrison, 2012). In this respect, Curtin and Meijer (2006) refer to the related danger that "too rigorous democratic control may squeeze the entrepreneurship out of public managers and turn agencies into rule-obsessed bureaucracies" (ibid: p.118) because they fear of being attacked publicly if not having followed the rules one-by-one. Hence, civil servants may loose the needs and necessities of the citizen out of sight and refrain from deciding flexibly when organisational guidelines and reality are in conflict. Accordingly, transparency measures need to be accompanied by effective public relations and communication through the disclosing organisation. However, this increases the transparency related costs again.

4.1.3 The context of mobile technology

In the context of transparency, mobile technology quickly reaches its practical limits. This is due to the fact that the amount of information that can be communicated via mobile devices is limited. This refers mainly to the smaller scope of the work surface of the mobile device itself but also to the context in which the mobile device is used: people are basically in the process of moving from point A to point B and dealing with the information in their device is essentially a secondary activity. Therefore, they are mostly not dealing with highly complex or serious issues but resort to lighter subjects like amusement or checking substantial information superficially. Accordingly, adapting to the permanently changing personal context of the user means a challenge for substantial applications on the mobile device as it is envisaged in the context of the Live+Gov project and one has to consider very carefully, which information should and could be communicated to the user for having a substantial effect.

However, this drawback can also be turned into an advantage assuming that the information that is presented via the mobile device has an initial and therefore strong impact on the user. This could be utilised by the authorities by offering information that is adapting to the location of the user. Accordingly, the initial interest of a user for a public infrastructural project - when passing a construction site for example - can be encouraged by an additional service informing about the context of the project, the costs and decisions that are possibly still to come and open for participation. Hence, through mobile technology the information that is presented to the citizen adapts to their context and has therefore a much higher effect on them: the information – and the related messages – can be communicated immediately without running the risk that the citizen forgets to search for the required facts

until they have the possibility to obtain the information on another website, or some other means of communication. Furthermore, the initial input can raise the awareness for specific problems and issues and even motivate the citizen to become active in the future. In the context of transparency of public decision-making procedures this can indeed use this fact and easily inform about actual topics in the municipality and how the related decisions are taken. Without the initial input this may not have happened.

The technical requisites for this are available but have to be combined to workable solution. First, the integrated sensors in the mobile device e.g. GPS localisation, compass, and gyroscope provide the information of where the user is located and how they are moving. Then, the related substantial information is presented on the mobile device, either by traditional means like text messages or in a more advanced way through "Augmented Reality" (AR) features. Additionally, external information sources can be included in the message and therefore increase the potential impact of the information. Important is, however, that the presented information fits to the instantaneous context of the user, which is marked by mobility and restricted time, restricted receptivity but actual interest (otherwise the citizens would not have stopped to take a look at the construction site), and technical limitations that due to the smaller scale of the screen and functionality.

4.1.4 Best practice example: transparency in Gangnam-gu

A very impressive example for how transparency precedes all other forms of Citizen Participation is the practice in "Gangnam" district with roundabout 61,000 inhabitants of the South Korean capital Soul.[4] Gangnam is one of the worldwide role models for the introduction of e-participation based on far-reaching transparency measures. It was ranked among the top seven "Intelligent Communities" in the years 2006, 2007, and 2008 by the "Intelligent Community Forum" (www.intelligentcommunity.org).

The origin of Gangnam's consequent pursuit of transparency, e-governance, and e-participation relates to a political reform in the 1990s introducing direct election of the municipalities' mayors. Ever since, the citizens could vote for their mayor directly who had been given the possibility of re-election. Both options were not available before. Accordingly, mayors as the highest representatives of a municipality and the chief of the municipality's administration have been given the clear incentive to establish a good relation to the citizens and become more responsive to their needs and demands. Gangnam's mayor Moon-Yong Kwon chose the method of utmost transparency and responsiveness to accomplish this and pursue his idea about a well-functioning community. His popularity and success shows the potential of his approach.

"As of 2003, Gangnam has incorporated 110 fully functioning innovative e-government services" (Ahn and Bretschneider, 2011: p. 416) with their number constantly increasing. The preconditions of these measures were, however, two consequent steps towards more transparency. First, the administration started to broadcast senior staff meetings in the

[4] Here, we refer mainly to the study of Ahn and Bretschneider (2011), which understands transparency as one form of participation and e-participation, respectively. It should be noted, however, that in the context of the Live+Gov project we interpret transparency as a fundamental principle of a democratic state and as the core pre-condition for any meaningful participation whatsoever and accountability of elected or appointed representatives of the state.

administration discussing actual issues of the municipality. This had two remarkable effects: on the one hand senior officials were bound by their word in the meeting having no possibility to break their promises and withdraw their decisions without jeopardising their public credibility. This can be interpreted as a powerful means of countering corruption because the influence of special interests becomes visible or non-effective with elected representatives.[5] On the other hand, broadcasting high-level meetings had an effect internal to the administration. Watching and listening to these meetings lower levels of the hierarchy better understand the decisions that are being taken and that they have to implement.

The second important transparency measure was the publication of most official documents including the names of the civil servants and public officials drafting and those approving the document. This measure had an astonishing effect on the working routines and operating processes of every individual public official and the administration in total: ever since, they are paying greater attention to their work, are working more thoroughly and accurately. This is mostly due to the fact that the mere possibility that citizens or stakeholders can identify flaws or mistakes in their documents motivates the officials to deliver a better quality output. Accordingly, this is a good and nuanced example how transparency improves the quality of government processes.

The effects of consequently introducing transparency of administrative processes and action are remarkable. “When asked how Gangnam’s e-government applications changed the way government operates, Gangnam employees answered that e-government transformed the bureaucracy from an authoritarian culture toward a more citizen-centric culture and increased transparency, responsiveness, and citizen trust in the government. In addition, Gangnam’s officials perceived that e-government applications had dramatically reduced corruption and abuse of power by public officials” (ibid.: p.420). Negative consequences are, however, a general increase of the workload due to the fact that public officials need to publish every detail of their work. Additionally, these measures strengthen the executive vis-à-vis the legislative, which is problematic considering the fact that executives’ role is not legitimised by the voter (Ahn and Bretschneider, 2011).

4.1.5 **Transparency guidelines for Live+Gov**

Live+Gov importantly improves transparency by providing personalised information to the citizens about public matters. This improves importantly citizens’ receptiveness by matching the presented information to their actual context and therefore responding to their actual needs. Therefore, the system collects geo-location data of the citizens using the integrated sensors of mobile devices, in particular GPS, compass, and gyroscope. Once the system recognises that the citizen is in a context that could be enriched by certain (available) information, the application provides this information.

There are principally two ways how this exchange of information can happen. First, the Live+Gov application can collect the data quietly once it is activated and informs the citizen automatically, as soon as appropriate information are available. Anticipating the mobility use-case description, this can be envisaged when informing the citizen about actual traffic

[5] Assuming that elected representatives are crucially interested in keeping their power and becoming re-elected.

conditions on the bus – or tramlines they are travelling on. The second possibility is delivering particular information about certain issues when the citizen activates the Live+Gov application in a particular context in order to get some information. In our concrete use-case examples this may be information about a construction site (Urban Planning) or the state of the public infrastructure (Urban Maintenance). The Live+Gov system is able to do both although it may be the case that one option is not applied in the concrete context. Whereas the Mobility use-case includes both possibilities, the Maintenance and the Planning use-case applications support only on demand information.

Accordingly, for enabling such transparency measures through the mobile device, the Live+Gov system relies on the following technical system requirements:

- First, the necessary movement- and geo-location data need to be acquired trough the sensors of the mobile device. Important are GPS, compass, and gyroscope. For capturing the immediate environment of the citizen, the camera is also needed to deliver context.
- Second, the data need to be mined for deriving substantial information from the raw data. This is done on an external server applying mining algorithms, which recognise the location of the citizen as well as how it is moving through the public infrastructure. The algorithms differentiate walking, biking, driving and the means of public transportation: bus (also which bus-line) and tram (also which tram-line). Furthermore, the activity of the citizen is also inferred from this data. Accordingly, the Live+Gov system recognises, whether the citizen is commuting, or is shopping, or is pursuing another free time activity.[6]
- Third, the Live+Gov system is linked to external data-sources providing the substantial information about the traffic conditions (e.g. links to other services), about the construction sites, about decision-making procedures, about substantial documents. These data-sources can be government servers or those of private service providers.
- Fourth, the derived information are presented on the mobile device considering the practical limitations of the mobile device and the particular context of the citizen. The two variants in the Live+Gov system are via Augmented Reality and a map based view. More generally, the user-interface of the Live+Gov application needs to be designed according to the requirements and necessities of the user. Concrete solutions are developed in the particular use-cases as well as in the subsequent deliverable D2.3.

Learning from the best practice example of Gangnam we see the need for proposing an organisational underpinning for these transparency measures formulated and agreed upon in a transparency policy. This is setting the central guidelines for the transparency process, is defining which documents are published, how they are published, and how the related decision-making processes are organised: which organisational unit is taking the responsibility for the publication, is moderating the publication process and keeping the

[6] In the Mobility use-case the same data are used for providing the citizen with real-time information about the actual traffic conditions, which are based on an aggregation of the available Live+Gov data. This functionality will be explained in greater detail later in the document.

contact to the media and other mediating organisations. A general focus of the transparency policy is the presentation of the disclosed information.

- First, the municipality needs to agree on a transparency policy. It needs to decide, which information it aims at disclosing and needs to make this available so that the Live+Gov system can access these data if necessary. This requires an organisational underpinning and institutionalised processes: which documents should be published and how, how is the decision-making process about publishing documents taking place. The transparency policy also needs to define whether and how it is moderated.
- There needs to be an institutional body that is taking good care of the transparency policy. Many municipalities have a “Citizen Contact Centre” or a similar central institution that is dealing with the communication between the public authorities and the citizens. Such a “Citizen Contact Centre” could also take the role of a moderator and attend the transparency process by commenting on the documents, communicating certain documents to the media and therefore organising pro-active transparency measures.

Table 1: Features, Effect and Purpose of Transparency Measures in the Live+Gov Context

Live+Gov feature	Effect	Purpose
	Conceptual	
Transparency via mobile device	Personalised information to the citizen	Public authorities engaging in pro-active communication with the citizens
	Technical	
Sensing via mobile device: GPS, compass, gyroscope, camera	Providing data about geo-location, movement, immediate context	Gathering the raw context information about the citizen
Server based data-mining I	Recognising location, movement and view as well as deriving the activity of the citizen	Choosing, which type of information is provided for the user
Server based data-mining II	Aggregating Live+Gov data and providing real-time information	Informing the citizen about actual conditions in the municipal area
Links to external data-sources	Establishing the contact to meaningful information, which will be provided to the citizen	Citizen is provided with valuable information fitting to their particular context
Presentation techniques: user-interface, AR, map-view	Presentation of the information acquired from the external data-sources	Citizen requires sophisticated presentation techniques for understanding the delivered information more easily
	Organisational	
Municipal transparency policy	Providing data about public policies	Agreement on what should be published, how it should be published, which publication processes should apply
Acting body	Organising and moderating the publication process	Controlling the publication process and adapting to the needs of the citizens

In preparation of the ontology and for summarising the content of table 1, the core components of the concept of transparency are visualised in Appendix A1.

4.2 Public participation

As it has been described earlier, Citizen Participation is here understood in a deliberative sense and as a feature of a representative political system in a modernising society. Accordingly, citizens should be having the possibility to communicate with public authorities about policy options and alternatives and to give their input to actual decision-making processes. Public authorities on the other hand should safeguard that the input coming from the citizens indeed reaches the relevant decision-making arenas and are sincerely considered in the decision-making procedures. Note that public participation does not come necessarily with direct democratic power originating with the citizens who have the capacity to instruct public authorities and compel them to follow a certain public decision.

4.2.1 Advantages of public participation

Nanz and Fritsche (2012) name the following positive effects of (improved) Citizen Participation:

First, by reaching out or the people who are concerned by certain political decisions policy-makers are getting a far better and more detailed image about the needs and necessities of the different demographic groups in the society. Consequently, they can adjust their policies proactively to meet these needs.

Second, policy-makers are gaining access to the knowledge of the society, which they can be using improve the respective policies substantially. In particular, citizens who are directly confronted with specific features of certain policies on site can add their practical (expert-) knowledge and therefore help to improve their quality. It has been shown elsewhere that well prepared and sophisticated deliberative processes involving the citizens may result in political outcomes with a high quality even if they relate to abstract and complicated political issues (see also: Powell and Kleinmann, 2008).

Third (and related), policy-makers may better recognise policy-related problems and stumbling blocks early on in the planning and decision-making process and can take counter measures before problems become severe. In this respect, it become also possible to identify highly conflicting interests that can be reconciled early in the process without running the risk of them causing significant delays.

Fourth, improved Citizen Participation comes automatically with enhanced communication dynamics between public authorities and the citizens. By granting information, explaining certain decisions, and answering questions citizens can comprehend the history of a legislative or executive decision. This is laying the foundation for more trust of the citizen towards their state.

Fifth, Citizen Participation has the potential of raising citizens' awareness for political issues and politics in general and mobilise hardly accessible citizens – in particular people who are generally sceptical towards politics, adolescents and first-time-voters or migrants who are traditionally less well integrated politically.

Sixth, Citizen Participation and encouraged stakeholder engagement can help to break the power of overly dominant particularistic interest and lobby groups, which are distorting political decisions to their ends and away from the majoritarian will (see also Fung and

Wright, 2004). Therefore, legislative and executive decisions become more just in terms of being more responsive to the needs and demands of the majority.

Seventh, participatory processes have the potential of raising awareness for important but not immediately visible or abstract societal issues and problems. As a matter of fact, they can even trigger a public debate, which is necessary to reach any form of societal consensus and a respective political decision.

Eighth, participatory decision-making processes have also an educative impact on the participating citizens. In a deliberative context, citizens have to cope with democratic decision-making in a pluralistic setting with more or less equally powerful counterparts and the necessity to come to a shared understanding, a consensus or at least a majoritarian decision. Accordingly, the participating citizens are experiencing democratic processes and are developing a sense for the political constraints in a democratic polity. Therefore, "deliberative processes in complex, multicultural and globalised social orders create a 'political space', in which [people] are jointly striving for solutions beyond short-term interests" (Nanz and Fritsche, 2012: p. 12 – in reference to Hanna Arendt – own translation).

However, initiators of such deliberation, Citizen Participation need to consider that they are highly fragile processes and require thorough planning and a clear structure. First and foremost, they need to create a common understanding about the aims and objectives of the process, its potential political outcome, its potential political leverage and impact. In particular, they must not be misused for ex post legitimising political decisions that have already been taken. Such fake participatory strategies will be easily detected by the citizens and will have the opposite effect as compared to real participation: they will make citizens turn away from public decision-making and increase their distrust, scepticism and cynicism towards the state.

4.2.2 Differentiating public participatory processes

Functionally, participatory and deliberative processes can be differentiated along the following criteria:

- organisational features like the duration and the number of participants;
- recruitment procedure;
- dominating form of communication;
- aims and objectives of the participatory process.[7]

They will be briefly discussed in the following:

Organisational features

The first criterion for differentiating participatory processes refers to organisational features like their duration and the number of people participating. The duration can range from a punctual, one-day format to processes that are going on over several weeks, months or even

[7] The following criteria are based on Fung (2006) and his „Democracy Cube" and are supplemented by Nanz and Fritsche (2012). Best practices will be selected according the fourth criterion (aims and objectives).

years. In terms of size, the participatory process can vary greatly from a few and individual participants to large numbers requiring sequential processes in groups and divisions.

Recruitment procedure

The second decisive criterion refers to the composition of the participating people and the method of selecting them. In general, the literature distinguishes three selection mechanisms: (i) self-selection, (ii) random selection, and (iii) targeted selection.

Self-selection

Open participatory processes without any limitation to the people taking part are highly dependent on the voluntary and pro-active willingness, attentiveness, and disposition of the participating persons. Accordingly, organisers have to take into account that the participating community is most probably neither a random sample of the society nor representative of it. In fact, as empirical studies reveal, highly educated citizens with relatively high time budgets are most probable to take part in participatory and deliberative processes (Nanz and Fritsche, 2012). Other studies refer to an overrepresentation of "highly educated, middle-class members in higher professional positions, public service employees, males aged between 30 and 60 as well as representatives of political parties, associations, societies and churches (Reinert, 2003: p.37). In contrast, "lower-income classes and older employees, migrants, youths, women as well as groups under extreme time pressure, such as single parents with infants and young children, shift workers and people with frequently varying working hours" are underrepresented (Albrecht et al. 2008: p.29). Accordingly, organisers of participatory processes have to consider the fact that self-selection mechanisms are not necessarily reaching those citizens that are targeted by the policy in respect.

Random selection

Selecting participants randomly has the potential to create participatory groups that are equally and representatively composed yet not guaranteeing it. Therefore, a random selection can be combined with targeted recruiting mechanisms selecting people with certain demographic backgrounds and therefore accomplishing a participatory setup, which is representative of the society or the targeted community.

Targeted selection

In order to achieve the highest possible representativeness of the deliberating community, the organisers of the participatory process can recruit special participants with certain demographic characteristics from the beginning. Accordingly, they make sure that they reach those people that are concerned by the debated question. However, the effort for this type of recruitment is rather high as compared to the others: organisers have to decide who to select, how to select and be prepared to run several recruiting rounds as the contacted people may not be willing to participate.

Forms of communication

Depending on the participatory process, communication patterns between public authorities and the citizens as well as among citizens are varying. Common is, however, that information is flowing vice-versa between the participants actively exchanging perspectives, opinions and viewpoints. Purely informative events and meetings with public officials or experts briefing citizens about policy processes or political decisions and the citizens listening to the explications are therefore not counted as proper communication. The literature is differentiating three distinct forms of (participatory) communication: (i) articulating interest, (ii) negotiating, and (iii) exchanging arguments and deliberation.

Articulating interests

In this context, participants are given the opportunity to express their opinions and viewpoints in respect to a specific issue. The central objective is raising awareness of the prevailing interests and stakes. Finding a consensus or coming to some sort of decisions is secondary.

Negotiating

If the participatory / deliberative process is intended to produce a concrete and reliable output or a certain decision the participants need to navigate between the different interests and negotiate an output that is acceptable for all. This, however, is highly demanding for the participating citizens: they need to know the details of the policy issues and have to have highly developed negotiating skills. Accordingly, concrete negotiations are rather held in mediating processes with professionalised interest groups that are able to reach to a common solution.

Exchanging arguments and deliberation

The main objective of participatory processes is exchanging arguments and developing a common understanding of a problem or an issue. Accordingly, citizens should acquire enough information about different interests and opinions to form a reasoned opinion about a certain policy and comprehend the related political decisions. This type of deliberation is therefore also activating and mobilising the citizens politically and is enhancing their democratic skills.

Aims and objectives of participatory processes

Participatory and deliberative processes can have different aims and objectives. People can deliberately be mobilised, ideas can be collected, societal and political interests can be discussed and possible solutions be explored. Therefore, we distinguish four general functions of participatory processes: (i) developing and enhancing personal competences and benefiting individually; (ii) impacting on and influencing the society; (iii) consulting and gathering citizens statements and positions; (iv) co-deciding and co-governing.

Box 2: Criteria for Differentiating Participatory Processes

Participatory processes can be differentiated along the criteria: **a) organisational features, b) recruitment procedure and c) dominating form of communication.**

a) Organisational features take into account the duration and number of people involved in the process.
b) The people that are involved in Citizen Participation can be either self-selected, appointed randomly or being explicitly chosen by the organiser.
c) Furthermore, the organiser's choice might be also influenced by the available communication channels (articulating interests, negotiation or exchanging arguments and deliberation).

4.2.3 Best Practives of Participatory Processes

We agree with Nanz and Fritsche (2012) saying that the most fundamental and important questions that organisers of participatory processes need to be clear about is what they intend to achieve and how tightly the deliberative outcome is linked to or even integrated in the formal political process. Therefore, we consider this is the most clear-cut way of differentiating Citizen Participation. Accordingly, the following subsection will briefly portray the four basic aims and objectives of participatory processes and give concrete and best practice examples. Those will cover traditional (offline) versions of public participation as well as more recent forms applying modern ICT.

Developing and enhancing personal competences and benefiting individually

Participatory and deliberative processes can deliver a personal and individual surplus even if they do not link directly to a specific political decision-making process. They can be a method for citizens to extend their knowledge about political issues, raise individual awareness for certain policies. Furthermore, even if is clear from the onset that the output of the participatory process will have little or no impact on the concrete political decision-making process it can be valuable for the participants by developing and enhancing their democratic skills. Therefore, they are excellent tools for educating students and school children by letting them participate in quasi-political processes where they have to come to an agreement with equally strong and "powerful" partners that possibly hold differing opinions.

A classical example of a participatory process aiming at enhancing individual knowledge and democratic skills is a "citizens' forum" also called "townhall meeting". Led by a moderator, usually randomly selected citizens of a municipality are invited to discuss actual political issues that are of particular interests for their specific living conditions. The former German President Christian Wulff in cooperation with the Bertelsmann Foundation and the Heinz Nixdorf foundation has initiated a series of such citizen forums in the year 2011 (www.buergerforum.de). Roundabout 10,000 citizens of 25 municipalities and cities have participated in this initiative and have discussed about the issues of "democracy and participation", "real-life living conditions of families", the "integration of migrants in the German society", "demographics", "solidarity and justice", and "education". This type of event is very popular in the United States of America, in particular where it is called "National Issues Forum" and has a relatively long tradition (see: www.nifi.org). The focus of

both examples is explicitly on the deliberative process and not primarily on a concrete result or outcome that should somehow be included in the formal political discourse.

One vivid example of a participation process combining online and offline participation is the "It's our Europe" project initiated by the German-Franco institute and the German city of Ludwigsburg and kick-starting the festivities in celebration of the 50th anniversary of the Elysée Treaty ending the centuries old hostilities between both countries (www.its-our-europe.eu). In this context, students and school children from seven EU member countries had the opportunity to discuss important European issues and prepare policy-visions in their particular field of expertise. The first phase of the project has been organised as an online discussion through a specially developed online portal, which facilitated the substantial exchange and deliberation between eleven groups of consisting of more than 300 participants in total and went on for a period of six months. Up to four members of each group were then invited to a central concluding three-day conference in Ludwigsburg where the participants "negotiated" common guidelines and proposals for future European politics. These outputs were symbolically handed over to top representatives of the German and French government in an official closing ceremony. Clearly, the main advantage of the online format was that the more than 300 participants from seven countries engaged in a political discussion over a long period of time. Such a European exchange would not have been possible in a traditional participatory process – or only to a disproportionate cost.

Impacting and influencing the society

Participatory and deliberative processes can also aim at creating publicity for certain political issues, initiating a public debate, or mobilising for certain societal issues. Therefore, they can raise the collective awareness for simmering social conflicts and contribute to finding solutions and balancing the society, in general. The distinction between participation for the individual development and for achieving a broader societal impact is often blurry. In particular, if the media is involved and reports about the participatory process it is automatically influencing the public. This has been the case in the "It's our project", which has been closely followed by the local, regional, and national media and has called the attention of the people for European issues.

A typical example for a participatory process aiming at influencing the society is the "Citizen Conference" or "Consensus Conference". In its original form, which has been developed in Denmark in the 1970s, 10-30 citizens are selected that are ideally representative of a municipality's community. They are invited to a three-day conference where they come together with experts of a specific issue and discuss about future planning in the respective context.[8] Citizens who are explicitly non-experts on the debated issues hear presentations by the experts, elaborate on questions that are later answered by the experts, and come up with a set of recommendations and evaluations. These are summarised in a final document, which is published, distributed among the media and the political representatives. Variants of these "Citizen Forums" are typically applied in Germany, Austria, France, the Netherlands, and Greece.

[8] This method has first been employed in the context of technology assessments. Today, however, they are applied for a great variety of political, social, and economic issues.

An online example for a participatory process, which is intentionally trying to start a public debate, is the "Io Partecipo" project, which is organised through an online portal of the Emilia-Romagna region in Italy. Inhabitants of that region can regularly participate in an online discussion about actual topics and raising awareness for important issues on the regional agenda. The specificity of this online portal is that citizens are given the possibility to discuss among each other and with the civil servants of the regional administration as well as elected representatives (Resca, 2011). Furthermore, the regional administration is pro-actively trying to involve the citizens in a deliberative process and sensitise them for public issues. At the same time, public authorities obtain a detailed view on the public dynamics in the region.

Consulting and gathering citizen statements

Consultative participatory processes aim explicitly at citizen contributions to the political discourse. Therefore, they are taking an advisory role besides the formal political deliberations and negotiations. Even if public authorities are rarely guaranteeing to follow citizen recommendations one-on-one and to respond to each and every issue they are, nevertheless, mostly ready to listen to the arguments of the participants and consider them in the formal political process. However, as argued before, the possible impact on the political discourse should be made very clear from the onset of the participatory process in order not to raise exaggerated or unrealistic expectations among the citizens. Therefore, consultative public participation can be a powerful instrument for increasing the democratic accountability of state representatives: combined with clear transparency rules and measures showing how the outcome of public participation is integrated in the political process, people can use this information to make a well reasoned choice in the upcoming elections and reward or punish the elected representatives for their political activities.

A consultative process that is very popular and widely applied in Great Britain is the so-called "Citizen Panel" in which between 500 and 2500 citizens are regularly (three to four times a year) asked to respond to questionnaires asking for concrete municipal issues. At the same time, the participating citizens are provided by relevant information how they could get involved in municipal issues and become engaged in other participatory and deliberative processes. Subsequently, the answers to the questionnaires are analysed, evaluated and introduced in the public decision-making processes. Therefore, they make up for an important source of information helping to adjust municipal decision-making to the needs and the demands of the people.

Another best practice example for a consultative participatory process is the so-called "Charrette": an interdisciplinary team of experts, citizens, public officials and stakeholders (interest groups) discussing and suggesting solutions for urban planning.[9] They are trying to integrate as many positions as possible in a specific planning process in order to coming up with a widely accepted plan that can be smoothly implemented. A role model of a one-sided, non-participatory urban planning and decision-making process can currently be observed in

[9] The basic concept of a "Charrette" is originating with the "New Urbanism Movement" among US American architects in the 1980s. Since the 1990s this concept is increasingly popular in Great Britain, Germany, and other European countries.

the German city of Stuttgart. There, the a construction of a new central station has been massively delayed with the related costs rocketing by the fierce opposition of stakeholders and citizens that had not been included in the planning process. A preliminary consensus could only be achieved by a kind of "Charrette" and a following direct vote by the citizens of the state of Baden-Württemberg after a decade of court trials, massive protests and even social unrest among the population.

According to the Bertelsmann Foundation (2010) the most online participation processes take place in the context of public consultations. They relate usually to decisions about investments in the public infrastructure (e.g. "De Amstel verandert" in Amsterdam - www.deamstelverandert.nl), to questions of political priorities giving the citizens the opportunity to recommending development strategies in certain policy areas (e.g. the "Intercultural Education Strategy 2010-2015" by the Irish government – www.pdst.ie), to consultations in reference to concrete legislative processes (e.g. the consultation process of the German Ministry of Interior in 2008 discussing the "De-Mail-Act", and to participatory budgeting.

Co-deciding and co-governing

Participatory processes which are granting citizens co-decision or co-governance powers are on the brink of direct-democratic decision-making and are accordingly rare in representative democracies.[10] As it has already been outlined before, direct democratic processes come with demanding requirements on the formal decision-making and voting process in order to guarantee the representativeness of the decision and therefore safeguard its legitimacy.

A vivid example of a modern co-deciding and co-governing participatory method is the "21st Century Town Meeting", which is basically a modern form of a traditional "Town Meeting" or citizen assembly. In Town Meetings citizens of a town or a smaller municipality have come together in order to taking care of the municipality's business. Accordingly, 21st Century Town Meetings are also mostly organised to take more or less mandatory decisions, which must be implemented by public authorities. In fact, introducing modern ICT is enabling this type of municipal decision-making in larger communities as well. Usually, such far-reaching and compelling participation procedures are rather costly as they have to be well prepared, need to be moderated and accompanied by trained personnel and supported by sophisticated technical and organisational documenting and processing procedures. Therefore, if they are applied they are mostly used for developing and formulating clear mandatory political alternatives (Nanz and Fritsche, 2012).

A second popular form of co-deciding and co-governing, which is, however, not as compelling for the public authorities is the "Citizen Budget". The process of citizens co-deciding about the budget of a municipality follows generally a three-step process: after the initial budget had been agreed upon by the public authorities, the public administration informs the public about the various positions in the budget and formulate concrete questions and priorities that need to be decided. Then, interested citizens can give their comments and suggestions and give their input on the respective questions in special

[10] However, they are increasingly prominent even in countries that are traditionally sceptical about direct Citizen Participation like Germany where "Bürgerbegehren" and "Bürgerentscheide" empower citizen quora to take mandatory policy decisions on a regional level.

consultation procedures. Eventually, public authorities (and elected representatives) take the final budgetary decision and explain which suggestions have been incorporated and how. Usually, public authorities are not fully giving up on their power over the budget and retain fundamental control. Therefore, the citizen budgets can also be classified as a consultative process. However, some of these processes are highly compelling and it is very difficult for elected representatives to depart too much from citizens' demands.

Municipalities are also experimenting with quasi direct-democratic online platforms enabling citizens to take mandatory decision. These examples show that modern communication solutions have the potential to facilitate direct participation in political decision-making if the political will is present. One is the city of Trikala in central Greece which has established the online platform "e-dialogos" for channelling the discussion about municipal development plans and infrastructural projects as well as providing possibilities for communication (with the municipality and with other citizens) and citizens' initiatives. In this context, citizens can sign online petitions and follow sessions of the city council via web-streams. A second example is the "Democracy Experiment" in Vallentuna, a suburb of the Swedish city of Stockholm (starting in 2002). This online platform structured Citizen Participation in the context of actual discussions and debates in the municipal assembly. Altogether, the participants have aired 700 issues, have formulated 80 motions among which 33 have been debated in the municipal assembly and leading to six positive decisions. In general, these examples show how the introduction of modern ICT facilitate and improve participatory processes: they largely extend the scope of addressed audience that can be reached. They are capable of involving more people over a longer period of time and therefore increase the representativeness of the decisions that are agreed upon in the participatory process. Accordingly, they can effectively facilitate participation on all levels of the political system.

Box 3: Aims and objectives of participatory processes

Developing and enhancing personal competences and benefiting individually – beyond any overall outcome public participation can be a method for citizens to extend their knowledge about political issues, raise individual awareness for certain policies.

Impacting and influencing the society – if implemented successfully public participation can raise the collective awareness for simmering social conflicts and contribute to finding solutions and balancing the society, in general.

Consulting and gathering citizen statements – these can be a powerful and additional instrument for increasing the democratic accountability of state representatives.

Co-Deciding and Co-Governing – combined effectively with modern ICT public participation can largely extend the scope of addressed audience that can be reached and can involve more people over a longer period of time and therefore increase the representativeness of the decisions that are agreed upon in the participatory process.

4.2.4 General issues with participation

The many advantages of public participation in political decision-making are rarely harvested because they are mostly weakly institutionalised and not part of the standard decision-making process. Even it they are, as is for example in Spain and citizens must be participated in municipal issues it is rarely the case that the participatory processes are implemented thoroughly and consequently. Rather, it seems to be the case that they are often misused for political strategies and fulfilling the formal requirements of the higher level legislator (see: Interview with Inigo Gomez) but are not tackling the fundamental challenges of participatory processes. Accordingly, their potential to improve the quality of decision-making and respond to public demands for more direct involvement in political decision-making is effectively not achieved. Thus, as in the context of transparency, the core requirement for the future is that political representatives as well as the public administrations adapt their thinking and their behaviour to the demands and the needs of the citizens and become more responsive. This can only be achieved effectively if they open up their decision-making procedures and allow for meaningful public participation. However, they have to take appropriate measures to deal with the challenges of Citizen Participation.

In particular, the aims and objectives of the participatory processes have to be made very clear from the beginning. This is important for both the public authorities initiating and organising the participatory process and the citizens participating in them. On the one hand depending on the expected impact of the outcome the process has to have different organisational and procedural features. If, for example, the decision should have compelling force, there have to be the measures in place that provide enough representativeness and therefore enough legitimacy, which is necessary for any further and official state action. In contrast, if the participatory process is only about consulting the citizens or informing them the respective legitimacy provisions are secondary because the legitimacy for a related decision is safeguarded through a formal political decision-making process. On the other hand citizens should be aware of the concrete consequences and purposes of participatory processes in order not to have exaggerated expectations. Changing the aims and objectives during the process may annoy the participants and repel them from future political or other participation.

The decision whether or not to initiating a participatory process is hampered by three fundamental issues. They relate to the high costs of participation, the complexity of political questions, and the representativeness of the decisions. They are briefly presented in the following.

The cost of public participation

Democratic decision-making is generally costly. Having parliaments taking the legislative decisions and involving manifold parties, interest, and stakeholders in political decision-making procedures requires large financial investments as well as the personal effort of the citizens. These initial investments are, however, paying off in the long-run as they legitimise the decisions and guarantee that they are respected by all parts of the society. The same applies to public participation. The question is, however, how to balance the costs and the benefits. In principal, public participation is beneficial to the political decision but if the burden on both the organisers and the participating citizens is too high in terms of financial

costs and the personal effort the benefits may not be worth it. They may even prove counterproductive if exhausting and consequently discouraging the citizens (EIPP, 2009; Involve, 2005).

The problem of complexity

A standard critique against Citizen Participation in policy-making is that citizens without particular expertise are not qualified for contributing substantially to the decision-making process. In particular, they would lack the capability for taking far-sighted and general decisions that deliver the best outcome for the society. Political commentators following the political philosophy of James Madison (one of the American Founding Fathers) or Joseph A. Schumpeter hold the opinion that citizens should be kept out of the concrete political process entirely and their participation should be strictly restricted to voting for representatives. Therefore, those should be fully responsible for the political business. In this respect, Madisonians argue that individuals are not capable of taking the most reasonable decisions that are best for the society because they are blinded by their personal interest. Schumpeterians on the other hand believe that citizens should not be involved in legislative decision-making at all because they lack the intellectual capacity to taking meaningful decisions in complex issues they are not familiar with. Nevertheless, there are empirical examples showing that well designed participatory processes including policy experts and ordinary (non-expert) citizens are leading to meaningful and sophisticated outcomes which are contributing substantially to the political decision-making (see: Renn et al., 1993; Surowietzki, 2004; Powell and Kleinmann, 2008). In the end, the question of complexity comes back to the effort that is invested in the participatory process itself and the related personal and financial costs for both the organisers and the participants.

The representativeness of public participation

The problem of representativeness of participatory processes is, in our understanding, the greatest obstacle for effective direct Citizen Participation. As long as there are no fixed procedures guaranteeing representativeness of a decision, its legitimacy can be disputed. The first important issue in this respect is the danger that organised interests “hijack” the participatory process and are pushing through their particularistic interests. These may then lead to a distorted outcome not representing the majoritarian will. In this respect, organised interests have a clear advantage over individual citizens as they can rely on an organisational structure. Furthermore, small and highly professionalised interest groups have the strongest grasp on participatory processes because they are usually better organised, financially better equipped and suffer less from the free-rider problem as compared to large monolithic interest representations (Olson, 1965). Accordingly, it goes without saying that concrete, economic (producer) interests are generally better represented by strong and vigorous lobby groups as compared to diffuse, socially oriented (consumer) ones (Stigler, 1971). A second problem with interest groups and organised advocacy coalitions is that they are mostly self-authorised organisations: they declare themselves being the representatives for certain interests but are not necessarily following fixed rules and procedures entitling them to speak for that part of the society. Therefore, it is not entirely clear whom they represent and how they are held accountable (Urbinati and Warren, 2008).

Accordingly, for avoiding issues with dominating organisations many participatory procedures are addressing individual citizens. However, Town Meetings and Consultation Procedures as they are represented in the previous section are reaching only a very small proportion of the society – even at the municipal level. Therefore, even if the selection of the participants is creating accurate "minipublics" (Fung, 2003), which are representing the basic population in every detail there is still the possibility that a decision of a participatory process is not supported by the greater public. Basing political action on the output of discussion and deliberation in "minipublics" can therefore be misleading and may imply legitimatory problems (Fung, 2003; Warren and Pearse, 2008). Even worse, if participatory processes are open and therefore subject to self-selection the deliberative output is automatically biased towards the opinion and the interests of the participating majority and not to the societal majority.

Box 4: Issues with public participation

In order to have a true impact public participation must go beyond the mere fulfilment of legal requirement. Therefore aims and objectives of the participatory processes have to be made very clear from the beginning. When taking the decision for public participation three issues are at stake:

The cost of public participation – how to balance cost and benefit of public participation when the cost occur immediately or short run, the potential gains on the other hand are long-run.

The problem of complexity – how to combine citizens' contribution with expert knowledge within a participatory process.

The representativeness of public participation – how to avoid disputes for the legitimacy of the results from public participation.

4.2.5 Participation with modern ICT

Introducing modern ICT and organising online versions of public participation has a number of facilitating effects. First and foremost, this is greatly reducing the costs of the participatory process both for the organisers (the municipalities) and the participants. Accordingly, by running an online portal, the organisers can save money by not having to supply a concrete location for the gathering as well as the personnel organising the gathering and the equipment necessary for dealing with the physical presence of the participants. However, the greater cost-saving potential concerns the participants as well, which is due to the fact that they can participate independently from time and space, do not have to attend the meetings physically and can contribute whenever they want.

In sum, reducing the cost of participation by modern ICT is increasing the probability that a municipality initiates such a process as well as the probability that citizens indeed participate. Above all, online participation reaches out for a much broader scope of citizens meaning that far more people can participate. This links directly to the representativeness of the decisions taken in participatory/deliberative processes: the more people can contribute, the more compelling is the outcome in terms of legitimation.

Other, procedural and organisational features of online participation touch on the representative quality of the outcomes as well. Nanz and Fritsche (2012) argue that it is

more difficult for individual participants of groups of participants to dominate the deliberative process. This is due to the fact that the personal appearance and the ability to speak in front of an audience are less important for making an argumentative point and influencing a discussion. Objective facts can be transported more effectively if they are in writing and the chances for being heard and reflected increases for every single contribution. This increases the heterogeneity of the debate, which is much more accurately reflecting the different opinions and interests of the participating community and ideally the affected population.

Furthermore, Nanz and Fritsche (2012) argue that the necessity to put contributions in writing increases the substantial quality of the discussion because they have to be better reflected. However, one could also argue that not being confronted with direct and personal responses participants could be tempted to speak out frankly without considering their contribution. This may have a negative effect on the quality of the statements.

A clear additional advantage relates to the "post-moderation" of the participatory process and the evaluation of the output. Being documented in writing, the organisers of a participatory process can analyse and summarise the input of the participants and draw much more sophisticated conclusions. Therefore, the available data constitute an excellent source of information about fundamental moods and dynamics in the population, which are possibly not visible on a first sight. Accordingly, the information being retrieved from the participatory process supports the policy-making process on a much fundamental level.

Thus, in principle there is no difference between traditional forms of participation in public decision-making and their online versions. However, modern ICT facilitate participation and make it a feasible option to be applied in manifold situations. A very promising strategy is for example to combining online and offline participation: the participatory process starts off with an extended online preparatory phase with discussions and deliberation in an online forum. Then, after the substantial foundation had been laid the participants, or some delegates or representatives, come together physically and agree on a certain outcome. While implying high costs for both the online solutions and the physical meeting, this type of a participatory process promises high quality results. This is mainly due to the fact that the related discussion can be continued over a long period of time, which is adding detail to the deliberative output and allows the participants to dwell deep into the substantial topic. Above all, as will be shown in the "it's-our-Europe-project", such participatory processes are capable of connecting people across geographic borders and of establishing communication that has not been possible before.

4.2.6 **The particularity of mobile participation**

Bringing public participation to the mobile device is challenging. This is due to the fact that public participation as it is understood in the Live+Gov project is basically a deliberative process in which the participants are discussing and exchanging arguments. Accordingly, this involves time and as it has been shown in the previous section participatory processes last up to several weeks or months. Consequently, public participation is not a spontaneous activity but requires that the participant is informed, takes a decision to participate and invests time for the respective preparations. Accordingly, the citizens who are taking part in

a participatory process are deliberately putting themselves into a participatory context. Therefore, the core advantage of mobile technology, which is that it is adapting to the context of a citizen is not fundamentally improving the participation.

If mobile participation is just about bringing participation to a new fancy electronic device and is understood as a repetition of traditional online and offline versions one could at least question its effectiveness: could the core advantage of the process, exchanging arguments and coming to a better substantial decision, still be achieved in a mobile context? Does the further reduction of the cost and effort of participation still lead to the desired effect or do participants need to be ready to engage and make some effort in order to reach a meaningful deliberative outcome? We consider this not to be the case.

Therefore, in order to make mobile participation work one needs to relax the deliberative component in mobile participation and reduce the complexity of the question (and therefore the effort needed by the participants). Thus, if it is possible to reduce the information required for any meaningful participation to be presented on a mobile device and giving the citizens room for their input, mobile participation can have a real value-added.[11] Then, the geo-location information of the citizens (recorded by their mobile device) can be used to call the attention of the citizens for e.g. an infrastructural project that they are passing by and ask them specific questions about their preferences concerning the future planning. Therefore, they can be motivated to engage in a poll providing the public authorities with valuable information about the attitude of the citizens concerning a specific project and take this into consideration for further planning. Another possibility for utilising mobile participation is giving the citizens a possibility to comment on certain issues with the public infrastructure and suggest structural improvements. This can then be introduced in the public discussion and deliberation about the mid-to-long-term planning in the municipality. This can importantly reduce the cost for participation for both the organisers as well as the citizens. Organisers can publish the participatory process once and let it work as an automated process that is not requiring close monitoring. Accordingly, they have to bear the initial costs for setting up the system and the respective post-moderation. The citizens on the other hand are presented an easy way for participation not requiring long-term engagement and the investment of personal (and possibly) financial effort.

However, mobile participation can also be thought of as an initial step in a more exhaustive participatory process or as a facilitator motivating citizens to give their input for an actual public decision-making process. In such a context the mobile device raises awareness of participatory offers by the public authorities, which the citizen has might not been aware of but may have, nevertheless, an interest in. Otherwise, they would not have the initial interest to consult their mobile device when passing a construction site or becoming aware of a problem in the municipality. Accordingly, one central component of mobile participation is to offer hints and links to more detailed background information about the participatory process and the substantial issue in respect. If citizens wish they can use this information and take an even more active role in the participatory process and engage in more sophisticated deliberation. Therefore, it is reasonable to add mobile components to

[11] How this is possible will be shown in the “Urban Planning” use-case of the Live+Gov project.

traditional online and offline participation processes: they are importantly extending their outreach and therefore their representativeness.

4.2.7 Participation guidelines for Live+Gov

The very fact that the Live+Gov system is fundamentally based on mobile technology greatly reduces the costs of participation for the citizen. Information about the participatory processes is delivered to the citizen in the moment that they are confronted with the subject, which is in dispute. Accordingly, they do not have to search particularly for information about an infrastructural project, a maintenance process or any other public matter but are provided with immediate access via their mobile device. This increases the probability that the citizens are indeed participating and are giving their input. Therefore, the representativeness of the participatory process increases as well.

As a fundamental approach, public participation via the Live+Gov system crucially involves a simple poll concerning an infrastructural project or any other relevant question in the municipality. For the sake of reducing complexity, Live+Gov will add a limited number of options that can be chosen by the citizen. These options are complemented by core consequences if these decisions are indeed taken. If, for example, the question is to build a new sports centre in the city background information will be added concerning the consequences of the financial burden for the municipality. Another question for the poll could be whether and how the citizens would use the sports centre if it was built or whether they were willing to sign in for courses, respectively. Therefore, Live+Gov could even be used to assess the practical usefulness of certain municipal projects.

The costs for the administration are also rather low if compared with the costs of traditional processes with a similar outreach. The fact that the system is running automatically and is collecting the citizen input the public authorities saves the costs for moderating the process personally. Except of providing feedback through the system there is no need for the administration to deal with the logistics.

Challenges remain, however, in the context of how to organise the deliberative element of the participatory process, how to reduce the complexity of the actual question including the task how to present its content, how to enable more fundamental and extensive participation if this is demanded by the citizen, and how the outcome of the polls is included in the decision-making process.

The single components will be the following:

- The Live+Gov system relies again on the same geo-location information gathered by the internal sensors of the mobile device (GPS, compass, gyroscope, and camera) in order to confront the citizen with an actual decision-making process they can participate in. In principal, tracking the movement of a citizen and confronting them automatically with participatory processes because they are near a certain location would also be possible. However, we consider the exact location of a person not as a sufficient proxy signalling that they are indeed interested in the participatory process. Accordingly, for not running the risk of deterring the citizen from the participatory process because they feel “spammed” by the information, the public participation function of the Live+Gov system relies on the clear activity of the

citizen, which is particularly activating the application near a special location and trying to gather specific information. As in the Urban Planning use-case, this might be a construction site, as in the Urban Maintenance use-case this might be a query about maintenance levels of the public infrastructure. Once the citizen does this, they are confronted with a poll about a relevant question, are presented information about the specific context and are given background information.

- Special attention needs to be paid to the presentation functionality, as a rather complex issue needs to be illustrated on the mobile device. Options and alternatives need to be formulated, consequences of a particular decision need to be depicted, further (background) information given as well as feedback options. The task is not to make the information and polling process too time consuming and easily understandable. Accordingly, the Live+Gov system relies on visual presentation techniques like AR capable of transporting much more information per action than simple text.

- Again, the data gathered by the mobile device are analysed on an external server and are related to the respective information fitting to the particular location or activity. Connections to external information sources are also implemented retrieving the substantial information that is to be communicated as well as additional (background) information that will be offered to the citizen. Accordingly, an important element of the Live+Gov system relates to the post-moderation of the participatory process. Therefore, results of the poll are recorded and analysed for further relevant information. Ideally, the municipalities survey the personal background of the voters, their characteristics like their age, gender, and possibly their neighbourhood. Accordingly, the municipality learns what the different groups of the municipality's inhabitants think of the respective infrastructural (or any other) project and how they feel affected by it. Therefore, the public authorities may identify certain concerns of the respective people and engage in targeted campaigns aiming at resolving the issues. Potential problems and stumbling blocks for the later implementation could so be realised at an early point in time.[12]

As in the transparency context, participation in public decision-making is crucially depending on organisational underpinnings. Learning from the best practices, the organisers of the participatory process need to clearly define and communicated the aims and objectives of the participatory process and preview the necessary measures for their successful implementation. Therefore, Live+Gov proposes the following organisational requirements:

- In general, the core strategy of this project is to integrate the Live+Gov system in the existing consultation and participation procedures or to create close links and communication channels between both. Therefore, the results of mobile

[12] Of course, such a participatory system put high requirements on privacy issues that need to be tackled within the project.

participation serve as an important input for the decision-makers and pre-structure the traditional participation process. If such a participation or consultation process does not exist, a new one could be established involving the Live+Gov system from the onset, which could then be conceived as a mixed participatory system.[13] In general, the connection between the mobile component and the traditional methods is important for countering the digital divide in the community and enabling the citizens of more far-reaching and exhaustive participation. For the same reason the Live+Gov solution will provide further background information about the participatory process in respect and inform about consultation events, websites, documents and the decision-making processes itself. The citizens can use this for gathering further information.

- The organising municipalities need to install a central body that is connecting the different organisational entities of the participatory process and is organising the communication procedures as well as the technical implementation of the system. Accordingly, an issue needs to be identified, which will be presented as well as the aim of the participatory process. Second, the plans including the options and alternatives need to be acquired from the planning authorities. Third, the plans need to be transposed to the Live+Gov system, e.g. models of construction sites need to be presented as an AR view. This technical implementation needs to be executed. Fourth, once the input of the citizens is available, it is communicated to the public authorities and optimally introduced into the official decision-making process. Fifth, a communication policy is introduced as well that is guiding the feedback process in the Live+Gov system. The respective communication procedures need to be established and pursued. Eventually, a communication strategy is developed for communicating the results with the citizens.

[13] However, this is beyond the scope of the Live+Gov project for the moment. Nevertheless, if a municipality uses the Live+Gov toolkit and methodology in the future, it can consider conceptualising and realising a completely new participatory process with the Live+Gov toolkit as the starting point.

Table 2: Features, Effect and Purpose of Public Participation Measures in the Live+Gov Context

Live+Gov feature	Effect	Purpose
	Conceptual	
Public Participation	Asking citizens for their opinion	Involving citizens in decision-making and obtaining valuable information about their opinions and sentiments
	Technical	
Sensing via mobile devices: GPS, compass, gyroscope, camera	Providing data about geo-location, movement, immediate context	Gathering the raw context information about the citizen
Server-side analysis I	Recognising location, movement and view as well as deriving the activity of the citizen	Choosing, which type of information is provided for the user: information about the actual issue, background information about decision-making processes, substantial documentation and links to external websites or further information
Server-side analysis II	Analysing citizen input: relating votes with personal information (age, gender) as well as analysing the textual input of the citizens for more fundamental patterns	Obtaining the information about what citizens think about the issue and the participatory process: impact on the decision-making process
APIs	Connecting different IT systems	Enabling communication between the Live+Gov system and the municipality's IT system as well as other service providers.
Presentation	AR view; presentation of simple options and alternatives to be voted upon (poll); background information, feedback options	Complexity reduction: presenting the substantial task in an easily understandable manner
	Organisational Requirements	
Acting body	Organising and moderating the participatory process	Keeping the participatory process going: attributing clear responsibility
Issue, aim and objective	Formulating a clear task	Raising correct/realistic expectations with the citizen
Communication with planning authorities	Obtaining substantial information to be presented	Working with original documents and plans
Technical implementation of the Live+Gov application	Creating the AR visualisations, formulating the questions for the poll, selecting background information	Safeguarding the functioning of the Live+Gov application

In preparation of the ontology and for summarising the content of table 2, the core components of the concept of participation are visualised in Appendix A2.

4.3 Collaboration

Harrison (2012) defines collaboration as a form of "democratic participation bringing individuals with expertise [together…] with government decision-makers to create solutions that will be implemented" (ibid: p.88). Accordingly, collaboration has been recognized as a new governance tool (Salamon and Elliot, 2002) and has mostly been discussed under the term "collaborative public management" (McGuire, 2006). In this context, it describes "the process of facilitating and operating in multi-organizational arrangements in order to remedy problems that cannot be solved – or solved easily – by single organizations" (ibid: p. 33). Therefore, the literature understands collaboration as a means to solve "wicked" problems by involving external expertise that is not necessarily present inside the public administration.

An important aspect, which is being discussed in the related literature, is that collaborative governance requires new work patterns in the public administration in general and by the individual civil servants, in particular. Most importantly, they need to establish and act within networks in order to deliver public services, which is however, equalling the departure from the traditional model of a "Weberian" bureaucracy with clearly and strictly separated organisational bodies. This becomes even more relevant in the context of administrative reforms following the paradigm of "New Public Management" that has captured most European countries in the last two decades. This has lead municipalities to outsource many public services to private companies (e.g. public maintenance issues) and to cut back their direct engagement, respectively. They have resorted to coordinating public services but have withdrawn from executing them. Subsequently, this implies a new role of the individual civil servant rather as a manager than an operator (Provan and Milward, 2001).

Within the Live+Gov project, however, we are referring to a second kind of collaboration that has not been fully acknowledged, yet. We understand collaboration as jointly taking responsibility for the urban communities. This is including normal citizens without any specific expertise who are cooperating and collaborating with the public authorities in maintaining and shaping their municipality. This adds a rather normative element to the concept of collaboration: while the standard literature perceives collaboration as a purely organisational issue between the public and the private sector we see it as a possibility to bringing the citizens closer to their public administration by showing them how a municipality is managed, which problems it is confronted with and eventually, how their tax-money is spent. It goes without saying that the administration needs to prove that it is taking citizens' input seriously and therefore create easily accessible and transparent communication channels.

The central difference between transparency measures and collaboration is the activity level of the citizens. Rather than passively consuming more or less abstract information about administrative procedures, they initiate a process and either execute it themselves or follow

how their input treated. This gives the citizen a much more concrete understanding of how the administration and the public authorities work and shows vividly that their very concrete and individual concerns are taken seriously.

The central difference to public participation should also be clear: while participation is about citizens taking part in decision-making processes preceding concrete action, collaboration aims at jointly executing tasks. Therefore, the citizens as well as private organisations "help" the public authorities creating a well-functioning municipality and community.

4.3.1 Forms and advantages of collaboration

Collaboration as understood by in the context of Live+Gov has two manifestations. The first, **type 1 collaboration**, refers to citizens reporting issues to their public authorities and therefore asking them to become active in respect to a particular issue. This can relate to damages of the public infrastructure or more fundamental issues of how the municipality is run (e.g. standards of maintenance or certain circumstances that should be addressed and tackled). After receiving this citizen input, the municipality's administration can become active and take care of the reported issue. The core advantages of such public-private collaboration are twofold. The first is that the public authorities can use the attentiveness of the citizens in order to obtain a better overview of the municipality by gaining better knowledge of the state of the public infrastructure. This is including issues that are offside the standard maintenance and surveillance procedures, is adding detail to the informational basis of the administration, is enhancing the public authority's ability to respond to citizens' demands and therefore increasing the quality of public service delivery.

Furthermore, the citizen input can be recorded, analysed, evaluated, and introduced into the municipality's mid-to-long term planning. Accordingly, this higher aggregation of citizen contributions can deliver subtle and not immediately visible issues enabling the public authorities to become active.

The second advantage is that citizens are given the possibility to shape their municipality by initiating either a repairing or an improvement process. Therefore, they become engaged in the bureaucratic process of managing a municipality. In particular, they comprehend how administrative and maintenance tasks are performed as well as how and why certain decisions need to be taken. As has been referred to before, the central advantage as compared to pure transparency measures is that this information is much more concrete than abstract information about similar processes. The citizens have a real world example in mind – their reported issue – and are able to relate the nuances of a process to the tasks that need to be implemented. Accordingly, the citizens see how the administration is working and that the administration is working and are becoming motivated to participate in the future as well. Therefore, being shown that their concerns are being treated seriously the citizens are motivated to participate more in the future. This may refer to reporting more issues and therefore further improving the benefits for the administration concerning the overview of the municipality as well as other possibilities for participation. Eventually, if the collaborative process is working and is organised efficiently it has the potential to become a powerful confidence-building measure and bring the citizens closer to their state.

It should be noted, however, that this sort of collaboration is often referred to as a means of modern complaint management (see e.g. Nanz and Fritsche (2012): p.88 in reference of the online reporting tool "fixmystreet.com"). We would like to point out here that we strongly disagree with this interpretation. In our opinion, it is clearly reflecting a traditional and paternalistic understanding about the role allocation between the state and the citizen: the bureaucracy solely being responsible for public service delivery and the citizen being reduced to a beneficiary without any possibility to take some of the responsibility. This does not fit to what modern citizens are aspiring (see: Introduction). Therefore, we strongly oppose to calling such collaboration "complaint management" and opt rather for the term "joint-action management", which is expressing that citizens and bureaucracy are working together in order to maintain and develop the municipality.

The second, **type 2 collaboration** is still in its infancy and is yet to be fully implemented in concrete, real-world contexts or discussed more broadly in the literature[14]: citizens assuming responsibility for concrete maintenance issues and shaping their municipality according to their own ideas. More concretely, this means that citizens are executing certain maintenance issues themselves. The need and demand for such own initiative projects can already be observed in the context of gardening and greening projects in large cities all around the world. Originating in Ney York (USA) in the 1970s, "guerrilla gardeners" have started to green brownfields in inner city areas without waiting for the city's public authorities to take good care of such neglected areas or until they have allocated the resources for it. In the meantime this former expression of civil disobedience has evolved to become a broad trend with administrations and private house owners often cooperating with "Urban Gardening" projects for greening the public space. Important is the fact that these are mostly private initiatives from citizens who are unhappy with the appearance with a part of a city or a municipality.

The Live+Gov approach in this collaborative respect is to channel citizen engagement and introduce official facilities to obtain information about public space, which is "free" for individual projects, past projects that have already been implemented, and possibilities how to get financial support and the like. We argue that this has the same positive effects as collaboration of the first type: citizens are given responsibility and the space to become active for their municipality, get a more direct and concrete view of the administrative processes, necessities and constraints, and are therefore developing a closer relation to their state, the municipality and their community. The main difference to the first type is, however, that the citizens' activity is clearly future-oriented and requires more engagement. This is not only more demanding for the individual citizen but also for the bureaucracy. By granting the citizens this freedom, the bureaucracy is not only giving up a certain degree of control over the related processes but has to guarantee the functioning of the system. This requires thorough planning and clear guidelines, which are being set in advance.

4.3.2 Discussion: issues of participation and the contribution of ICT

Systematic and institutionalised collaboration between public authorities and the citizens in maintenance issues is a novelty in the context of Citizen Participation. This is mostly due to

[14] See the following Section 5 about the Live+Gov use-case in Utrecht for the first concrete implementation of collaboration in a municipal context.

the fact that the classical bureaucracy understands itself as a paternalistic organisation that is neither receptive nor responsive to citizen input neither on the decision-making nor on the executive level. Therefore, collaboration or collaborative public management requires a change in the fundamental orientation of the public authorities themselves and the mindset of the individual civil servants. In particular, both the structure and the individuals have to abandon their strict focus on structural and functional boundaries and need to adapt their working routines to the concrete tasks and not vice versa (adapting the concrete tasks to the working routines), as it is the case in the traditional bureaucracy model. Internally, the administrative units and departments have to cooperate and collaborate more closely and directly; externally, the administration as such has to be permeable for citizen and stakeholder input. Therefore, effective collaboration requires a certain degree of reorganising the working processes of the public administration itself. Accordingly, the main obstacle for effective collaboration is the self-conception of the public authorities. They have to give up power and control and accredit it to the citizens. They need to transfer real responsibility to the citizens that can make a difference to the appearance or the functioning of a municipality. As soon as this change in the mindset has taken place the administration can start to take the organisational decisions that are necessary for making collaboration possible.

Collaboration of the type 1 is not completely new. Citizens are already having the possibility to get into touch with their public administration and report issues. Municipalities usually have installed “citizen contact centres” that can be addressed in person, by mail or email, or by telephone. However, the problems are twofold: first, the personal cost for the citizen contributing reports to the administration is rather high: appearing personally in the respective office and describing the issue is time consuming. So are writing letters or emails. Furthermore, the timespan between the citizen detecting an issue and the effective possibility to report the issue is usually quite long. Therefore, the citizen may forget or the urge making this report travels down the individual priority list resulting in not making the report.

Second, it is rather difficult for the administration to fully assess the reported issue. Citizens’ descriptions are often lacking detail, may be confusing or even wrong in terms of not being an issue. Accordingly, the administration cannot avoid to double-checking the reported issue and come to an own assessment. No doubt, even under these circumstances the citizen contribution is still valuable as it is raising awareness for in the public administration. However, the maintenance procedure as such does basically not change and the related optimisation potential for the administration is marginal.

Collaboration of the type 2 poses even greater problems for the administration. On the one hand this is due to lacking organisational capacities within the administration. On the other had agreeing with citizens about the type of their collaboration is time consuming and possibly unclear. Therefore, the core task is to install the appropriate administrative procedures for this second type of collaboration. Issue areas have to be defined, legal obstacles clarified, information systems set up as well as quality control mechanisms established. Thus, this requires severe organisational underpinnings. However, mobile technology can be a decisive facilitator for this especially if reporting systems as in the case of Eindhoven are combined or already in place.

4.3.3 The mobile context

It has been argued that the core obstacle for effective collaboration between citizens and public administrations is the organisational and personal effort. In this respect, mobile technology is particularly valuable for the first type of collaboration. Using applications like "BuitenBeter" in the city of Eindhoven (see: best practice example in section 4.3.4) clearly facilitates reporting an issue because the users do not have to wait until they reach a means for communicating with the public administration – they have the means at hand! Accordingly, they can respond to their urge immediately and do not forget. Consequently, the administration is automatically receiving more reports. Furthermore, the information is of much higher quality and is containing pictures and a record of sensor data including GPS localisation, compass course, time, etc. This enables the administration to start the maintenance process immediately. Reports may still be misinterpreted (by the area manager) but the bulk is accurate enough to take concrete action. In addition, the same application can be used to maintain a communication channel to the citizens informing them about the progress of the maintenance. In this respect, the differences between transparency measures, public participation and collaboration become blurred.[15]

Mobile devices can be used in an even more advanced way. Their internal sensors can, for example, automatically and permanently record information about the movement profile of the user by GPS localisation, gyroscope, as well as the compass to name but a few. These data can then be analysed for relevant information about a specific issue. E.g. if one is interested in the traffic flow in a metropolitan area, tracking the movement of the mobile device reveals in every detail how the respective person has moved through the system including traffic jams, waiting times between different means of transportations, etc. The applicability of this kind of data is vast. Logging the movement profiles of a high number of commuters in a metropolitan area for example, provides a very detailed description about the actual traffic conditions. Accordingly, the people can be warned if problems occur in real-time. The data can also be recorded over a longer period of time revealing how the traffic flows in general covering different modes of transportation. This can be of high value to urban (traffic) planners.

Collaboration of the second type is also profiting from mobile technology. Once citizens have identified a spot in the municipality for their collaborative contribution (e.g. greening a certain brownfield) they have the possibility to react immediately: they can take a picture and send it to the administration. Their purpose is, however, not to demand maintenance but to offer maintenance and announcing that they would like to become active and what they are planning to do. After receiving the information, the administration either gives its consent or explains why it cannot approve the plan (because the spot is not suitable or others have already planned to do something). Accordingly, the citizens learn immediately whether they can start with their plans or not. The administration on the other hand gains knowledge about where citizen activities are underway and can establish a randomised quality control system safeguards a certain quality level. Eventually, such a collaboration

[15] However, one could also say that considering Citizen Participation holistically and combining all three pillars transparency, public participation and collaboration is most effective for achieving the final aim of improving the relation between the citizens and the public authorities and improving public service delivery.

system can be complemented by a web application informing citizens about possibilities for collaboration, as well as ongoing and completed projects.

4.3.4 Best practice example: BuitenBeter Eindhoven[16]

One very impressive and advanced best practice example of how **collaboration type 1** can be organised is the maintenance department of the city of Eindhoven in the Netherlands. There, the public administration has introduced a sophisticated maintenance system allowing the citizens to share information about the state of the public infrastructure and report damages and nuisances. The core characteristic of the system is that the input coming from the citizens is treated in exactly the same way as input from public authorities like for example the municipal public order office surveying the functioning of the city. Accordingly, both public authorities as well as the citizens report their issues through the same system whereas both are having equal priority: citizens and public authorities are treated equally if it comes to reporting maintenance issues.

The functioning of the maintenance system in Eindhoven has three central pre-conditions. The first is a central administrative reform process of the maintenance department of the city. Before the reform in the year 2009, maintenance of the city's infrastructure had been the responsibility of eight independent municipal districts applying and following their own rules and procedures. This led to major inefficiencies and confusion about the best way to handle the maintenance of the public infrastructure. Accordingly, the city administration enacted common rules and procedures for the whole maintenance department including all eight districts. Area managers have been kept to handle the issues in a certain district but they all have been connected by a comprehensive and consistent set of rules and procedures.

A second pre-condition is that the maintenance department has introduced a common and single electronic management system that is similar for all area managers and implements the coherent rules and procedures. Area managers are continuing to execute their task autonomously but with the new system they are bound to a set of standardised procedures and are connected among each other. This improves their communication considerably.

The third pre-condition of the system in Eindhoven, in particular is the fact that maintenance of the public infrastructure has completely been outsourced to external service providers. Ever since these external service providers execute the complete maintenance of the public infrastructure ranging from sweeping the roads and mowing the lawns to maintaining the electricity or sewage system.

The basic administrative act is as follows: besides internal communication procedures of the public authorities (e.g. between the maintenance department and the public order office), the citizens have manifold possibilities for reporting issues with the public infrastructure. First, they can apply the most traditional method and write a letter to the public administration describing their concern. Second, they can call the administration by

[16] The information about the maintenance system in the city of Eindhoven have been collected in personal interviews with civil servants from the city as well as area managers who are being responsible for urban maintenance.

telephone and explain their issue. Third, they can access the online portal of the city of Eindhoven and report their issue. They also have the additional possibility to upload a picture. Fourth, they can utilise the "BuitenBeter" application on their mobile device and submit a report possibly augmented by a picture and the exact GPS location as well as the compass course.

Letters and telephone calls are received by the "Citizen Contact Centre" of the city. The public employees and civil servants have access to the maintenance system and enter the reported issue directly into the system. If the citizens choose to communicate via the web-service or the "BuitenBeter" application their message is sent directly to the information system of the administration. From there it is forwarded to the "middle-ware", which is a "Content Management System" (CMS) introduced and maintained by the Live+Gov partner YUCAT. The received input is then presented to the maintenance department in a coherent manner regardless of the means of the previous communication.

Depending on the exact location of the issue, area managers take care of the report and initiate the maintenance process. Therefore, they assess the reported damage and send a request to a private contractor capable of executing the required task on site. The contractor is connected to the city's maintenance department via the same maintenance system and receives the area manager's request via "Personal Digital Assistants" (PDAs). Once the contractor assumes the job, it has a period of five days for accomplishing the maintenance except for the case that the reported issue turns out to be more sever than expected before. Surpassing this time limit is costly for the contractor: for every day of delay it has to pay a certain fine. Furthermore, the contractor is obliged to document the progress of the work and record the invested resources, which is all done electronically via the PDAs. Therefore, the area managers in the maintenance department have full control of the maintenance issue and can intervene immediately if things proceed differently than envisaged.

Eventually, as soon as the task is accomplished and the area manager has approved the work by the contractor, the maintenance system automatically compiles the receipt based on the documented work and sends it to the contractor. They can then claim the incurred costs from the finance department of the public administration.[17]

Placing the area manager in the centre of this maintenance system makes it particularly flexible. Having full control of the maintenance process, the area manager can negotiate with the contractors about the needed investments or can contact external service providers if there is no appropriate company among the contractors.[18] This can be the case if the reported issue requires extraordinary expertise or some other form of special treatment that cannot be covered by a regular partner. Furthermore, the area manager is in permanent contact with an external quality control unit, which is controlling and spot-checking the work by the contractors.

[17] In this respect, it is interesting to know that the budget of the maintenance department of the city of Eindhoven is flexible. Accordingly, all tasks that are deemed necessary to be taken care of by the area managers will be accomplished.

[18] It should be noted that the contracts with the permanent service providers define the costs of all conceivable service. Therefore, the negotiations with the contractors involve mainly the effort that can be accounted for.

There are various advantages of such a maintenance system for the public administration. First and foremost, it saves costs. Although the public administration has to bear the costs for setting up and maintaining the electronic system, the consequent transparency of the maintenance process facilitates an unprecedented degree of control over the maintenance the related costs. As a matter of fact, this gain in efficiency results in saving a considerable amount of the budget. The second advantage for the administration relates to decreasing workload for the civil servants and the public employees. This relates basically to the transparent and clear-cut relations between the contractors and the individual area managers that leave less room for interpretation or discussion. Additionally, the clear and unambiguous procedures are pre-defining the workflows to a considerable extent enabling the area manager to focus on the more important issues and problems. Furthermore, the coherent maintenance system connects the individual area managers and enables internal communication and learning from the experiences of the others. The third administrative improvement relates to the quality of the public service. The system allows to handling damages of the public infrastructure much more rapidly. Therefore, they can be tackled before becoming too severe. If a citizen reports an issue via the BuitenBeter application web-service it takes roundabout one minute (!) until the message appears on the screen of the area manager and is ready to be dealt with.

The advantages for the citizens are basically as described in the previous section: they have a channel to become active and contribute to improving their municipality or city. Additionally, they can follow the maintenance process and see the concrete working procedures of the administration. This is greatly increasing their satisfaction with the public authorities.[19]

An additional effect of the transparent maintenance system in Eindhoven and the mobile component is that it has indeed increased the attentiveness of the citizens. As surveys of the public administration have revealed, citizens have developed a view for issues in the public space and their environment and are more concerned about the state of the public infrastructure. This effect is highly valuable for the administration because they can rely on an improving and expanding their informational basis when it comes to overseeing the needs and demands of their municipality.

4.3.5 Collaboration guidelines for Live+Gov

The Live+Gov project tackles both types of collaboration. In terms of collaboration type 1, it advances the current “BuitenBeter” system (as it is running in Eindhoven) by improved feedback and information possibilities for the citizen. In particular, they are provided by advanced information about maintenance levels in the municipality and can comment on them. Additionally, the system will be augmented by more extensive analytical features for extracting more fundamental information from the acquired data about the state of the municipality. This information will then be communicated to the decision-making arenas of

[19] The city of Eindhoven has installed a Twitter account available for further comments about the public maintenance. Following these tweets shows vividly that the citizens are appreciating the effort and the general work oft he administration and the maintenance department after having reported and issue via the different channels and having observed the maintenance process.

the municipalities in a more institutionalised manner.[20] Accordingly, the "BuitenBeter" system should become a feature and an additional policy-support tool in the mid-to-long-term planning process of the municipality.

Accordingly, the citizens can activate their Live+Gov application and report issues in the public infrastructure by taking a picture and writing a short comment (which is optional), categorising the issue and sending this via the application to the municipality. The message is automatically augmented by geo-location data. The administration receives this input and is having enough information to start the maintenance process immediately, which is also running via mobile devices – in this case in the hands of contractors taking care of the concrete business and reporting back to the administration about the progress of the work. Type 2 collaboration is included into this system by having the possibility to announce personal maintenance projects like greening a brownfield in the city: [21] the citizen is taking a picture, choosing the option to become active, sends this to the administration, which is coming back to the citizen by a positive or negative answer (whether individual maintenance is possible there or not). The collaboration system is crucially organised through a central web-application disclosing widespread information about collaborative projects in the city, about further possibilities and resources.

The technical requirements for the collaborative system in the context of the Live+Gov process are:

- Sensing technology on the mobile device: GPS, compass, gyroscope, camera. These are intended to add enough detail to the report that is enabling the public authorities to start the maintenance process based on this information exclusively.
- Server-side analysis: The incoming data are stored and analysed on an external server. The information, which is derived by the system are: who is using the application (if information is available), are there patterns in reporting, e.g. are citizens in one particular district particularly active? How is the shape of certain districts? Where does the infrastructure need more investments?
- Frond-end presentation on both the mobile device and the web-application: the features of the application (categories for reporting, feedback area, area for background information) need to be presented. The same is true for the web-application (see: solution by YUCAT).
- Technical communication: the Live+Gov systems need to communicate with the municipality's IT systems. The necessary APIs are included in the package.

As it could be learned from the best practice example in Eindhoven, these new functionalities require sophisticated organisational underpinning. Above all, the municipality needs to agree on a collaboration policy defining which type of collaboration should be possible (gardening, cleaning, or more complicated matters) and which must remain in the hands of the public authorities and the respective specialised service providers.

[20] Reports analysing the citizen contributions for fundamental patterns are currently not done systematically.

[21] Collaboration type 2 is also currently not incorporated in the system.

Furthermore, it needs to identify the areas in the municipality, which should be available for citizens' collaboration activity. Then, the municipality also needs to set a certain quality control mechanism for checking the activity of the citizens to a certain extent and having the possibility to intervene in the project if necessary. Eventually, collaboration type 2 is demanding more sophisticated communication between the public authorities and the citizens. In particular, they need to stay in touch in terms of sustainability of the project and the moment that the respective area should be opened for a successive collaborative project.

- The concrete maintenance procedure organising the relation between the municipality and the executive bodies taking care of the concrete work on site. A second aspect of the maintenance procedure is to having clear guidelines, which type 2 collaboration is facilitated by the Live+Gov system: what can be executed by the citizens, which resources are given, and how is the quality management organised?
- Communication policy, determining the communication policy with the citizen and also organising feedback.
- There should be a central authority organising the collaborative projects either in the administration or related to it like a "Citizen Contact Centre".

Table 3: Features, Effect and Purpose of Collaboration Measures in the Live+Gov Context

Live+Gov feature	Effect	Purpose
Conceptual		
Collaboration type 1 and 2	Collaborating with the citizens in maintaining the public infrastructure	Assigning responsibility to the citizen
Technical		
Sensing via mobile devices: GPS, compass, gyroscope, camera	Providing data about geo-location, movement, immediate context	Gathering the raw context information about the citizen
Server-side analysis I	Recognising location, movement and view as well as deriving the activity of the citizen	Obtaining enough information for starting the maintenance process
Server-side analysis II	Deriving patterns in the data: who reports (if data available), what is reported, where are issues reported,	Providing more fundamental information for the public authorities
APIs	Connecting different IT systems	Enabling communication between the Live+Gov system and the municipality's IT system as well as other service providers.
Front-end presentations on mobile and web-applications	Mobile: AR view; presentation of features (categories for reporting, feedback area, area for background information) Web-application: see solution by YUCAT	Enabling easy utilisation; informing the citizens about collaborative projects and possibilities
Organisational Requirements		
Acting body	Organising and moderating the collaborative process	Keeping the participatory process going: attributing clear responsibility
Maintenance guidelines	Defining the maintenance process, defining the collaboration process	Institutionalising the maintenance process; setting out the possibilities of the citizens
Communication policy	Organising feedback and communication	Providing the citizen with information pro-actively

In preparation of the ontology and for summarising the content of table 3, the core components of the concept of collaboration are visualised in Appendix A3.

5 Formal Ontology for mobile Citizen Participation

In the following, this section presents the formal ontology describing the Live+Gov approach, its strategies, its functionalities and the interdependencies of the single concepts as they are visually depicted in the previous section. Please note that in there, the basic concepts transparency, public participation and collaboration are presented separately whereas the ontology combines all the three in one consistent Live+Gov solution.

The ontology consists of two basic parts: the first part describes the fundaments of the Live+Gov system that are similar in all specific applications. These are the basic concepts of Citizen Participation transparency, public participation, and collaboration, the technical requirements and the organisational requirements. Furthermore, some technical requirements are also general meaning that links to external sources, mobile sensing (active citizen input and automatic sensor input), server-side analysis, and presentation on the mobile device are relevant in all Live+Gov applications both in the actual use-cases as well as future applications. The second part describes the more specific components, which are being developed for implementing the use-cases.

Please note that all the features that are being developed and implemented in the Live+Gov project can either be implemented as they are or be combined individually depending on the needs and requirements of future contexts.

Accordingly, this section is organised as follows: it first introduces into the formal language of the ontology (5.1); second, it formalises the general parts of the Live+Gov system (5.2); third, it formalises the detailed part of the Live+Gov system, which is specifically developed in the context of the use-cases.

5.1 Description logic as modelling language

We now give a brief overview on description logics (Baader et al. 2003), the language family that underlies modern ontology languages like OWL2 (Hitzler et al. 2009). To keep things simple, we use $\mathcal{ALC}$ (*Attribute Language with Complement*) as our modelling language for ontologies and we assume some familiarity with basic concepts of logic and knowledge representation (Brachman et al. 2004).
The *signature* $Sig_{\mathcal{L}} = \mathbf{C} \uplus \mathbf{R} \uplus \mathbf{I}$ of an $\mathcal{ALC}$ language $\mathcal{L}$ is composed of a set $\mathbf{C}$ of atomic concepts denoted by *A*, *B*, *C*,..., a set $\mathbf{R}$ of atomic roles denoted by $r, s, \ldots$, and a set $\mathbf{I}$ of individuals denoted by $a, b, c, \ldots$. A concept describes a specific *class* or *classification* of an individual and a role models a relationship two different individuals.

Complex concepts in $\mathcal{L}$ are built using the symbols in and the following syntax rules:

$$C ::= A \mid \top \mid \bot \mid (\neg C) \mid (C \sqcap C) \mid (C \sqcup C) \mid (\exists\, r.C) \mid (\forall\, r.C) \mid \qquad (1)$$

where $A \in \mathbf{C}$ is a concept name, $r \in \mathbf{R}$ is a role name and $a_1, \ldots, a_n \in \mathbf{I}$ are individuals. The special symbol $\top$ denotes the most general concept (every individual belongs to this concept) and the special symbol $\bot$ denotes the empty concept (no individual belongs to this concept).

The concept $\neg C$ denotes the complement of C (every individual not belonging to C belongs to $\neg C$), $C \sqcap C'$denotes intersection (only individuals belonging to both C and C' belong to $C \sqcap C'$), $C \sqcup C'$denotes union (individuals belonging to C or C' belong to $C \sqcap C'$), $\exists r.C$ denotes existential quantification (only individuals a for which another individual b exists such that the relation r holds between a and b, belong to $\exists r.C$), and $\forall r.C$ denotes universal quantification (only individuals a belong to $\forall r.C$ for which all individuals b, which are in the relationship r to a, belong to C).

If C_1, C_2 are concepts then $C_1 \sqsubseteq C_2$ is an *inclusion axiom*. If C is a concept, $r \in \mathbf{R}$ is a role, and $a, \in \boldsymbol{I}$ are individuals, then $C(a)$ and $r(a, b)$ are *assertional axioms*. An *ontology* $\mathcal{O}$ is a pair $\mathcal{O} = (\mathcal{T},)$ where $\mathcal{T}$ is a finite set of inclusion axioms (called the Tbox) and $\mathcal{A}$ is a finite set of assertional axioms (called the Abox). We assume the standard first-order semantics of $\mathcal{O}$, given by Tarski style model-theoretic semantics using interpretations like in Baader et al. (2003). In order to illustrate the usage of $\mathcal{ALC}$ and the (informal) meaning of complex concept constructions and axioms, consider the following example, for technical details see e. g. (Baader et al. 2003).

Example 1 *Assume we want to model an ontology describing families and the relationships between different people in these families. The signature* $Sig_{\mathcal{L}} = \mathbf{C} \uplus \mathbf{R} \uplus \mathbf{I}$ *then can be composed of the following elements (note that we are not exhaustive in our modeling approach):*

- Concepts **C**:
  - Human: a human being
  - Man: a male human
  - Woman: a female human
  - Father: an individual which is both a man and has a child

- Roles **R**:
  - hasChild: identifies one individual to be a parent of another individual
  - hasSibling: identifies one individual to be a sibling of another individual

- Individuals **I**: for the sake of presentation let us assume that the individuals under consideration only contain three persons **I**={anna,bob,carl}.

Using complex concept constructions and axioms we can relate the different concepts to each other in order to describe implicit knowledge such as follows

- Man⊑Human: Every man is a human.
- Man⊓Woman⊑⊥: No man is a woman and vice versa.
- Father⊑Man⊓∃*hasChild.Human*: A father is a man that has at least one (human) child.

The above terminological axioms are examples of axioms that can be collected in the Tbox $\mathcal{T}$ of an ontology $\mathcal{O} = (\mathcal{T}, \mathcal{A})$. The Abox $\mathcal{A}$ then can contain specific information on individuals such as

- Human(anna): Anna is a human.
- Father(bob): Bob is a father.
- hasChild(bob,carl): Carl is a child of Bob.

Systems like *Protege*[22] allow easy development of ontologies in the above manner. Furthermore, systems like *Racer*[23] allow for *automatic reasoning* with ontologies, that is, to infer new information from an ontology. We do not go into further details here as we will use $\mathcal{ALC}$ only as a modeling framework for specifying the context taxonomy for citizens in eParticipation scenarios.

5.2 Live+Gov Ontology: General part[24]

For modeling collaboration we employ $\mathcal{ALC}$, which has been briefly introduced in the previous section. We build the signature of our language iteratively and start with the most general one $Sig^1_{\mathcal{L}_{lg}} = \mathbf{C}^1_{lg} \uplus \mathbf{R}^1_{lg} \uplus \mathbf{I}^1_{lg}$ of the *Live+Gov ontology* $\mathcal{O}_{lg} = (\mathcal{T}_{lg}, \mathcal{A}_{lg})$ is defined as follows:

$$\mathbf{C}^1_{lg} = \left\{ \begin{array}{c} CPSEMTSolution, Strategy, Requirement, Functionality, Policy, CollaborationStrategy, \\ TransparencyStrategy, ParticipationStrategy, TechnicalRequirement, \\ OrganisationalRequirement, LiveAndGovSolution \end{array} \right\}$$

$$\mathbf{R}^1_{lg} = \{hasRequirement, hasStrategy, hasFuncitionality\}$$

$$\mathbf{I}^1_{lg} = \emptyset$$

All axioms that follow are included to form the Live+Gov ontology

The following are basic concept definitions:

$$\begin{array}{ll} CPMTSolution & \sqsubseteq \top \\ Strategy & \sqsubseteq \top \\ Requirement & \sqsubseteq \top \\ Functionality & \sqsubseteq \top \\ Policy & \sqsubseteq \top \end{array}$$

[22] http://protege.stanford.edu

[23] http://www.racer-systems.com

[24] The general part oft he ontology refers to the concepts that are describing the most fundamental concepts, which similar for all use-cases as well as for all future applications. Please note that the concept functionality has no further details on the general level.

Strategies (or measures), which belong to a citizen participation approach:

$$CollaborationStrategy \sqsubseteq Strategy$$
$$TransparencyStrategy \sqsubseteq Strategy$$
$$ParticipationStrategy \sqsubseteq Strategy$$

Requirements for implementing a strategy:

$$TechnicalRequirement \sqsubseteq Requirement$$
$$OrganisationalRequirement \sqsubseteq Requirement$$

Every strategy has at least one technical and one organizational requirement, as well as a functionality:

$$Strategy \sqsubseteq \exists hasRequirement.TechnicalRequirement \quad (2)$$
$$Strategy \sqsubseteq \exists hasRequirement.OrganisationalRequirement \quad (3)$$
$$Strategy \sqsubseteq \exists hasFunctionality.Functionality \quad (4)$$

A Live+Gov solution is a solution to citizen participation with mobile technology:

$$LiveAndGovSolution \sqsubseteq CPMTSolution$$

A solution to citizen participation and stakeholder engagement with mobile technology has a collaboration strategy, a transparency strategy, and a participation strategy:

$$CPMTSolution \sqsubseteq \exists hasStrategy.CollaborationStrategy \sqcap \exists hasStrategy.TransparencyStrategy \sqcap \exists hasStrategy.ParticipationStrategy$$

5.2.1 Organisational requirements

We extend the signature from above by $Sig^2_{\mathcal{L}_{lg}} = \mathbf{C}^2_{lg} \uplus \mathbf{R}^2_{lg} \uplus \mathbf{I}^2_{lg}$ with

$\mathbf{C}^2_{lg} = \{CollaborationPolicy, TransparencyPolicy, ParticipationPolicy\}$

$\mathbf{R}^2_{lg} = \{hasPolicy\}$

$\mathbf{I}^2_{lg} = \emptyset$

Policies for organizational requirements:

$CollaborationPolicy \sqsubseteq Policy$

$TransparencyPolicy \sqsubseteq Policy$

$ParticipationPolicy \sqsubseteq Policy$

If the organizational requirement belongs to a collaboration strategy it must have a collaboration policy (and so on):

$CollaborationStrategy \sqsubseteq \exists hasPolicy.CollaborationPolicy$

$TransparencyStrategy \sqsubseteq \exists hasPolicy.TransparencyPolicy$

$ParticipationStrategy \sqsubseteq \exists hasPolicy.ParticipationPolicy$

If the organizational requirement belongs to a collaboration strategy it must not have a transparency policy (and so on):

$CollaborationStrategy \sqsubseteq \neq \exists hasPolicy.TransparencyPolicy \sqcup \neq \exists hasPolicy.ParticipationPolicy$

$TransparencyStrategy \sqsubseteq \neq \exists hasPolicy.CollaborationPolicy \sqcup \neq \exists hasPolicy.ParticipationPolicy$

$ParticipationStrategy \sqsubseteq \neq \exists hasPolicy.TransparencyPolicy \sqcup \neq \exists hasPolicy.ParticipationPolicy$

5.2.2 Technical requirements

We extend the signature from above by $Sig^3_{\mathcal{L}_{lg}} = \mathbf{C}^3_{lg} \uplus \mathbf{R}^3_{lg} \uplus \mathbf{I}^3_{lg}$ with

$$\mathbf{C}^3_{lg} = \begin{cases} ExternalDataSourceRequirement, MobileSensingRequirement, ServerAnalysisRequirement \\ MobilePresentationRequirement, ActiveInputRequirement, AutomaticInputRequirement, \\ ActivityRecognitionRequirement, TransportationDetectionRequirement, \\ TextAnalysisRequirement, StatisticalCalculationRequirement \end{cases}$$

$$\mathbf{R}^3_{lg} = \emptyset$$

$$\mathbf{I}^3_{lg} = \emptyset$$

Four different types of technical requirements:

$ExternalDataSourceRequirement \sqsubseteq TechnicalRequirement$
$MobileSensingRequirement \sqsubseteq TechnicalRequirement$
$ServerAnalysisRequirement \sqsubseteq TechnicalRequirement$
$MobilePresentationRequirement \sqsubseteq TechnicalRequirement$

Two different types of mobile sensing requirements:

$ActiveInputRequirement \sqsubseteq MobileSensingRequirement$
$AutomaticInputRequirement \sqsubseteq MobileSensingRequirement$

Four different types of server-side analysis requirements:

$ActivityRecognitionRequirement \sqsubseteq ServerAnalysisRequirement$
$TransportationDetectionRequirement \sqsubseteq ServerAnalysisRequirement$
$TextAnalysisRequirement \sqsubseteq ServerAnalysisRequirement$
$StatisticalCalculationRequirement \sqsubseteq ServerAnalysisRequirement$

5.3 Live+Gov Ontology: Detailed part

In contrast to the general part, the concepts that are being described in the detailed part refer to the concepts that are more specifically geared towards more specific functionalities. Please note, however, that their application is not restricted to a special context.

5.3.1 Organisational requirements

Therefore, we extend the signature from above by $Sig^4_{\mathcal{L}_{lg}} = \mathbf{C}^4_{lg} \uplus \mathbf{R}^4_{lg} \uplus \mathbf{I}^4_{lg}$ with

$$\mathbf{C}^4_{lg} = \left\{ \begin{array}{c} Organization, ModerationType, DocumentType, DisclosingProcedure, \\ PublicProcedure, PrivacyPolicy, CommunicationPolicy, Issues, Procedures, \\ CitizenCommunicationPolicy, GovermentalCommunicationPolicy, \\ WebApplication, PlanningGovernmentalCommunicationPolicy, \\ ConsultationGovermentalCommunicationPolicy, FeedbackMechanism \end{array} \right\}$$

$$\mathbf{R}^4_{lg} = \{hasActionBody, hasParameter, hasMethod\}$$

$$\mathbf{I}^4_{lg} = \emptyset$$

An organizational requirement contains an acting body if it belongs to a transparency strategy:

$TransparencyPolicy \sqsubseteq \exists hasActingBody.Organization$

$CollaborationPolicy \sqsubseteq \neq \exists hasActingBody.Organization$

$ParticipationPolicy \sqsubseteq \neq \exists hasActingBody.Organization$

Parameters of a transparency policy:

$TransparencyPolicy \sqsubseteq \exists hasParameter.ModerationType$

$TransparencyPolicy \sqsubseteq \exists hasParameter.DocumentType$

$TransparencyPolicy \sqsubseteq \exists hasParameter.DisclosingProcedure$

$TransparencyPolicy \sqsubseteq \exists hasParameter.PublicationProcedure$

Parameters of a collaboration policy:

$CollaborationPolicy \sqsubseteq \exists hasParameter.PrivacyPolicy$

$CollaborationPolicy \sqsubseteq \exists hasParameter.CommunicationPolicy$

$CollaborationPolicy \sqsubseteq \exists hasParameter.Issues$

$$CollaborationPolicy \sqsubseteq \exists hasParameter.Procedure$$

Two types of communication policies:

$$CitizenCommunicationPolicy \sqsubseteq CommunicationPolicy$$
$$GovernmentalCommunicationPolicy \sqsubseteq CommunicationPolicy$$

Two types of governmental communication policies:

$$PlanningGovernmentalCommunicationPolicy \sqsubseteq GovernmentalCommunicationPolicy$$
$$ConsultationGovernmentalCommunicationPolicy \sqsubseteq GovernmentalCommunicationPolicy$$

Parameters of a participation policy:

$$ParticipationPolicy \sqsubseteq \exists hasParameter.PrivacyPolicy$$
$$ParticipationPolicy \sqsubseteq \exists hasParameter.CommunicationPolicy$$
$$ParticipationPolicy \sqsubseteq \exists hasParameter.Issues$$
$$ParticipationPolicy \sqsubseteq \exists hasParameter.Procedure$$

Differences between participation and collaboration policies: a collaboration policy includes a communication policy with citizens over a web application and introduces participation results into the planning process.

$$CollaborationPolicy \sqsubseteq \exists hasParameter.(CitizenCommunicationPolicy \sqcap \exists hasMethod.WebApplication)$$
$$CollaborationPolicy \sqsubseteq \exists hasParameter.PlanningGovernmentalCommunicationPolicy$$

A participation policy includes a communication strategy with governmental bodies and introduces participation results into the decision-making process.

$$ParticipationPolicy \sqsubseteq \exists hasParameter.ConsultationGovernmentalCommunicationPolicy$$

A communication strategy with citizens has a feedback mechanism:

$$CitizenCommunicationPolicy \sqsubseteq \exists hasMethod.FeedbackMechanism$$

5.3.2 Technical requirements

We extend the signature from above by $Sig^5_{\mathcal{L}_{lg}} = \mathbf{C}^5_{lg} \uplus \mathbf{R}^5_{lg} \uplus \mathbf{I}^5_{lg}$ with

$$\mathbf{C}^5_{lg} = \left\{ \begin{array}{c} MapViewRequirement, ARRequirement, TextRequirement, \\ LinksRequirement, CommuitingDetectionRequirement, \\ FreetimeDetectionRequirement, CarDetectionRequirement, \\ BusDetectionRequirement, TramDetectionRequirement, \\ BikeDetectionRequirement, WalkDetectionRequirement, \\ ReportStatisticsRequirement, UserStatisticsRequirement, \\ AgeStatisticsRequirement, GenderStatisticsRequirement, \\ NeighbourhoodStatisticsRequirement, \\ NumberStatisticsRequirement, TypeStatisticsRequirement, \\ AreaStatisticsRequirement, GPSRequirement, GyroscopeRequirement, \\ CompassRequirement, PictureInputRequirement, \\ TextInputRequirement \end{array} \right\}$$

$$\mathbf{R}^5_{lg} = \emptyset$$

$$\mathbf{I}^5_{lg} = \emptyset$$

Four different types of mobile presentation requirements:

$$\begin{aligned} MapViewRequirement &\sqsubseteq MobilePresentationRequirement \\ ARRequirement &\sqsubseteq MobilePresentationRequirement \\ TextRequirement &\sqsubseteq MobilePresentationRequirement \\ LinksRequirement &\sqsubseteq MobilePresentationRequirement \end{aligned}$$

Two types of activity recognition requirements:

$$\begin{aligned} CommutingDetectionRequirement &\sqsubseteq ActivityRecognitionRequirement \\ FreetimeDetectionRequirement &\sqsubseteq ActivityRecognitionRequirement \end{aligned}$$

Five different types of transportation detection requirements:

$$\begin{aligned} CarDetectionRequirement &\sqsubseteq TransportationDetectionRequirement \\ BusDetectionRequirement &\sqsubseteq TransportationDetectionRequirement \\ TramDetectionRequirement &\sqsubseteq TransportationDetectionRequirement \end{aligned}$$

$$BikeDetectionRequirement \sqsubseteq TransportationDetectionRequirement$$
$$WalkDetectionRequirement \sqsubseteq TransportationDetectionRequirement$$

Two different types of statistical calculations requirement:

$$ReportStatisticsRequirement \sqsubseteq StatisticalCalculationRequirement$$
$$UserStatisticsRequirement \sqsubseteq StatisticalCalculationRequirement$$

Three different types of user statistics requirements:

$$AgeStatisticsRequirement \sqsubseteq UserStatisticsRequirement$$
$$GenderStatisticsRequirement \sqsubseteq UserStatisticsRequirement$$
$$NeighbourhoodStatisticsRequirement \sqsubseteq UserStatisticsRequirement$$

Three different types of report statistics requirements:

$$NumberStatisticsRequirement \sqsubseteq ReportStatisticsRequirement$$
$$TypesStatisticsRequirement \sqsubseteq ReportStatisticsRequirement$$
$$AreaStatisticsRequirement \sqsubseteq ReportStatisticsRequirement$$

Three different types of automatic sensor input requirements:

$$GPSRequirement \sqsubseteq AutomaticInputRequirement$$
$$GyroscopeRequirement \sqsubseteq AutomaticInputRequirement$$
$$CompassRequirement \sqsubseteq AutomaticInputRequirement$$

Two different types of active input requirements:

$$PictureInputRequirement \sqsubseteq ActiveInputRequirement$$
$$TextInputRequirement \sqsubseteq ActiveInputRequirement$$

5.3.3 Functionalities

We extend the signature from above by $Sig^6_{\mathcal{L}_{lg}} = \mathbf{C}^6_{lg} \uplus \mathbf{R}^6_{lg} \uplus \mathbf{I}^6_{lg}$ with

$$\mathbf{C}^6_{lg} = \left\{ \begin{array}{c} PollFunctionality, FeedbackFunctionality, InformationFunctionality, \\ AnnouncementFunctionality, ReportFunctionality, ProcedureInformationFunctionality, \\ DocumentInformationFunctionality, ContactInformationFunctionality, \\ ContactInformationFunctionality, ExternalInformationFunctionality, \\ ARInformationFunctionality, PollInformationFunctionality, \\ OptionsInfromationFunctionality, StatisticalInformationFunctionality, \\ ScheduleInformationFunctionality, OwnReportsInformationFunctionality, \\ MaintenanceLevelFunctionalityTrafficjamSIFunctionality, BlockageSIFunctionality, \\ MeansSIFunctionality, LineSIFunctionality, FromTimeSIFunctionality, \\ ToTimeSIFunctionality \end{array} \right\}$$

$\mathbf{R}^6_{lg} = \{ \quad \}$

$\mathbf{I}^6_{lg} = \emptyset$

Five different types of functionalities:

$PollFunctionality \sqsubseteq Functionality$

$FeedbackFunctionality \sqsubseteq Functionality$

$InformationFunctionality \sqsubseteq Functionality$

$AnnouncementFunctionality \sqsubseteq Functionality$

$ReportFunctionality \sqsubseteq Functionality$

Eleven different types of information functionality:

$ProcedureInformationFunctionality \sqsubseteq InformationFunctionality$

$DocumentInformationFunctionality \sqsubseteq InformationFunctionality$

$ContactInformationFunctionality \sqsubseteq InformationFunctionality$

$ExternalInformationFunctionality \sqsubseteq InformationFunctionality$

$ARInformationFunctionality \sqsubseteq InformationFunctionality$

$PollInformationFunctionality \sqsubseteq InformationFunctionality$

$OptionsInformationFunctionality \sqsubseteq InformationFunctionality$

$StatisticalInformationFunctionality \sqsubseteq InformationFunctionality$

$ScheduleInformationFunctionality \sqsubseteq InformationFunctionality$

$OwnReportsInformationFunctionality \sqsubseteq InformationFunctionality$

$MaintenanceLevelFunctionality \sqsubseteq InformationFunctionality$

Six different types of schedule information functionalities:

$$\begin{aligned} \mathit{TrafficJamSIFunctionality} &\sqsubseteq \mathit{ScheduleInformationFunctionality} \\ \mathit{BlockageSIFunctionality} &\sqsubseteq \mathit{ScheduleInformationFunctionality} \\ \mathit{MeansSIFunctionality} &\sqsubseteq \mathit{ScheduleInformationFunctionality} \\ \mathit{LineSIFunctionality} &\sqsubseteq \mathit{ScheduleInformationFunctionality} \\ \mathit{FromTimeSIFunctionality} &\sqsubseteq \mathit{ScheduleInformationFunctionality} \\ \mathit{ToTimeSIFunctionality} &\sqsubseteq \mathit{ScheduleInformationFunctionality} \end{aligned}$$

5.4 Example

Taking everything together from above, i. e., defining the general signature $Sig_{\mathcal{L}_{lg}} = \mathbf{C}_{lg} \uplus \mathbf{R}_{lg} \uplus \mathbf{I}_{lg}$ via

$$\begin{aligned} \mathbf{C}_{lg} &= \mathbf{C}_{lg}^1 \cup \ldots \cup \mathbf{C}_{lg}^6 \\ \mathbf{R}_{lg} &= \mathbf{R}_{lg}^1 \cup \ldots \cup \mathbf{R}_{lg}^6 \\ \mathbf{I}_{lg} &= \mathbf{I}_{lg}^1 \cup \ldots \cup \mathbf{I}_{lg}^6 \end{aligned}$$

and defining the TBox of our *Live+Gov ontology* $\mathcal{O}_{lg} = (\mathcal{T}_{lg}, \mathcal{A}_{lg})$ by the union of all axioms appearing above, we obtain a general ontology for representing software solutions that follow the Live+Gov paradigm. We now populate our ABox $\mathcal{A}_{lg}$ with a specific example of such a solution.

Note that the following example is random and does not necessarily describe a specific use case (although we take the Urban Maintenance use case as a template).

Imagine we want to describe a software solution for the Urban Maintenance use case. Let's call our solution "Universal Maintenance Tool" (UMT). We want to follow the Live+Gov paradigm, so our solution is of type Live+Gov solution:

$$\mathit{LiveAndGovSolution}(\mathit{umt}).$$

In order to comply with the Live+Gov ontology we have to implement transparency, collaboration, and participation strategies. We call these specific strategies *totalTransparencyStrategy1*, *weakCollaborationStrategy1*, and *someParticipationStrategy1* and define

$$\mathit{CollaborationStrategy}(\mathit{weakCollaborationStrategy}1).$$

$$\mathit{TransparencyStrategy}(\mathit{totalTransparencyStrategy}1).$$

$$\mathit{ParticipationStrategy}(\mathit{someParticpationStrategy}1).$$

$$\mathit{hasStrategy}(\mathit{umt},\mathit{weakCollaborationStrategy}1).$$

$$\mathit{hasStrategy}(\mathit{umt},\mathit{totalTransparencyStrategy}1).$$

hasStrategy(*umt*,*someParticpationStrategy*1).

We specify *totalTransparencyStrategy1* a bit more. For that we need a transparency policy *myTransparencyPolicy*.

TransparencyPolicy(*myTransparencyPolicy*).

hasPolicy(*totalTransparencyStrategy*1,*myTransparencyPolicy*).

For the transparency policy we need (among others) a publication procedure *pubProcedure0815:*

PublicationProcedure(*pubProcedure*0815).

hasParameter(*myTransparencyPolicy*,*pubProcedure*0815).

In order to specify this procedure a bit more we define

hasName(*pubProcedure*0815,"*FullDisclosureProcedure*").

hasMedium(*pubProcedure*0815,"*Newspaper*").

hasMedium(*pubProcedure*0815,"*WWW*").

hasMedium(*pubProcedure*0815,"*TV*").

In this example, the above formalization means that our procedure discloses information in the newspaper, on the web, and via television.

Let us assume that the rest of the transparency strategy is defined as well and turn to another part. Let us continue with our *someParticpationStrategy1*. For that we specify some technical requirements. Among others our final solution should support participation by analyzing citizens means of transportation. In particular, we should be able to distinguish whether a citizen uses the specific bus lines *bl12* and *bl13*. We include two different bus requirements:

BusDetectionRequirement(*bl*12).

BusDetectionRequirement(*bl*13).

hasRequirement(*someParticpationStrategy*1,*bl*12).

hasRequirement(*someParticpationStrategy*1,*bl*13).

Note that by adding at least one of the above requirements we automatically satisfy constraint (2). By adding more strategies and requirements to our solution *umt*, we will finally come up with a Live+Gov compliant software solution.

5.5 Use-case description

The particular novelty of the Live+Gov system is that it is combining the three dimensions of Citizen Participation in one context and is therefore providing a general platform for a wide range of participatory processes. They set the foundations for transparency measures, for advanced forms of public participation, and collaboration – all crucially facilitated through mobile devices. The fundamental concepts, presented here are aiming at defining the relevant issues that need to be tackled when introducing new ways of Citizen Participation by making use of mobile technology. The following brief use-case descriptions depict how the single components of the ontology and the entirety of is concepts are put together in a preliminary use-case application. They are based on the cooperation with WP 5 for compiling deliverable D5.1 in particular.

5.5.1 Urban Mobility

According to the general setup of the Live+Gov system (as outlined in section 5.1) the mobility use-case introduces solutions for Citizen Participation on the three distinct dimensions of transparency, public participation and collaboration. However, the emphasis of this use-case is mainly on transparency and collaboration. In particular, the users of the Live+Gov application are systematically supplied with valuable information. This relates first to actual debates and decision-making procedure in the domain of planning and improving the (public) traffic infrastructure. Second, users have access to real-time information about the current conditions in the transportation system and so acquire knowledge about traffic jams, blockades, and other nuisances. Furthermore, they are supplied by links to external services like e.g. route planners enabling them to choose alternative routings.[25]

A core feature of the Live+Gov system is that the user receives specific information, which is fitting to their actual context and is therefore valuable to them. For example, users are reported traffic jams and nuisances only if they affect their particular journey and routing. For this purpose, first the internal sensors of the users' mobile devices record their movement profile by using geo-location instruments like GPS, gyroscope, compass, etc. Second, the acquired data are sent to external serves and are analysed by algorithms capable of recognising the activity of the users (whether they are commuting, go shopping, etc.) as well as the actual means of transportation (whether the users are moving on public transportation facilities, are in a car, on a bike, or walk). In the context of public transportation facilities, the system is also able to detect which particular bus- or tramline the users are utilising, where they change different facilities, how long they wait, and how long they walk or drive to the nearest stop. The information, which is provided to the users takes also their active reporting into consideration. If the users have made a report by taking pictures or commenting on certain issues and there is related information available it is communicated as well.

The second emphasis of the mobility use-case is on collaboration. By mining the context of a user when using the public traffic infrastructure and aggregating these data over a longer period of time as well as over a higher number of users, the public authorities obtain a highly

[25] Therefore, transparency in the mobility use-case context covers also a service element.

detailed view of the transportation system in general. In this context, the core feature of the data is that they reflect its functioning of the from a user point of view. They are not fragmented by means of transportation (buses, trams, car observation, etc.) but show how the general system is working and how the single components are working together. In fact, the data cover the whole journey of a user starting at their home and ending at their final destination. Therefore, the respective sensor data are collected by the mobile devices, stored and analysed on a central server. The corresponding reports are subsequently and regularly communicated to the public authorities and serve as a powerful additional source of information supporting their mid-to-long-term planning of the traffic infrastructure of a metropolitan area.

The second collaborative feature of the Live+Gov system is enabling effective passenger-to-provider communication about damages and nuisances of the public traffic infrastructure like broken windows, lack of lightning, etc. By taking a picture and sending it to the authorities (augmented by sensor input like GPS location and compass course) to the provider the authorities receive actual and highly detailed information about actual damages that need a timely response. Furthermore, the data sent via the application are stored on in the Live+Gov server, aggregated, filtered and mined for further meaningful information. This information is added to the regular reports for the public authorities and assists their planning. Hence, the Live+Gov system is assisting the public authorities in better maintaining the public traffic infrastructure as well as supporting their mid-to-long-term planning.

Public participation, the third element of Citizen Participation, is also represented in the mobility use-case. The Live+Gov application will provide information about how the data of the users has been utilised and which decisions have been facilitated. Furthermore, they will be provided by information about how to get involved in the relevant decision-making procedures. In particular, however, the citizens have the possibility to issue their concerns, opinions, and attitudes about the public infrastructure and suggest potential improvements.

5.5.2 **Urban Maintenance**

For the "Urban Maintenance" use-case in the Live+Gov system the "BuitenBeter" is the basis. This application has been developed by YUCAT and is currently running in many local authorities in the Netherlands. It enables citizens to report nuisances in the public infrastructure by taking a picture with their mobile devices and sending it to the respective local administration. The “BuitenBeter” will be advanced by transforming it into a citizenend of a comprehensive collaboration and information system, introduced in the model city of Utrecht; additionally the “BuitenBeter” in Eindhoven, which is already a partially automated maintenance system, will be improved by the Live+Gov system.

Citizens can report a nuisance in the public infrastructure (potholes, damaged streetlights) by taking a picture of the issue with the application in their mobile and sending it to the municipality. The picture will include exact geographical information of the issue and if entered additional text information. Subsequently, the administration receiving the information can immediately initiate the repairing process. From the public perspective the advantages of the system are threefold, first, the administration is receiving from its citizens very detailed and valuable information on the status of the infrastructure. The maintenance

can therefore become more effective. Second, integrated into a back-end operating system, which is automating the repairing process, the initiation of the repairing service becomes more efficient and has a considerable cost-reducing potential. Third, citizens are explicitly invited to engage in the public maintenance, which is generating a feeling of responsibility among them.

The Live+Gov systems will enabling three additional functions:

1) Augmentation of the mobile reporting function by communication options
2) Advancement of collaboration between citizen and the municipality in maintaining public infrastructure
3) Embedment of the mobile application into an open web-application.

Live+Gov will advance this system by additional communication components. Citizens should get more opportunities to interact by receiving detailed feedback on their reports, having access to further information on maintenance standards and related decision-making procedures within the administration and the municipality in general. Finally, the Live+Gov system will offer means for comparing status of the public infrastructure with the desired conditions as envisage by the municipality. Projecting the designated standards onto the screen of a mobile device by AR technology, the citizens can better judge what standards the municipal administrations has to guarantee for different areas, this can trigger fruitful discussion and further collaboration.

The second innovation of the Live+Gov system will be enabling the citizens to take concrete responsibility for their community by collaborating with the public local authorities in maintenance issues. In particular, the Live+Gov application will allow for advanced planning of maintenance and gardening of the public sphere, Citizens who volunteer to taking care of certain spots, can be allowed for by sending a picture of the respective spot and being informed if gardening is allowed. Results can be reported to the administration, which will give feedback to future plans taking into account that citizens are in charge for certain areas in the public sphere. This may lead to more attractive areas in the municipality, as more space will be greened as originally it was foreseen for, this will be appreciated by the inhabitants and may cause cost reduction for the public services. Finally, if the system is functioning, widespread demands for participation in public matters are realized in a very practical manner.

The third innovation will be realized in creating a comprehensive communication facility with the mobile as a core pillar. Reports by the citizens either through their mobile devices or through other electronic communication facilities will be aggregated, summarised, visualised, and presented on various maps informing about maintenance issues and status of their resolutions. Additional official data, such as related budgets or future plans will be added and all in all will serve as an informational tool for citizens and municipality enabling direct communication function. Finally, the data fed into this service will become the basis for the official reporting authorities on maintenance issues and may therefore contribute to better informed decision-making.

5.5.3 Urban Planning

The starting point for the Urban Planning use-case description is the traditional consultation process in Basque municipalities when it comes to large infrastructural projects. The precondition is, however, that such consultation procedures exist and are applied in the use-case municipality. The Live+Gov application and system is therefore complementing existent consultation procedures and is combining mobile participation with traditional methods. This guarantees maximum representativeness when it comes to public decisions and account for the problem of the "digital (mobile) divide". Therefore, the Live+Gov system facilitates public participation by making it easy to issue and opinion and by being informed about the consultation processes, which are taking place in the context of the actual infrastructural planning.

Accordingly, the Urban Planning use-case emphasises, in particular, public participation from of the three dimensions of Citizen Participation. However, collaboration is taking place through the concrete possibility that citizens can issue their concerns, opinions, and attitudes related to the infrastructural process, which can be used by the public authorities to improve the planning.

The fundament of such participation and collaboration are, again, advanced transparency measures being of particular relevance here. As pointed out in the previous section, in order to enable citizens for taking concrete decisions they need to be provided with high quality information about the issue in respect. In the context of creating new infrastructure this necessarily contains clear visualisations of what is planned for the future. Accordingly, this use-case builds importantly on "Augmented Reality" functions serving as the main informational basis for subsequent participatory decision-making.

However, installing a participatory procedure via mobile devices is a complex undertaking and requires careful planning and moderation. This relates on the one hand to the technical complexity of transforming architectural plans into an "Augmented Reality" view on the mobile device. On the other hand large infrastructural projects are often highly disputed politically and is motivating many stakeholders to interfere with the planning. Therefore, the Live+Gov concept for the Urban Planning use-case foresees creating a "Working Group" consisting of public officials and external service providers, which is attending the participatory procedure and is taking care of the technical implementation.

So, basicall, the Live+Gov process consists of five phases: It sets off with the planning process in the municipality or more concretely with the discussion in the city council and the respective local authorities about the different options in the context of the infrastructural project: what should be built (building, park, playground, stadium, etc.) and how. Accordingly, the first Live+Gov phase is to reach out for these options and to feed them into the successive phases. The second phase relates to the task of translating the options and introducing them into the Live+Gov system. The central actor in this context is the before mentioned "working group". Its members agree on the principal presentation of the options having been agreed upon in the municipal deliberations and on the functions of the application. The third phase relates to the running system with the citizens using the application and the Live+Gov system (the database) receiving and processing the data, giving automatic feedback and summarising the data for an automated report provided to the "working group". The "working group" comes together again in the fourth phase and

initiates the subsequent steps: the publication of the participation report via traditional communication channels (e.g. on municipal websites), the publication of the report via the Live+Gov system, and the introduction of the report in the traditional consultation process. The fifth phase concludes the Live+Gov augmented consultation process by the traditional methods like a town hall meeting or public hearings, etc.

Phase 1 of the Live+Gov process

If a municipality plans to invest in an infrastructural project it has to develop concrete alternatives in their administration and discuss them in their city council. Optimally, if there is a standard consultation procedure in place (as is the case in many municipalities in the Basque region) the different options will be introduced in the participatory / consultation process and the final decision being taken in the city council thereafter. Accordingly, parallel to the public consultation process the different options need to be collected and fed into the Live+Gov process.

Phase 2 of the Live+Gov process

According to the agreements that we have made with Biscay TIK, the Live+Gov process will continue with setting up a "working group" consisting of representatives of the city council of the municipality and representatives from BiscyTIK agreeing on the presentation of the options and specifying the functionalities of the application. BiscayTIK will be in charge of implementing the application technically. According to the agreements with BiscayTIK, YUCAT, and CERTH, the standard presentations will contain a "list view", a "map view", and an "augmented reality (AR) view". It has also been discussed whether or not the various options should be complemented by short explanation about the options, e.g. costs or related questions to the plan ("would you be willing to pay a subscription fee for using the sports centre?"). In terms of functionality, the Live+Gov application should enable polling functions for voting and a feedback function either by text of by choosing among predefined categories.

Phase 3 of the Live+Gov project

The third phase of the Live+Gov process relates to the running Live+Gov system. It is receiving the citizen input. Voting and polling results will be stored in a separate database, summarised, aggregated and combined with other external datasets for retrieving additional information about the polling process. Textual information will be edited and summarised, searched for substantial information and added to the other information. Eventually, the Live+Gov system will assemble all the information for a report about the views and the opinions in the municipality about the planned infrastructural project.

Phase 4 in the Live+Gov process

Phase 4 will focus again on the "working group" between BiscayTIK and the city council in respect discussing the report and deciding how to deal with the citizen input recorded through the Live+Gov system. Concretely, the "working group" decides whether and how the content of the report will be published (via website, local media, Live+Gov system). Most

importantly, the city council will prepare the introduction of the Live+Gov input into the traditional consultation procedure. If there is not consultation procedure in place, the "working group" will agree on how to organise a public hearing or a town hall meeting in order to presenting and discussing the report and to hearing other citizens' opinions related to the infrastructural project.

Phase 5 of the Live+Gov process

The fifth (and last) phase of the Live+Gov process is the traditional consultation procedure already in place in the municipality. Therefore, the input from the Live+Gov system is intended to support and augment the consultation and participation process (and not to replace it).

6 Conclusion: A Blueprint for the Live+Gov Architecture

The purpose of deliverable D2.1 was to develop a conceptual approach of the Live+Gov project embedding it in a context and bridging the demands of the core stakeholders – the citizens and the administrations/public authorities. Therefore, is has derived a conceptual basis connecting the technical and organisational requirements for the running Live+Gov system. This meets the ambition of the Live+Gov project to develop a software solutions linking the citizens and the public authorities and providing value-added to both ends.

Based on a short explanation why the oft-claimed gap between citizens and public authorities is evolving and continues to be a problem, the deliverable carries on substantiating the related terminology in the context of eParticipation and is therefore defining the scope, the range, and the aims and objectives of the Live+Gov project. This conceptual approach is also specifying the functionalities of the Live+Gov toolkit.

Subsequently, D2.1 presents and discusses the three pillars of Citizen Participation (which is the working definition of eParticipation in the Live+Gov project) transparency, public participation, and collaboration and depicts, in particular, the crucial advantage of mobile technology for each. Based on this reasoning and on best practice examples, the discussion results specific guidelines for the Live+Gov development process explicating technical and organisational requirements. This is setting the substantial agenda for the implementing work packages WP4, WP5, and WP2 showing which components need to be implemented and which issues need to be solved.

- Based on these theoretical underpinnings and based on the functionalities and requirements formulated in the guidelines for Live+Gov, WP4 can finalise the plan of the software architecture and start connecting the single components to a running system. This has the clear advantage that the software architecture is directly connected to the conceptual approach and that the software components make part of the Live+Gov methodology.
- WP5 on the other hand receives important input from WP2 and deliverable D2.1, in particular by having clear guidelines how to implement the Live+Gov solutions organisationally and render it a running system once the concrete aims, objectives, and functionalities are set in the use-case contexts. This increases the probability that the system is indeed being used sustainably after the end of the Live+Gov project.
- D2.1 serves also as the fundament for the remainder of WP2, which will (based on the conceptual approach as formalised in the ontology) generalise the lessons learned from the use-cases for as far as possible, will include them in the general Live+Gov methodology and develop a training concept for municipalities willing to implement mobile Citizen Participation according to the Live+Gov concept.

The insights and results of these discussions are eventually drawn up in a visual presentation and are formalised in an ontology, which is presented in the fifth section. The ontology is illustrating the core concepts of the Live+Gov system and their interrelation. Once the concepts are clearly defined in detail fitting to the actual context and field of application, they can be assembled to a comprehensive workflow process enabling improved Citizen Participation by the help of the Live+Gov toolkit.

Thus, the core output and value added of D2.1 (conceptual foundation and the explication in a formal ontology) is that it pre-defines the working areas that need to be included in the software architecture, implemented in the actual use-cases in the project as well as in any further and future application. Therefore, once a municipality decides to resort to the Live+Gov solutions for advancing Citizen Participation they have basically three options: first, they can to install the same functionalities as developed for the Live+Gov use-cases; second they can implement selected parts of the Live+Gov toolkit that are fitting to their actual demands; third, the can also take the general ontology for developing their own technical solutions according to the general guidelines derived from the theoretical underpinnings.

7 References

7.1 Books and Journals

[1] Albrecht, S. et al., *"E-Partizipation – Elektronische Beteiligung von Bevölkerung und Wirtschaft am E-Government"*, A study on behalf of the German Federal Ministry of Internal Affairs, Ref. IT 1, Institut fpr Informationsmanagemenet Bremen, 2008

[2] Anna, Erik and Brundin, Pia *"Balancing Hopes and Fears"*, in Brundin, Pia (ed.): New Forms of Citizen Participation, Baden Baden: Nomos, 2010

[3] Baader, et al. *"Description Logic Handbook"* Cambridge: Cambridge University Press, 2003

[4] Bertelsmann Foundation, *"Politik leben, Bürger beteiligen. Characteristika neuer Bürgerbeteiligung"*, Gütersloh: Bertelsmann Stiftung, 2010

[5] Blühdorn, Ingolfur, *"Democracy Beyond the Modernist Subject: Complexity and the Late-modern Reconfiguration of Legitimacy"*, in: Blühdorn, Ingolfur (ed.) "In Search of Legitimacy. Policy Making in Europe and the Challenge of Complexity", Oplanden & Farmington Hills, MI: Barbara Budrich Publishers, 2009

[6] Brachmann, R.J. and Levesque, H.J., *"Knowledge Representation and Reasoning"* Morgan Kaufmann, 2004

[7] Curtin, D. and Meier, J.,*"Does transparency strengthen legitimacy?",* Information Polity 11, p. 109-122, 2006.

[8] Dalton, R. J. *"Democratic Challenges – Democratic Choices. The Erosion of Political Support in Advanced Industrial Democracies"*, Oxford: Oxford University Press, 2004

[9] Dalton, R. J., "Citizenship Norms and the Expansion of Political Participation", Political Studies, vol. 56 (1), p. 76-98, 2008

[10] European Institute for Public Participation (EIPP), "Public Participation in Europe. An international perspective", June 2009

[11] Florini, A., *"The Battle Over Transparency"*, in Florini, A. (edt.) The Right to Know. Transparency for an Open World, New York: Columbia University Press, 2007

[12] Fung A., *"Recipes for Public Spheres: Eight Institutional Design Choices and Their Consequences",* The Journal of Political Philosophy 11(3), p. 338-367, 2003

[13] Fung, A., "Varieties of Participation in Complex Governance", Public Administration Review, Special Issue, p. 66-75, December 2006

[14] Fung, A. and Wright E. O., " Deepening Democracy: Institutional Innovations in Empowered Participatory Governance. London: Verso, 2004

[15] Gallagher, M. et al., *"Representative Government in Modern Europe"*, Boston (Mass.): McGraw-Hill, 2006

[16] Harrison, T. et al., *"Open Government and E-government: Democratic Challenges from a Public Value Perspective"*, Information Polity, vol. 17, p. 83-97, 2012

[17] Hitzler, P. et al., *"Owl 2 web ontology language primer",* W3C Recommendation

[18] Inglehart, R. and Welzel, C., *"Modernization, Cultural Change, and Democracy: the Human Development Sequence"*, Cambridge: Cambridge University Press, 2007

[19] Gavelin, K. et al. (INVOLVE), *"Open Government beyond static measures"*, A paper produced by Invovle for the OECD, 2009

[20] Kaina, V., *"Declining Trust in Elites and Why We Should Worry About It – With Empirical Evidence from Germany"*, Government and Opposition, Vol 43 (3), p.405-423, 2008

[21] McGuire, M., "Collaborative public management: Assessing what we know and how we know it, Public Administration Review 66 (s1), p. 33-43, 2006

[22] Nanz, P. and Fritsche, M., *"Handbuch Bürgerbeteiligung. Verfahren und Akteure, Chancen und Grenzen"*, Bundeszentrale für politische Bildung, 2012

[23] Norris, P. (ed.), *"Critical Citizens: Global Support for Democratic Government*". Oxford: Oxford University Press, 1999

[24] Nye, J. et al., *"Why People Don't Trust Government"*, Cambridge: Harvard University Press, 1997

[25] OECD/International Telecommunication Union, *"M-Government: Mobile Technologies for Responsive Governments and Connected Societies"*, OECD Publishing, 2011

[26] Olson, M., *"The Logic of Collective Action"*, Cambridge, M.A.: Harvard University Press, 1965

[27] Pierre,J., *"Reinventing governance, reinventing democracy?"* Policy and Politics Vol. 37, No 4, p. 591-609, 2009

[28] Pitkin, H., *"The Concept of Representation",* Berkely: University of California Press, 1967

[29] Powell, M. and Kleinmann, D.L.,"Building Citizen Capacities for Participation in Nanotechnology Decision-Making: the Democratic Virtues of the Consensus Conference Modell," in: Public Understanding of Science 17, p. 329-348, 2008

[30] Provan K. G.and Milward, H.B., "Do networks really work? A framework for evaluating public-sector organizational networks", Public Administration Review 61 (4), p. 414-42 2001

[31] Reinert, A. *"Bürder(innen)beteiligung als eil der lokalen Demokratie 2003"*, in: Ley, A. and Witz L. (eds.) Praxis Bürgerbeteiligung. Ein Methodenhandbuch, Bonn: Verlag Stiftung Mitarbeit und Agenda-Transfer, 2003

[32] Renn , O. et al., *"Public Participation in decision-making: A three-step procedure"*, Policy Sciences 26, p. 189-214, 1993

[33] Resca, A., *"Constructing and implementing e-participation tools in the Emilia Romagna Region: assemblages and sense-making"* Journal of Balkan and Near Eastern Studies, 13 (1), p. 59-76, 2011

[34] Roberts, A.,*"Transparency in the Security Sector"*, in: The Right to Know. Transparency for an Open World, New York: Columbia University Press, 2007

[35] Salamon and Elliot 2002

[36] Somerville, P., *"Democracy and Participation"*, Policy and Politics, vo. 39 (3), p. 417-437, 2011

[37] Stilgler G., "The theory of economic regulation", The Bell Journal of Economics and Management Science, 2, Nr.1, p. 3-21, 1971

[38] Stoker, G., *"The Rise of Political Disenchantment"*, in: Hay Colin (edt.): New Directions in Political Science. Responding to the Challenges of an Interdependent World, Houndmills: Palgrave Macmillen, 2010

[39] Surowietzki J., "*The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business*", Economies, Societies and Nations, Doubleday: Anchor, 2004

[40] Urbinati N. and Warren M.E., *"The Concept of Representation in Contemporary Democratic Theory"*, Annual Review of Political Science, Vol. 11, p. 387-412, 2008

[41] Warren, M.E. and Pearse, H. (eds.), *"Designing Deliberative Democracy: The British Columbia Citizens' Assembly",* Cambridge M.A.: Cambridge University Press, 2008

[42] Von Winter, T., *"Interessengruppen und Demokratie im Wandel verbändetheoretischer Paradigmen"*, in: Schrenk, Klemens H. and Soldner, Markus (eds.): Analyse demokratischer Regierungssysteme, Wiesbaden: VS, p. 115-128, 2010

7.2 Internet Sources

[43] http://protege.stanford.edu

[44] http://www.buergerforum.de

[45] http://www.deamstelverandert.nl

[46] http://www.intelligentcommunity.org

[47] http://www.its-our-europe.eu

[48] http://www.nifi.org

[49] http://www.opengovpartnership.org

[50] http://www.pdst.ie

[51] http://www.racer-systems.com

7.3 Interviews

[52] Interview with Inigo Gomez, Advisory Board Member of the Live+Gov project, Civil Servant at the town of Gorexola and former technican for the municipalities of Basque Municipalities, EUDEL (May 9th, 2013).

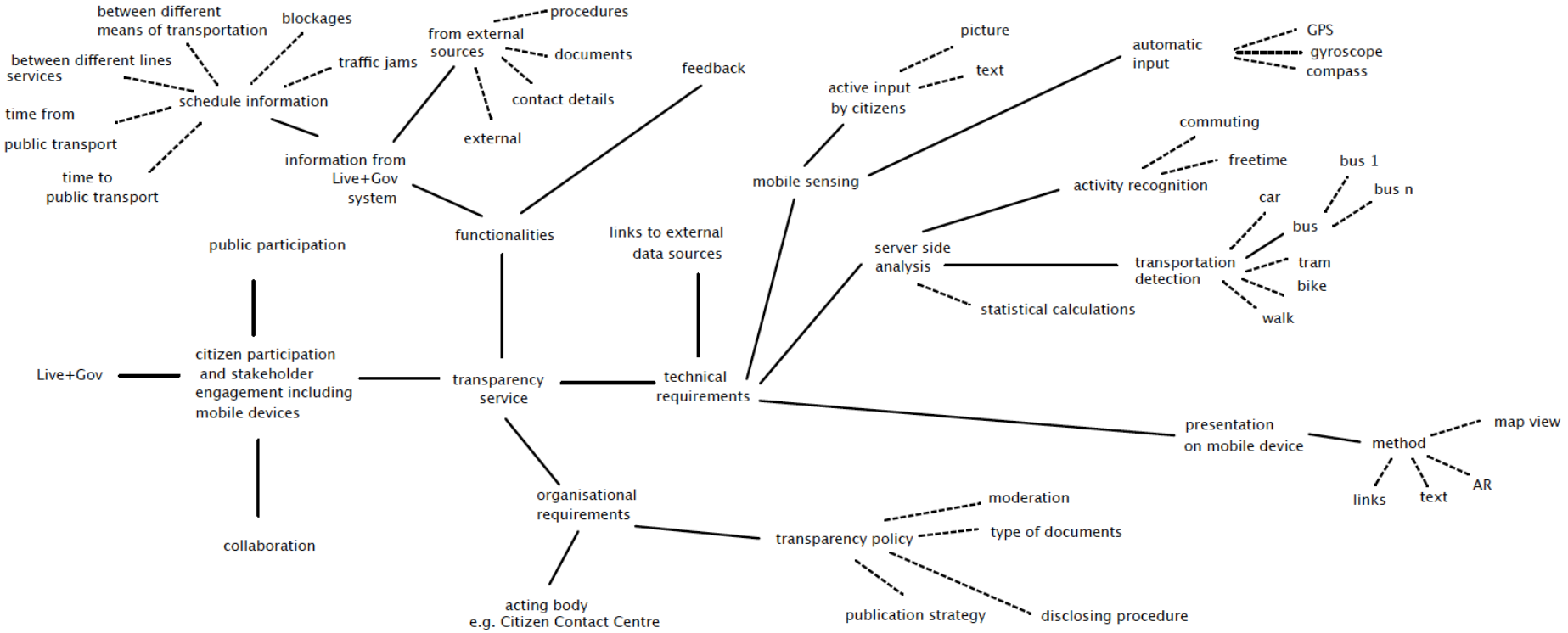
[53] Interview with Paul Smeets, Head of the Maintenance Department in the city of Eindhoven during a visit to the maintenance department of the city of Eindhoven (May, 31st, 2013).

A Appendix: Visualisations Live+Gov approach

The following visualisations depict the three basic concepts of the Live+Gov approach transparency, public participation, and collaboration. They make up for consistent Citizen Participation and are utilised to different degrees in the Live+Gov use-cases. According to the reasoning of Section 4, implementing all of these concepts in one case would make up for an ideal example for how Citizen Participation could be optimally achieved by the help of mobile technology.

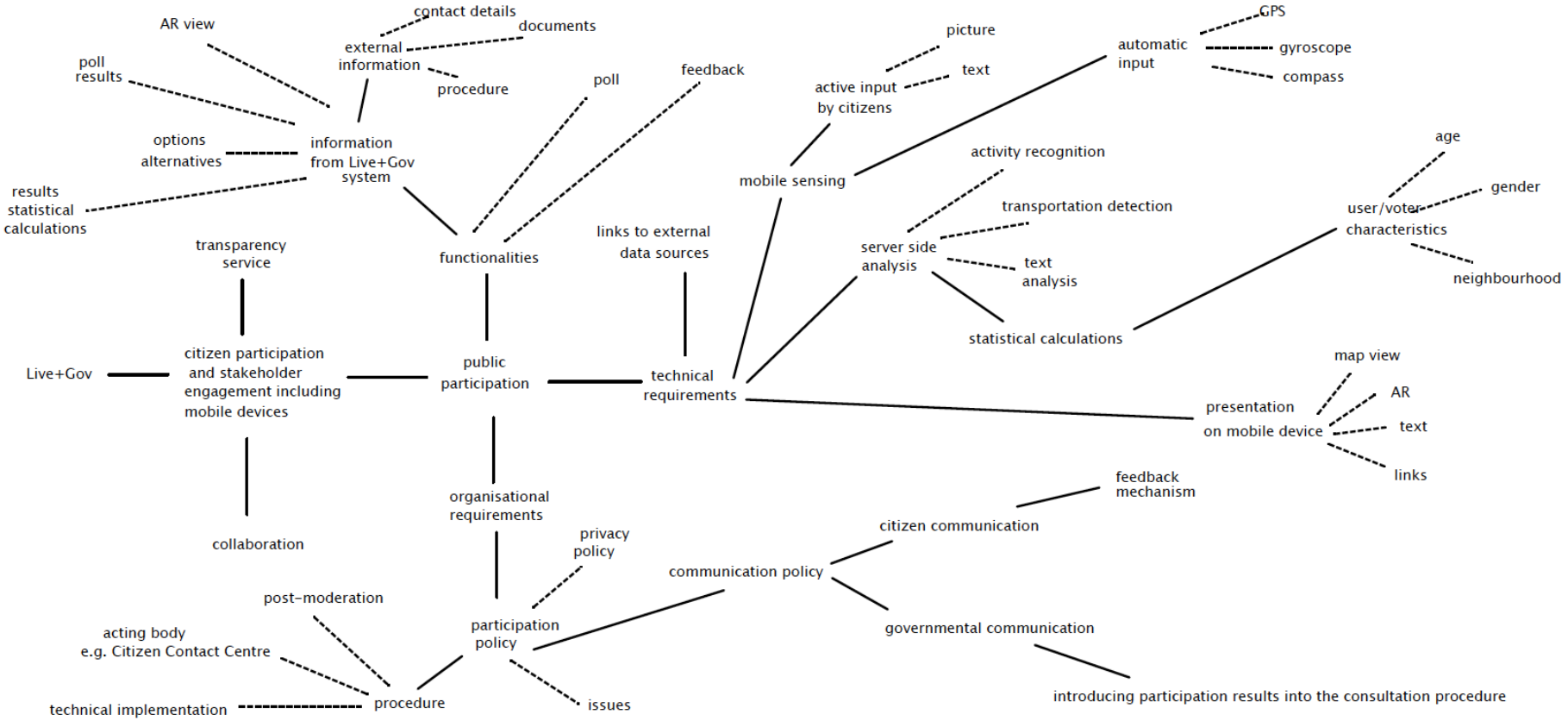
A.1. Live+Gov Transparency

The transparency concept of Citizen Participation is presented in Figure A 1. It contains all components that are derived from the theoretical discussion about transparency in Section 4.1 of this deliverable D2.1. They are corresponding to the tabular presentation of Table 1.



A.2. Live+Gov Public Participation

The public participation concept of Citizen Participation is presented in Figure A 2. It contains all components that are derived from the theoretical discussion about public participation in Section 4.2 of this deliverable D2.1. They are corresponding to the tabular presentation of Table 2.



A.3. Live+Gov Collaboration

The collaboration concept of Citizen Participation is presented in Figure A 3. It contains all components that are derived from the theoretical discussion about collaboration in Section 4.3 of this deliverable D2.1. They are corresponding to the tabular presentation of Table 3.