Nantes | Hamburg | Helsinki

Deliverable due date: M36 – November 2019

D1.5 BENCHMARK OF ICT-BASED SOLUTIONS FOR CITIZEN ENGAGEMENT

WP1. Task 1.1

Transition of EU cities towards a new concept of Smart Life and Economy

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Project Acronym	mySMARTLife
Project Title	**Transition of EU cities towards a new concept of Smart Life and Economy**
Project Duration	1st December 2016 – 30th November 2021 (60 Months)
Deliverable	D1.5 Benchmark of ICT-based solutions for citizen engagement
Diss. Level	PU
Status	■ Working ☐ Verified by other WPs ☐ Final version
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Work Package	WP1
Lead beneficiary	TEC
Contributing beneficiary(ies)	CAR, HCU, VTT, FVH
Task description	Subtask 1.1.3: ICT-based strategies for active participation: In this subtask, RTOs and technological players (TEC, CAR, HCU, VTT, FVH) will analyse the tools that each Lighthouse City currently employs for engaging and raising awareness. Benchmarking of these tools with those at follower cities and other European cities may reveal good practices, distinguishing between participation areas, communication channels, etc.

Date	Version	Author	Comment
26/09/2019	0.1	Elena Usobiaga (TEC)	First version of the complete deliverable
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Abbreviations and Acronyms

Table 1: Abbreviations and acronyms

Acronym	Description
mySMARTLife	Transition of EU cities towards a new concept of Smart Life and Economy
GEI	Global Engagement Index
CE	Citizen Engagement
A_Level of engagement	Level of engagement in e-participation sub-index
B_Technological requirements	Technological requirements sub-index
C_Possibilities of replication	Possibilities of replication in different socio-economic contexts sub-index
D_Level of inclusiveness	Level of inclusiveness sub-index
E_Data security	Data security sub-index
A1_Conceived_for	Indicator regarding the objective for whom the tool was conceived (related to question N14 of the questionnaire, see section 8.2)
A2_Conceived_size	Indicator regarding the ambition for whom the tool was conceived (related to question N15 of the questionnaire, see section 8.2)
A3_Stages	Indicator of the stages of decision-making addressed by the tool (related to question N16 of the questionnaire, see section 8.2)
A4_Citizens_as	Indicator about how the tool contributes to consider citizens as democratic participants, co-creators, ICT users, none of them or others (related to question N19 of the questionnaire, see section 8.2)
B1_User_interface	Indicator regarding user interface of the tool (related to question N22 of the questionnaire, see section 8.2)
B2_Installation	Indicator about if the tool requires installation or not (related to question N23 of the questionnaire, see section 8.2)
C1_Cost	Indicator about the cost that implies the use of the tool for a city (related to question N5 of the questionnaire, see section 8.2)
C2_Availability	Indicator about the availability of the tool for any city (related to question N6 of the questionnaire, see section 8.2)

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C3_Languaje	Indicator about the language availability of the tool (related to questions N7-N11 of the questionnaire, see section 8.2)
D1_Non-digital	Indicator about the possibility of incorporating non digital participation processes' results in the tool (related to question N20 of the questionnaire, see section 8.2)
D2_Usability	Indicator about the usability of the tool (related to question N25 of the questionnaire, see section 8.2)
D3_Target_users	Indicator about the target users foreseen for the tool (related to question N26 of the questionnaire, see section 8.2)
D4_Age_target	Indicator about the orientation of the tool to a specific age target (related to question N27 of the questionnaire, see section 8.2)
E1_Anonymity	Indicator about the personal data required for the use of the tool (related to question N24 of the questionnaire, see section 8.2)

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1.Executive Summary

The aim of this deliverable is to analyse the ICT tools for citizen engagement employed by Lighthouse cities and benchmark those tools with the tools at follower cities and those employed by other cities. With that aim in mind, the deliverable is divided into the following chapters:

Chapter 2 "Introduction***"***: introduce the purpose and the target group of the deliverable, the contribution of partners to deliverable development and the relation of the deliverable with other project activities.

Chapter 3 "Trends in ICT-based solutions for citizen engagement (state of the art)***"***: describes the state of the art of the trends in ICT tools for citizen engagement, which constitutes the foundation for the definition of the benchmarking criteria (section 4.2).

Chapter 4 "Benchmarking methodology***"***: describes the methodology employed for benchmarking analysis development divided into three sub-sections: 4.2*) Benchmarking criteria*; 4.3*) Data-gathering process*; and 4.4*) Data-processing and analysis method*.

Chapter 5 "Analysis***"***: reports on the analysis of the ICT engagement tools database gathered through the questionnaire (see section 8.2). The analysis is divided into two sub-sections: 5.1*) Qualitative analysis*; and 5.2*) Quantitative analysis*.

Chapter 6 "Conclusions***"*** outlines some general conclusions related to the benchmarking analysis and how the tools that are analyzed can contribute to the mySMARTLife project objectives.

Chapter 7 "References***"*** compiles the bibliography used for the deliverable development.

Chapter 8 "Annexes***"*** includes the template for the data-gathering process, the questionnaire, and the list of the ICT tools that were analysed.

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2.Introduction

2.1. Purpose and target group

The aim of this deliverable is to analyse existing ICT tools for citizen engagement depending on the type of cities that employ them (Lighthouse, Follower, or Others), and to compare them in terms of level of engagement, technological requirements, possibilities of replication, and level of inclusiveness. The result of this deliverable will contribute to rank existing ICT engagement tools among these parameters and, likewise, to obtain some crucial information on the strengths, weaknesses, and risks of these types of tools, and how they should be conducted and managed in an engagement process.

2.2. Contributions of partners

The following Table 2 depicts the main contributions from participant partners in the development of this deliverable.

Table 2: Contribution of partners

Participant short name	Contributions
TEC	Deliverable leader, coordination of deliverable, methodology design, compilation of ICT tools from Nantes & other experiences/cities, quantitative analysis (section 5.2) and general conclusions (section 6.1).
CAR	State of the art (section 3), compilation of ICT tools from other experiences/cities
HCU	Qualitative analysis (section 5.1), compilation of ICT tools from Hamburg & others and conclusions on the methodology employed (section 6.2).
VTT	Compilation of ICT tools from Follower cities & others
FVH	Compilation of ICT tools from Helsinki & others

2.3. Relation to other project activities

There is no relation to other deliverables.

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3. Trends in ICT-based solutions for citizen engagement (state of the art)

3.1. Introduction

Researchers as well as practitioners claim that the citizens of smart cities play an essential role. They must be able to identify priorities and goals for the smart city strategy and they must be considered actors at the centre of the smart city projects and their implementation and benefits. For Caragliu *et al.* (2009), [1] a city is smart when *investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high-quality of life, with a wise management of natural resources, though participatory governance*.

Citizen participation or public participation is, according to the definition of Creighton (2005) [2], the process by which public concerns, needs and values are incorporated into governmental and corporate decision-making. It involves two-way communication and interaction, with the overall goal of better decisions that are supported by the public. So, the participation can be useful to ensure better plans when there are complex planning problems. The target that a city sets itself must be achieved in a democratic and inclusive manner.

Current Information and Communication Technologies (ICTs) have made it possible to enhance traditional participation procedures by electronic means, thereby introducing the concept of electronic participation (Panopoulou *et al.*, 2009) [3]. A good definition of e-participation is the one given by Saebo *et al*. (2007) [4]: e-participation involves the extension and transformation of participation in societal democratic and consultative processes mediated by ICTs, primarily the Internet. It aims to support active citizenship with the latest technological developments, increasing access to participation and opportunities to do so, in order to promote fair and efficient society and government.

Ertiö (2013) [5] contended that the use of ICTs may help to overcome some obstacles to participation; with benefits such as surmounting the democratic deficit, implementation ease and cost-efficiency, easier citizen participation and access, and increasing trustworthiness. It is also a tool to improve the relationships in terms of quality, access to services, and transparency of decision-making.

A whole new policy area has been developed through the adoption of ICT for public participation and technologically-mediated innovation in government-citizen relationships such as digital democracy and e-democracy. It can therefore be concluded that e-democracy (Macintosh, 2004) [6] is the use of ICT to support the democratic decision-making process. E-participation is considered the essence of e-democracy and is central to quality improvements. Related to the adoption of ICT for the participation of citizens, e-government would be the public organization that supports the interactions between

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stakeholders where ICT would convey new and existing information, and complete transactions, functioning as a means of communication, see Abu-Shanab *et al.* (2012) [7].

E-governance, defined by Omariba *et al.* (2015) [8], is a form of public administration making "use of information and communication technologies (ICT) to enhance the access and delivery of government services to benefit citizens, employees and management of urban local bodies". It aims to "help strengthen government's drive toward effective governance and increase transparency to better manage social and economic resources for development" (Pohoryles *et al.,* 2017) [9].

Citizen co-production of public services has aroused much interest, especially in view of the financial pressures currently facing governments around the world (Falco *et al.*, 2018) [10]. Co-production is about the public sector and citizens using assets and resources to achieve better outcomes and improved efficiency.

Vrabie *et al.* (2016) [11] established four pillars of e-participation that must be improved, in order to have a smart city, in which democracy is at the base of every activity of governance: greater government transparency, sharper focus on the needs of citizens, increased citizen involvement, and improved government responsiveness. Initiatives are developed by civil society to convey their message of protest and express their desire to participate in political decision-making. The management of transparency that fosters informed participation by citizens is an indispensable requirement to do so (Rebolledo *et al.*, 2017) [12].

3.2. Levels of engagement in e-participation

Many authors have established different levels for citizen participation. For Arnstein (1969) [13] the participation of citizens is a categorical term for their power, the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future. Arnstein established eight levels of participation, to help with an analysis of this issue of participation and for illustrative purposes the eight levels are arranged in a ladder. The bottom rungs of the ladder of citizen participation would be the two levels of "non-participation" that have been contrived as a substitute for genuine participation: ***Manipulation*** and ***Therapy***. As participation levels, the have-nots can hear and have a voice at the following levels: ***Informing*** and ***Consultation***. ***Placation*** is placed at the next level, which allows have-nots to advise, but which retains for the powerholders the continuance of decision rights. ***Partnership*** level enables citizens to negotiate and to engage in trade-offs with traditional powerholders. At the topmost rungs, Arnstein established ***Delegated Power*** and ***Citizen Control***, where have-not citizens can obtain the majority of decision-making seats, or full managerial power.

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Al-Dalou *et al.* (2013) [14] summarized the main classification for the e-participation levels. One of the most relevant is the one presented by the Organization for Economic Cooperation and Development (OECD), with three levels for traditional participation:

- **Information provision:** considered the foundation of the participative process.
- **Citizen consultation:** two-way interaction.
- **Citizen active participation:** active citizen engagement is requested for defining and shaping policy.

The International Association for Public Participation (IAPP) presented another schema that included five levels of traditional participation [14]:

- **Inform:** to provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions. This includes fact sheets, websites and open houses.
- **Consult:** to obtain public feedback on analysis, alternatives and/or decision. This includes public comment, focus groups, surveys and public meetings.
- **Involve:** to work directly with the public throughout the process to ensure that public issues and concerns are consistently understood and considered. This includes workshops and deliberate polling.
- **Collaborate:** to partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution. This includes citizen Advisory committees, consensus-building and participatory decision-.
- **Empower:** to place final decision-making in the hands of the public. This includes citizen juries, ballots and delegated decisions.

Macintosh (2004) [6], using the terms of the OECD, developed a new three-level schema of participation, to characterize e-democracy initiatives:

- **E-enabling:** using technology to reach the wider audience by providing a range of options for the diverse technical and communicative skills of citizens.
- **E-engaging:** using technology to engage with citizens, to enable deeper contributions, and to support deliberative debate on policy issues through consultations with a wider audience.
- **E-empowering:** using technology to empower citizens and support active participation and facilitate bottom-up ideas to influence the political agenda.

Wimmer (2007) [15] introduced a modified schema, prompted by the observation that many information flows are initiated by citizens and NGOs to government, or the reverse of what is described in the previous schemas. In consequence, she proposed a four-level schema of engagement in e-participation consisting on **e-informing**, **e-consulting**, **e-collaborating** and **e-empowering**.

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Tambouris *et al.* (2007) [16] adapted the IAPP participation spectrum to accommodate its five e-participation levels: **e-informing**, **e-consulting**, **e-involving** (which refers to working online with the public throughout a process to ensure that public concerns are understood and taken into consideration), **e-collaborating** and **e-empowerment**.

According to all of these main levels of participation, there are not many sub-levels identified, but some authors, for example, Ertiö (2013) [5] identified **public communication** as a sub-level of the information or e-informing level, which refers to a one-way transfer of information from the government to the public. There are two more sub-levels for this information level, **public consultation,** where the information flows from the public to the government; and **public participation,** assuming information exchange between the public and governments, through deliberation and dialog, by which the opinions of both parties are communicated, reflected upon, and transformed.

Although the main goal of the ICT for citizen engagement is the inclusion of citizens in the decision-making process, there are other political processes in which citizen participation can be engaged, such as participatory budgeting.

Through Participatory Budgeting (PB), citizens from different countries have had the opportunity to gain knowledge of government operations, and they can influence governance policies, and hold government accountable and deliberate, debate and influence the distribution of public resources (Karnal *et al.*, 2016) [17]. As a participatory technology, PB is in a position to be taken into account as a citizen participation tool, although it moves away from the urban planning of the city to focus on the economic aspect [18 to 21].

While the process of participatory budgeting features diverse organizations, stages and methods, it generally follows an annual cycle with the following stages (Parra *et al.*, 2017) [22]:

- **Collection of ideas:** citizen brainstorming sessions for ideas in a variety of settings (face-to-face meetings, online forums, etc.).
- **Proposal development:** groups of either elected or volunteer citizens categorize and develop ideas into proposals with help from experts and city staff.
- **Vote:** after project proposals are finalized, citizens vote to decide which projects to fund.
- **Implementation:** the city executes the winning projects.

Following the decision-making process, the stages become more complex and relevant to citizen engagement, as we shall see in the next stage of the State of the Art.

3.3. Stages of the decision-making process

In addition to the levels of electronic participatory processes, a framework is needed for discussing where ICT is most appropriate in the policy-process stages. By explicitly defining these stages, governments will

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better appreciate initiatives from different countries and from different levels of government. These stages, according to Macintosh (2004) [6], would be as follows:

- **Agenda setting:** establishing the need for a policy or a change in policy and defining the problem and the justification they need. In the context of ICT tools for citizen engagement, this stage is referred to the need recognition or problem definition.
- **Analysis:** defining the challenges and opportunities for each item in the agenda, in order to produce a draft policy document. This can involve gathering knowledge from different sources including citizens and civil society organizations, understanding the context, and developing a range of options. This stage is addressed to seek the information that fulfils the previous problem identified, by comparing and contrasting challenges and solutions, as well as their features.
- **Creating the policy:** create the policy document using a variety of mechanisms such as formal consultation, risk analysis, undertaking pilot studies, and designing the implementation plan. This stage occurs after evaluating the alternative solutions of the previous stage in order to make the best decision.
- **Implementing the policy:** the process by which governments put policies into effect, developing the legislation, regulation, guidance, and delivery plan. It comes after taken into account all relevant solutions to the identified problems, and then they are ready to be implemented.
- **Monitoring the policy:** evaluation and review of the policy in action, research evidence, and views of the users, and according to the results, perhaps returning to the first stage.

Through ICT, policy-makers could go directly to users of services and those at whom the policy is aimed, to seek their input. In this way, citizens will be able to exercise greater influence on policy content through consultation earlier in the policy-making process.

It can be argued that consultation at the stage of a draft policy document (as the stage 3) requires citizens to have the communication skills to interpret the typical legalistic terminology of the document before commenting appropriately. Even if the wider audience of citizens is given the opportunity to comment on decision-making before that stage, they will still need to be well-informed on issues, but the information could be made more readable and understandable.

3.4. E-participation and the role of the citizen

Citizen's involvement in decision-making related to policies which target them directly is likely to win more of their trust in government and to increase their willingness to comply with those decisions. Moreover, both researches and practitioners have argued for one way to approach the decreasing trust in political parties, preparing governmental institutions for increasingly in involving citizens in relevant political decisions as a way to answer people's wish to participate more in such decisions.

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However, the way in which citizens can get involved in governmental decision has multiple levels, as the following ones, analysed in a similar way by Simonofski *et al.* (2017) [23], which has developed a whole scheme on this regard (Figure 1 below), and Irvin et al. (2004) [24] regarding different roles of citizens in decision-making processes:

- **Citizens as democratic participants:** citizens have democratic control on smaller issues but only have a symbolic impact on larger scale decisions such as smart city strategy. The main advantage is that citizens can learn about difficult technical problems and become experts in matters of public relevancy. The democratic participation implies a passive involvement of the citizen, but it also gives them the opportunity to make their point and to apply their viewpoint in a non-confrontational manner.
- **Citizens as co-creators:** the citizens' input is favourable and needed, they have the opportunity to share with their representatives their feedback on different policies and decisions. Co-creating a public service refers to the active participation of end-users (the citizens) in various stages of the production process (Vooberg *et al.*, 2014) [25].
- **Citizens as ICT users:** the integration of ICT in a city can nevertheless offer a new range of opportunities and can change the landscape of the city. Technological support is often essential to enable smart city architecture, as existing architectures often combine a range of technologies and paradigms [23]. The citizen involvement implies creating the setting for collaboration and partnership with the government and its representatives, a setting where citizens practically engage in the decision- and policy-making process.

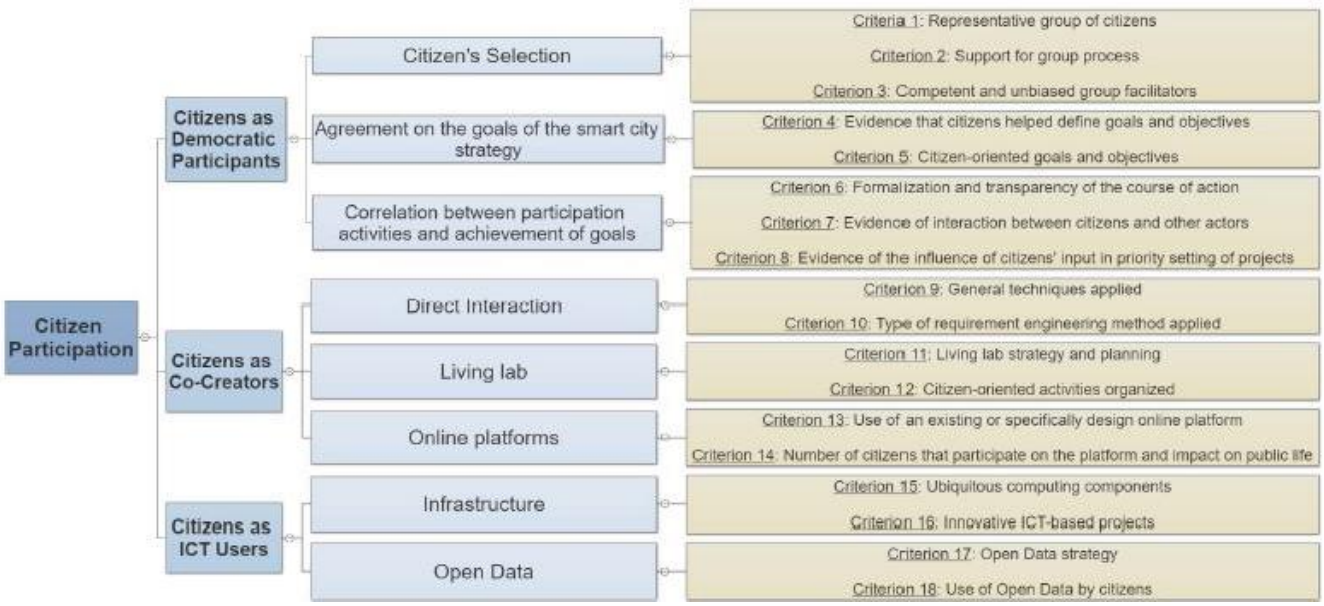

Figure 1: Citizen participation evaluation framework from the Simonofski et al. article (2017) [23]

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3.5. ICT tools and technologies for citizen engagement

It is as difficult to identify the interactions between people and technology as it is to understand them, because of the versatile nature of technology, the plurality of tools, and the variety of actors in the participation process [14].

Online participation services through information and communication technologies (ICTs) should be placed at the heart of an e-participation process, because these services form the essence of e-participation. The deployment of ICT tools in an online interaction is a common feature in the most successful e-participation projects.

Social networks and virtual communities are also of great importance in citizens' participation process, as a foundation for implementing e-democracy. Maciel *et al.* (2010) [26] claimed that social networks are considered a new type of online public sphere or context for civic discourse and debate through public discourse and online discussions, where social networks can hold many opportunities for e-participation and e-democracy.

More intelligent technology will lead to more research areas serving the e-participation process. There are some new areas in the emergent web 3.0 era (which combines **web 2.0** with the semantic web to facilitate e-participation through intelligent technologies).

There are also many indications for e-government innovation policy, such as multichannel and mobile government, and modern and future means of communication. These considerations and many others (such as increasing the equality of political participation) have led to the phenomenon of **mobile participation**, which means using mobile phones for political participation.

Phang & Kankanhalli (2008) [27] established that e-participation initiatives could serve varied objectives, such as informing citizens, generating support among citizens, utilizing citizens' input in decision making, and probing for citizens' needs. An array of ICT tools for these initiatives such as online discussion forums, e-mail, online surveys, online chat, and group support systems. They also proposed that e-participation initiatives could be deployed to achieve four general objectives of citizen participation: information exchange, education and support-building, decision-making supplement, and input probing.

At some distance from the concerns of political decision-making, there is also a set of ICT tools focused on the active inclusion of young people [28], but in general terms they focus on the domain of active inclusion services for disadvantaged young people. The target of these services is to strengthen young people skills and capacities and to give them support for employment and active participation in social life.

One emerging trend in the field of public participation is gamification. Gamification is the use of game design elements in non-game contexts. It is used to create a common space for an enjoyable user

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experience, expanding into something more than solely for entertainment purposes (Meloni *et al.*, 2017) [29].

Some authors (Thiel, 2016) [30] justified this element, because of the significant decline in public participation over past decades. If citizens stop participating in public life/politics, politicians will lose the foundation for their work and perspective for future campaigns. Gamification is a process that increases users' motivation and fun while encouraging them to come back to the game, so it is an engaging experience. Engagement games are an emerging form of serious games that facilitate civic learning, general civic engagement, and increase trust in government (Hassan, 2016) [31].

Serious games are actual games that are created for more serious purposes than just entertainment (Pflanzl *et al.*, 2016) [32]. The targets of the serious games are generally related to education, training, and informing with incisive and effective methods. Additionally, practice, testing, simulation, and treatment can be objectives of serious games (Ahmed *et al.*, 2015) [33].

As e-participation is still at an early stage, it is very difficult to distinguish between e-participation applications, tools, components and technologies. One would expect there to be a number of applications and tools for each specific area (in the Table 4 some examples could be consulted). So, one can therefore identify components that constitute applications and tools and relevant underlying technologies. Usually, a suite of tools will be employed at different stages of a public participation process, starting from outreach to stakeholders, building common understanding by defining a shared vision and goals, to evaluation and decision-making (Krishnaswamy, 2012) [34].

There are some authors who have made different classifications of web-based tools [16, 35]. A good example of a technologies classification is the one made by Boson et al. (2012) [36] and gathered in Table 3 below.

Table 3: Examples of Web 2.0 and Social Media Technologies

Web 2.0 Technologies	Description
Content syndication	It allows the user to automatically receive updates about the state of the resource syndicated.
Widgets	These are tools to deliver information from a web source to other pages or devices.
Sharing and bookmarking	They allow a user to share web content with their friends by means of social networks and to give a score to that content based on its usefulness and/or relevance.
Mashups	These are applications that take data and combine it either with other data or other web services to create something new.

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Embeddings	They consist of the inclusion in a web page of material created by a third party.
Webcasts	These are media files, distributed over the internet to many simultaneous listeners/viewers. Webcasting can be seen as “broadcasting” over the internet.
Social Media Technologies	**Description**
Blogs	They are publishing tools, managed by a particular identified author, that make it possible for users to record comments.
Wikis	These are a special kind of website, configured to support the entries of different users.
Media sharing platforms	They can be used to distribute certain documents presentations and pictures to citizens and can also be a platform for citizens to share their own intellectual assets with the community.
Social networks	They are new platforms for exchanging personal and professional information. Most of them allow users to interconnect from one of these platforms to another.
Twitter	It is a social network and micro-blogging tool. It can be used to send instant messages to citizens to announce special events, taking advantage of the viral delivery of information that this tool provides, and allowing local politicians to check how this event is perceived by the users.
Facebook	Another social network, may governments have a direct link to the Facebook platform from the official website of the municipality.

Beyond this classification, there are some tools that are of special interest for the purpose of this analysis.

- **Digital Participatory Platforms (DPPs):** are defined by Falco *et al.* (2018) [10] as a specific type of civic technology explicitly built for participatory, engagement, and collaborative purposes that allow for user generated content and include a range of functionalities (e.g. analytics, map-based and geo-located input, importing and exporting data, ranking of ideas), which transcend and considerably differ from social media.
- **Web 2.0:** is a new and important type of web experience, as citizens, as end-users, have a feasible interface via which they can supply valuable input for public policy formulation over mutual shared platforms (Karkin, 2013) [37]. Web 2.0 is mostly used for referring to some interactive tools used via the web such as blogs, micro blogs, social networking, podcasts and wikis.
- **Public Participation Geographic Information Systems (PPGIS):** they are commonly used for gathering citizen insights on the decision-making process, for new applications that merge localized

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data collection by combining crowdsourcing elements, to conduct environmental research and environmental perception (López-Aparicio *et al.*, 2017) [38].

- **Volunteered Geographic Information (VGI):** an online interface where citizens and individuals freely contribute their knowledge and information on a specific part of the city. Sanvig Knudsen *et al.* (2012) [39] referred to VGI as an aspect of Public Participation GIS (PPGIS), which addresses the more participatory and bottom-up aspects of GIS. VGI is related to the concept of crowdsourcing as an assertive method of collecting geospatial information from people who are mainly participating in Web-based social networking sites, in citizen science initiatives (Capineri, 2016) [40]. VGI is the harnessing of tools to create, assemble, and disseminate geographic data provided voluntarily by individuals [41].
- **CityGML:** the key standard for the 3D city models, it is based on Geography Markup Language (GML). CityGML represents physical world objects with four aspects: semantics, geometry, topology, and appearance. Functionally, it is partitioned into modules that provide support for the definition of different thematic models such as building, land use, city furniture, and so on. The future applications of augmented reality (AR) and virtual reality (VR) will naturally also benefit detailed surfaces. Appearances are not however only limited to visual data, but they can also contain arbitrary categories called *themes* such as infrared radiation, noise and sunlight emission and even earthquake-induced structural stress (Ruohomäki *et al.*, 2018) [42].

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Table 4: Examples of previously developed tools

Platform / Tool	Website	Description	Country	Pricing
CoUrbanize [50]	www.courbanize.com	Platform for developers and planners to create and manage their own online project page, by allowing them to send updates, provide information and give community members the opportunity to add ideas, make comments and ask questions.	USA	YES
MetroQuest [50]	www.metroquest.com	Online survey that collects targeted information to be used in the development of a project. The platform is targeted for planning and for government agencies to use during community engagement processes.	Canada	YES
Crowdbrite [10]	www.crowdbrite.net	Web application for team collaboration and community engagement. It can be used to "communicate plans, build community, prioritize investments, and inspire action" using mobile surveys, public kiosks, and workshops.	USA	YES
Citizinvestor [10]	www.citizinvestor.com	Crowdfunding and civic engagement platform that empowers citizens to invest in their community and create real change. The projects are like renovating neighbourhood pools, building new parks and constructing playgrounds, libraries, and educational and cultural programs in every municipality.	USA	YES
Mapping for Change [10]	www. mappingforchange. org.uk	It works to provide benefit to individuals and communities from disadvantaged and marginalised groups, along with the organisations and networks that support those communities, where the goal is to create positive sustainable transformations in their environment through the use of mapping and geographical information.	UK	YES
Ideascale [10]	www.ideascale.com	Ideas management platform that uses crowdsourcing to help citizens find and develop the next 'big thing'. The software allows organisations to involve the opinions of public and private communities by collecting their ideas and giving users a platform to vote. The ideas are then evaluated, routed, and implemented.	USA	YES

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EngagingPlans [50]	www.urbaninteractivestudio.com/engagingplans	An online engagement tool that provides interactive project websites pages to help project teams effectively reach communities, and share news and updates.	USA	YES
Block by Block [10]	www.blockbyblock.org	A DPP that allows citizens to create and to design parts of their city, simulating in a 3D environment what the new solution will like. It is the integration of the computer game Minecraft into public space planning to stimulate the involvement of community members.	USA	YES
GeojSON [10]	www.geojson.io	A platform for collaborative mapping based on open source technology with a vector feature and attributes represented as a JavaScript object. It allows users to map, add information, share their maps and ideas, and export them into different formats.	USA	NO
CityPlanner [42]	www.cityplanneronline.com	A map-based platform that visualizes the plans and built models in user friendly way, permitting movements within the model, measuring areas and changing attributes, like lighting.	USA	YES
Maptionnaire [48]	www.maptionnaire.com	A tool that allows the creation of a geographical survey, in which questions are linked with places on a map. Its objective is so that planners can collect, analyse and visualize map-based data, and so that citizens can co-design project areas and express their opinions.	Finland	YES
Commonplace [51] [52]	www.commonplace.is	An online consultation platform that allows users to set up a website to provide information and updates on a project, while receiving comments on areas that need improvements and feedback on the proposed designs.	UK	YES
TransformCity [10]	www.transformcity.com	An online platform to design adaptive strategies for urban development. It provides strategic advice, design and training on how to build and improve urban transformations.	Netherlands	NO
Carticipe (Debatomap' in English) [10]	www.carticipe.net & www.carticipe.net/carticipe-debatomap-in-english	A participatory mapping platform that adapts every map to specific projects, in order to facilitate lively debates and spark smart, informed conversations in a community.	France	YES
Kattohukka [42]	www.kattohukka.fi	A comprehensive building heat-loss visualisation tool. The user answers questions on the shape and material of a roof, so that the map can generate the surface thermal radiation measured on each roof.	Finland	NO

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FixMyStreet [53]	www.fixmystreetcom & www.fixmystreet.org	A platform in which residents can report issues and experiences on their street. These reports are passed on to local councils, which then communicate when and whether the problem has been addressed.	UK	NO
SmartSantander RA [23]	-APP-	A vision and AR (Augmented Reality) application that provides information on 2700 places in the city of Santander (Spain). It also provides real-time access to traffic and diverse public data.	Spain	NO
Bang the Table - engagementHQ [10]	www.bangthetable.com	A platform that provides the opportunity to give citizens access to information and to enable them to have their say. It drives inclusive, transparent and measurable community engagement processes that empower collaborative learning, discussion, and debate.	Australia	YES
MobiSAM [53]	www.mobisam.net	A mobile social accountability and monitoring platform that offers civic actors a rights-based and evidence-based framework for understanding how government service delivery processes work, as well as the skills and tools to engage with them.	Netherlands	NO
Biotracker [30]	-APP-	A mobile application designed to assist scientists in their quest to classify and to provide further descriptions of plants for non-experts to use. Users track plants, take pictures and add phenological data.	France	NO
DoGood [30]	-APP-	An application that works as a personal record to civic good deeds. Deeds that one has done or would like to do for the community can be recorded. These activities can be marked as a to-do by other users, which in turn increases the score of the respective activity. The activities are also geo-referenced.	USA	NO
Community Planit [31]	www.atsakegame.com/games/community-planit & www.elabemerson.edu/projectscommunity-planit	A fully-fledged serious game intended to have a positive impact on civic engagement, developed and evaluated for local planning. Through the game, citizens are educated in matters related to their communities and then asked to deliberate with each other, suggesting solutions and support.	USA	NO

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MOMO (Mind Of My Own) [28]	www. mindofmyown.org.uk	An App that addresses key problems facing social providers who are dealing with children and vulnerable people. It enables young people to have their voices heard and to participate in decisions on their lives.	UK	NO
Mundo de Estrellas [28]	www. mundodeestrellas.es/ opencms/index.html	An application with the objective of giving all the hospitalized children in the Andalusia region the opportunity to get to know each other, interact with one another using virtual worlds, voice, images, texts, and develop recreational and educational activities.	Spain	NO
What Do They Know [54]	www. whatdotheyknow.com	A platform that allows citizens to ask questions to public local or national authorities. It targets the House of Commons and the House of Lords, as well as local UK parliaments.	UK	NO

3.6. Stakeholders in e-participation

In e-participation initiatives, many types of actors/stakeholders affect and are affected throughout the process. There are relatively new actors in urban planning that are rooted in the world of ICTs and they are open to lots of criticism in their technocratic roles for the development of smart cities. As they have no background in urban planning, these new actors may have a negative impact on citizen involvement in urban planning (Groot *et al.*, 2018) [43]. However, stakeholder knowledge of the characteristics of these initiatives may be considered a prerequisite for developing e-participation initiatives. The invited citizens their background and numbers are important, to define whether those stakeholders are internal or external to the government and what their skills and capabilities may be, so multi-disciplinary teams of both government and stakeholders may be called on to support the process [7].

Actors are divided into four groups: citizen, politicians, government institutions, voluntary organizations (Saebo *et al.*, 2007) [4]. Citizens are often discussed in relation to other stakeholder groups. The relationship between citizens and politicians is widely discussed, on how participation varies between these stakeholder groups and on discussion of their new opportunities for participation, and empowerment of citizens in the political discourse..

In the case of users of the tool, the categories were identified by Fung (2006) [44] by examining the participation area. Those categories are presented below, from the more exclusive to the more inclusive:

- **Expert Administrators:** referring to technical experts selected by the politicians.
- **Elected Representatives:** referring to those elected to represent citizens' interests.
- **Professional Stakeholders:** referring to participants that are paid representatives of organized interests and public officials.

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- **Lay Stakeholders:** referring to unpaid citizens who have a deep interest in a public concern and are willing to represent those having similar interests or perspectives, but who choose not to participate.
- **Randomly Selected Recruits:** this addresses the problem of descriptive representativeness of the general population.
- **Non-Randomly Selected Recruits:** this group is used in exercises to enhance participation especially among subgroups that are less likely to participate.
- **Self-selected Participants:** meaning that exercising the right to participate is open to all those wishing to participate. Although this is invariably the case, it will not always represent the larger public, as the participation of wealthier and better-educated with better access to information will tend to be greater.

There are only four categories in the case of the facilitators and moderators of the tool: **Expert Administrators, Elected Representatives, Private Companies,** and **Civil Society Organisations (CSOs)** (Tambouris *et al.*, 2007) [16].

3.7. ICT-based citizen engagement: limits and risks

Citizen engagement has also some limits and risks to take into account when using these tools, such as ensuring that participation is inclusive, the costs of technology, data storage and ICT infrastructure, the legitimacy of a decision once taken, disengagement or self-exclusion, the representativeness of the results, and the evaluation of the impact.

There are complex issues related to ensuring that participation is inclusive (Davies *et al.*, 2013) [45]. Even where it is possible to bring together a diverse range of people that might largely reflect the whole community, the dynamics of group interactions can easily skew emergent information and ideas.

A risk of disengagement also exists, motivated by negative experiences of participation that lead people to disengage even further [45]. So, bad participatory practice creates mistrust, wastes people's time and money, and can seriously undermine future attempts at public engagement. The risks of poorly thought through participatory activity should be noted, because some communities have experienced so many attempts to foster participation that they have become tired and critical. Indeed, if people have been consulted umpteen times and seen that nothing happens as a result, self-exclusion may be a pragmatic choice, so as not yet again to waste time.

Social exclusion is a multi-dimensional phenomenon (Olphert *et al.*, 2007) [46]. It is generally recognized that some groups of citizens are at risk of exclusion from full participation in society, due to factors such as age, disability, low income, low education, cultural and language differences, and geographic and social isolation. There is widespread concern that new digital divides could be created between those who do and those who do not have access to the benefits of the new services and facilities.

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Citizen engagement often downplays the importance of collective action by placing disproportionately more emphasis on the role of the individual (Bajraktari, 2016) [47], and this is because the concept of engagement frames the relationship between those who are in engagement processes and those doing the engaging in a unidirectional way.

There is also a need to consider the legal regulations in the context of e-participation. In urban planning there are regulations in some countries that leave the option open, without making it mandatory (e.g. Italy). As Haklay *et al.* (2018) [48] stated, in other countries, data protection and ownership are fast becoming major concerns for organisations, with regard to what is collected and where (e.g. Ireland), or there are laws that require participation in planning, although what type or which level of participation is not made explicit (e.g. Brazil).

There is an important limit regarding online consultation: the question of how representative the results of such online dialogue are (OECD, 2003) [49]. A major objection to e-engagement is that not enough citizens will become involved and that the technology is giving government self-selected comments. There is the risk that an active minority might achieve an influence far beyond their proportional representation. However, given the current uptake of ICT, and specifically the Internet, any engagement initiative in OECD member countries should be seen as simply another way to engage citizens. This unilateral channel usually implies a need to ensure multiple channels for citizen input and the need to ensure that e-contributions are fully integrated with offline contributions.

Finally, there are also limitations to be considered regarding the lack of mechanisms to automate the measurement of this e-participation (Simonofski et al., 2017) [23]. Although there has been considerable financial investment in the development of online and offline engagement tools, there has to date been no corresponding investment in evaluating the impact of this “enhanced” government-to-citizen relationship. According to the OECD (2003) [49], there are many evaluations of participation exercises on “citizen satisfaction”, but the actual impact of citizens’ contributions has not been widely researched and documented.

3.8. Conclusions

Citizen engagement is an issue that has always been at the centre of planning processes. The emergence of new technologies and the concepts of e-participation, e-democracy and e-government offer potentials and various options to give citizens a noteworthy role in the decision-making process and, in different ways, to communicate with their governments.

Comparisons of this state-of-the-art approach to planning highlight the most important dimensions of e-participation, to analyse e-participation and to clarify what it is, what are its steps and the different ways to engage citizens in public participation: the levels of e-participation, the stages of the decision-making

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process, the roles of citizens in e-participation, the ICT tools and technologies for citizen engagement, and the stakeholders in e-participation.

The review of the levels of citizen engagement shows the changing roles of citizens during the different stages, varying from information consumer to active decision-maker in the final levels (e-involving, e-collaborating and e-empowering). This classification at levels is closely related with the stages of the decision-making process and the relation gives us an idea of where the citizens are invited to participate, from the agenda setting that is more related with the first levels of engagement (rather than actual engagement) to the last stages, such as creating and implementing the policy, in correlation with the most active citizen participation levels.

Considering the citizen as the most important part in this process, three different roles of participation were identified: citizens, as democratic participants, citizens as co-creators, and citizens as ICT users. This categorization of roles can help with the definition and place a focus on the objective of any one specific tool.

The changing trends of ICT tools and technologies for citizen engagement are very diverse, since they are still at an early stage and we have identified many avenues for the involvement of citizens in the decision-making process. A framework is proposed to classify ICTs in both a tool category and a technological category. The most interesting trends are also analysed within those categories, to highlight the most interesting ones in terms of true citizen engagement.

The stakeholder role in e-participation is analysed in the same way as the previous stages, paying special attention to the different types of tool users.

Citizen engagement has also few limits and risks to take into account, such as social exclusion, disengagement motivated by negative experiences, the costs of technology, data storage and ICT infrastructure, the legitimacy of the decisions that are taken, the representativeness of the results and the evaluation of the impact.

To conclude this description of the state of the art, the main trends in ICT solutions for citizen engagement are those related to certain technologies such as Digital Participatory Platforms (DPP), Web 2.0, Public Participation Geographic Information Systems (PPGIS), Volunteered Geographic Information (VGI), and 3D Models. These technologies must be linked with the different levels of engagement and the stages of the decision-making process; and, it is also important to focus on the target audience, to achieve inclusion and legitimacy, so citizens' inputs to the development of a smart city can be taken into account.

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4. Benchmarking methodology

4.1. Introduction

This chapter describes the methodology followed for the benchmarking analysis (see Figure 2) and is divided into 3 sections: 4.2) Criteria for benchmarking analysis, resulting from the state-of-the-art assessment (section 3); 4.3) Data-gathering process, which describes the data-gathering procedure for ICT engagement tools; 4.4) Method for data processing and analysis, the results of which can be consulted in section 5.

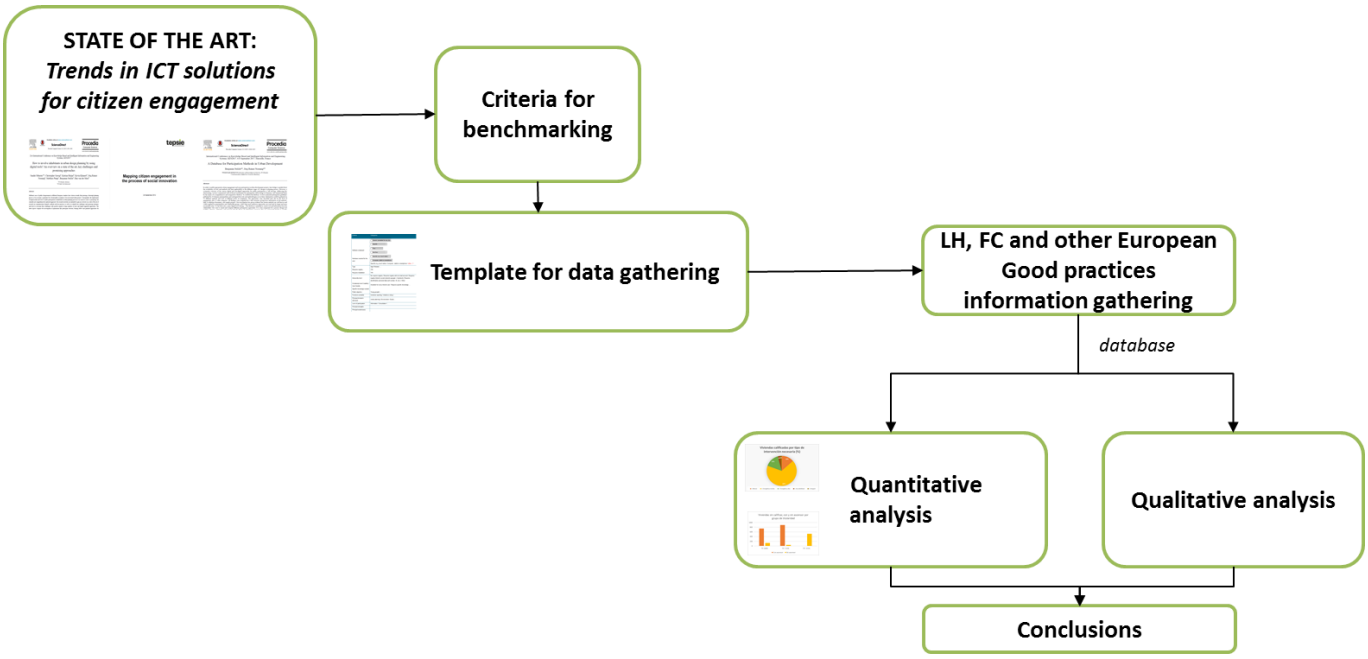

Figure 2: Methodological process for benchmarking analysis development

4.2. Benchmarking criteria

The first step for benchmarking development was the analysis of the state of the art of the trends in ICT-based solutions for citizen engagement. The state-of-the-art study identified the critical aspects that deserve consideration and that serve to establish a benchmark from among the different ICT tools under analysis. The benchmarking objective has also been reviewed, considering that the objective of the benchmarking is to: ***Compare different ICT tools for engaging the citizen in the urban transformation and management of a Smart city.***

For this purpose and as a result of the trends analysed in the state of the art, the following criteria were defined for the benchmarking (see Table 5):

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Table 5: Criteria employed for the analysis of ICT engagement tools

Criteria	Explanation	Relevant data from the template
Levels of engagement in e-participation	There are many ICT tools identified as "participative", although they rely on citizen's reports (e.g. in street lighting or maintenance of urban furniture) to be city-maintenance oriented. We must be critical on this point and try to focus on those tools that really serve to engage citizens in urban transformation.	Type of participation, stages of the decision-making process, functions/purpose of the participation, role, etc.
Technological requirements	To analyse technological trends in ICT engagement tools.	Type of technology, user interface, etc.
Possibilities of replication in different socio-economic contexts	There are some factors (availability, cost, usability, etc.) that will influence the possibilities of replicating the use of the ICT tool in other contexts.	Availability, cost, target audience, usability, possibility of translating into local languages
Level of inclusiveness	Identifying the target group, assessing the level of inclusiveness as ICT solutions runs the risk of excluding elderly or socially marginalized groups	Barriers, limits, risks, specific target users, target age groups
Data security	Is the ICT tool for participation secure from external manipulation? Who gets access to collected data from citizens? (public institutions or also private companies)	Anonymity level

Those criteria had been translated to a template for data gathering (see Annex I: Template for data gathering), validated by partners, and finally uploaded to a Google forms survey as a data-gathering tool. The final survey that was employed can be consulted in Annex II: Questionnaire employed for data gathering.

4.3. Data-gathering process

The data-gathering process comprised 3 scenarios:

- ICT tools employed by mSL **Lighthouse** cities (Hamburg, Helsinki, & Nantes)
- ICT tools employed by mSL **Follower** cities (Rijeka, Bydgoszcz, & Palencia)

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- ICT tools employed by **Other cities/ other ICT engagement tools** identified

In the case of the **Lighthouse cities,** visits to conduct **face-to-face interviews** with inhabitants gave them the opportunity to respond to questions on the ICT tools that they use for citizen engagement and the characteristics and assessment of these tools, following the data-gathering template.

In the case of the **Follower cities** (Bydgoszcz, Rijeka, and Palencia), they were contacted, in the first place, to identify the ICT tools that they use for citizen engagement and the responsible person to be interviewed for each tool. The **interviews were completed by both phone and skype** following the data-gathering template.

In the third case, information on ICT tools **employed by other cities and other ICT engagement tools that had been identified** was **collected from the website and from partners recounting their experiences** through the Smart cities' projects.

Each partner was responsible for the collection of information on the Google forms survey, for standardization of the data-gathering process. As a result of the contributions from the partners, 95 ICT tools were collected following the survey.

4.4. Data-processing & analysis method

As a result of the data gathering with the Google forms tool, an Excel database was compiled with 99 ICT tools, which without duplicities resulted in 95 ICT tools database. The questions from the survey (see Annex II: Questionnaire employed for data gathering to check question numbers) were classified into 3 categories for analysis, in order to process the information that had been gathered for analysis:

- **Quantifiable questions (Nº 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 19, 20, 22, 23, 24, 25, 26, 27):** those that can be transformed into quantitative variables through the assignation of score and weights to their categories.
- **Questions per comparison (Nº 4, 12, 17, 18, 21, 28, 29, 30, 31):** those that could be of interest for use as comparative factors between different quantitative aspects (e.g. domains addressed by the tools, the relative increase in citizen engagement, and which types of cities used it –LHC, FC, Others).
- **Qualitative questions (Nº 13, 32, 33, 34, 35, 36, 37):** those which cannot be easily measured or grouped because they are mainly open questions.

This classification served the purposes of two separate analyses: a qualitative analysis with the open questions and a quantitative analysis with the quantifiable & comparative-type questions. The methodology employed for each analysis is described in the following sections:

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4.4.1. Qualitative-analysis methodology

During the qualitative-data collection process for the benchmarking of ICT tools, questions were deliberately asked openly without formulating prior norms or categories. This approach was chosen, to encourage answers that would cover as broad a spectrum of assessments and experience as possible. The answers also had to be as unbiased as possible. Accordingly, the qualitative analysis covered aspects that could not be divided from the outset into categories or measured by hard quantifiable factors.

Figure 3: Qualitative methodology process

In the evaluation of the qualitative aspects, an interpretative and content analytical approach was adopted (see Figure 3). First, a general screening of all the answers was performed. In the next step, codes were defined as result categories to which the individual answers were assigned. On that basis, results could be interpreted according to categories and described and evaluated with regard to the question.

4.4.2. Quantiitative-analysis methodology

The quantitative analysis comprised the following procedure (see Figure 4).

Figure 4: Quantitative methodology process

The first step consisted of **cleaning and completion** of the database. Duplicates were deleted and empty responses or open responses in quantifiable questions were, whenever possible, assigned to existing question categories.

The second step was to **transform quantifiable questions into numeric indicators**. For this purpose, the quantifiable questions were linked with the criteria addressed in the benchmarking and a weighting distribution for the categories of each question was defined. Weightings were agreed between project partners and can be consulted in Table 6.

The weighting per question ranged between 0 and 1. Depending on the type of question, the following general criteria were applied:

- In the questions with the possibility of selecting several options, the total weighting (1) was distributed between the different selection alternatives. The only exception was the alternative for

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open response for other options that have (where possible) been reassigned to one of the main categories or weighted as 0.01, to avoid null values.

- In dichotomic (Yes/ No) questions, one of the category weights was 1 and another was 0.01 (to avoid 0 values). Whenever there were other open options that could be reassigned to Y/N categories, they were assigned a weight of 0.5. If there was a "not-applicable" category, it was assigned a weighting of 0.01.
- In other questions with only one possible selection, the most suitable one was assigned a weight of 1, and the others, according to their contribution. The explanation of each particular case could be consulted in Table 6.

Table 6: Questions per criteria and weighting of question categories:

Criteria	Indicator	Question Nº	Weighting per category	Additional information
Levels of engagement in e-participation	Conceived for	N. 14	0.01: Information 0.09: Consultation 0.2: Interaction 0.3: Co-production 0.4: Self-Organization …… 0.01: Other/s.	The weights were assigned considering that participation is higher in each step. (ladder of participation)
	Conceived size	N. 15	0.15: Smaller issues 0.35: Medium scale decisions 0.5: Large scale decisions …… 0.01: Other/s.	Weights were assigned considering that the commitment to participation is greater in large-scale decisions (e.g. policy making) than in medium scale (e.g. neighbourhood information) or smaller issues (e.g. maintenance).
	Stages of decision-making process addressed	N. 16	0.2: Define a problem 0.2: Define challenges for the problems identified 0.2: Create the solution 0.2: Implement the solution 0.2: Monitor the implemented solution …… 0.01: Other/s	The different stages of the process are equally necessary, for which reason they were rated with the same weight. If permitted by an ICT tool, all of them can have the maximum score.

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	Citizens as	N. 19	0.4: Democratic participants 1: Co-creators 0.4: ICT users 0.01: None of them …… 0.01: Other/s	Among the different categories of citizens, "Co-creators" is the most participative category, considering that citizens contribute to policy making (see section 3.4 Levels of engagement in e-participation).
Technological requirements	User interface	N. 22	0.3: Smartphone/Tablet app 0.3: On-line participation services 0.1: Social networks and virtual communities 0.3: Specific device indoor or outdoor (e.g. touch screen) …… 0.01: Other/s.	Website or app interfaces are the most widely used by the public. The possibility of providing the information in a specific device, either indoors or outdoors, could serve to engage more users (facilitating access and heightening attractiveness). Social networks or virtual communities are not used for all populations, as it is a more exclusive interface than the others.
	Requires installation	N. 23	0.01: Yes 1: No …… 0.5: Other (requires but for x uses)	The installation requirement complicates the use of a tool for aging people (even those who use smartphones) and requires free space on the device and an additional step for its use.
Possibilities of replication in different socio-economic contexts	Cost of the tool	N. 5	1: Free 0.01: Subject to any payment (purchase, subscription, etc.) 0.01: Not applicable	The "free" option increases the possibilities of replication. "Not applicable" or "subject to any payment" options were considered with the same score.
	Language availability	N. 7 -8 (instruct-ions) [0.4]	0.2: Available in 1 language, but not in English 0.4: Available in several languages, but not English 0.6: Available only in English 1: Available in several languages, one of them is English	"Language availability" indicator has been constructed through a combination of these three indicators, assigning them a weighting of: • 0.4 to instructional language/s; • 0.4 to tool language/s; and, • 0.2 to the possibility of translation. For instructions and tool categories,
		N. 9-10 (tool) [0.4]	0.2: Available in 1 language, but not in English 0.4: Available in several languages,	

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			but not in English 0.6: Available only in English 1: Available in several languages, one of them is English	the possibility of different languages was given a higher rating (considering replication possibilities), and the influence of English as the common spoken language for EU.
		N. 11 (translat-ion) [0.2]	1: Yes 0.01: No or Not applicable	
	Tool availability	N. 6	1: Generic (Available for any city) 0.01: Specific (Developed for/by the city) …… 0.1: Other	This indicator differentiates the generic tools that are available for every city or those specifically designed for one city.
Level of inclusiveness	Possibility of incorporating results from non-digital participation processes	N. 20	1: Yes 0.01: No …… 0.01: Not specified	This indicator evaluates the possibility of including or combining presential participation processes with digital ones. If a tool provides the possibility of including non-digital participation, results would allow combined processes, increasing its inclusiveness.
	Usability	N. 25	1: Easy for anyone (regardless of their age or ICT knowledge level) 0.8: Easy for an average Internet user 0.6: Easy for an average smartphone or Internet user 0.2: Easy for a medium/advanced user (e.g. knowing how to use the mobile for interaction with QR codes) 0.1: Easy for an ICT skilled user …… 0.01: Other/s	This indicator evaluates the usability of a tool. The easier the tool is to use, the higher its rating.
	Target users	N. 26	0.05: Professional users (city planners, experts, etc.) or companies 0.15: Non-professional users but with specific skills (e.g. ability to understand maps, ability to understand laws, etc.)	In response to this question, different options can be selected, as the same tool could have been defined for different profiles. “Anyone” category is the highest rated, as it is considered the most inclusive one.

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			0.3: Non-professional users, although with basic education 0.5: Anyone	
	Age target	N. 27	0.1: 1 Age target 0.3: >1 age target 1: No	The more specific the age target, the less inclusive it is. The answers were classified into 3 categories: if only 1 age target is considered, if more than 1 age target is considered, of if there is no specific age target.
Data security	Anonymity level	N. 24	0.01: Registration not required 0.19: Requires registration with an email account 0.19: Requires registration linked to social networks (google +, Facebook) 0.6: Requires identification with personal data (cellphone number, ID, etc.) …… 0.01: Other	The more information required, the more security in terms of phishing or voting several times. Some tools require different registration information and depend on the use of a tool. For this reason, they are rated foreseeing a possible accumulation or selection of several possibilities.

Once the simple indicators had been weighted, the criteria were transformed into indexes, assigning equal weightings to each indicator under consideration, and finally, a Global Engagement Indicator (GEI) was defined for weighting the sub-indexes (criteria). The weightings can be consulted in the following table (Table 7).

Table 7: Weighting of the Global Engagement Index (GEI), Sub-indexes and Indicators

Weighting per GEI	Sub-indexes	Weighting per Sub-index	Indicator	Question num.
0,25	A_Levels of engagement in e-participation	0.25	A1_Conceived_for	N. 14
		0.25	A2_Conceived_size	N. 15
		0.25	A3_Stages	N. 16
		0.25	A4_Citizens_as	N. 19
0,25	B_Technological requirements	0.5	B1_User_interface	N. 22
		0.5	B2_Installation	N. 23
0,25	C_Possibilities of replication in different socio-	0.33	C1_Cost	N. 5
		0.33	C3_Language	N. 7-11

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	economic contexts	0.33	C2_Availability	N. 6
0,25	D_Level of inclusiveness	0.25	D1_Non-digital	N. 20
		0.25	D2_Usability	N. 25
		0.25	D3_Target_users	N. 26
		0.25	D4_Age_target	N. 27
Finally, not considered	E_Data security	1	E1_Anonymity	N. 24

The “Anonimity” indicator (not included in GEI) in the analysis was finally discarded, because of its low representativity, for data security purposes. Also, some questions for comparison (17, 18, 28, 29 & 30), were discarded due to a lack of data.

The indicator range was set between 0 and 1. The GEI and its sub-indexes were rescaled from 0 to 100, in order to use a common scale for them all.

After the calculation of the indicators, the last step (Figure 1, below) was the analysis of the results and their visualization. It was done through Power BI software, and as a result a dynamic database can be consulted at the following link: https://labur.eus/0nQmM.

This dynamic tool includes 3 visualizations or screens that can be changed using the arrow in the lower part of the screen.

The first screen (Figure 5) includes a summary with the average scores of the GEI, the sub-indexes and their indicators. It also shows the qualitative evaluation (from 1 to 5) of how much this tool contributes to citizen engagement. There are also pie charts with the classification of the tools by type of city, principal domains addressed, and type of technology employed.

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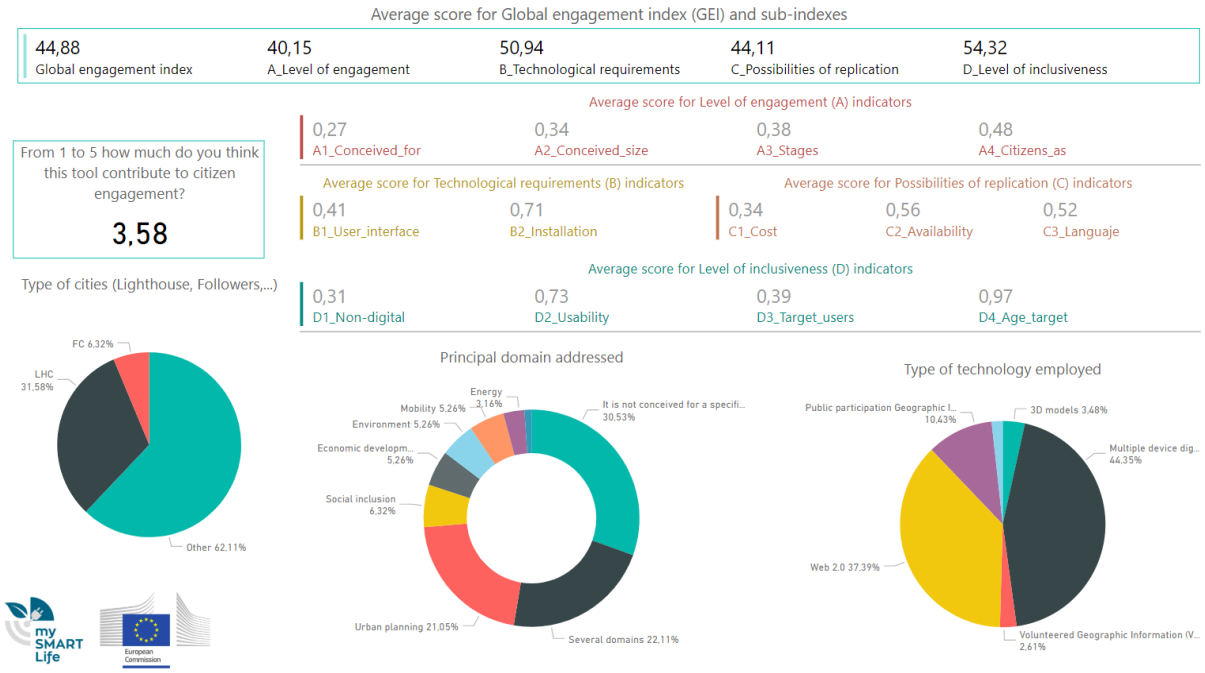
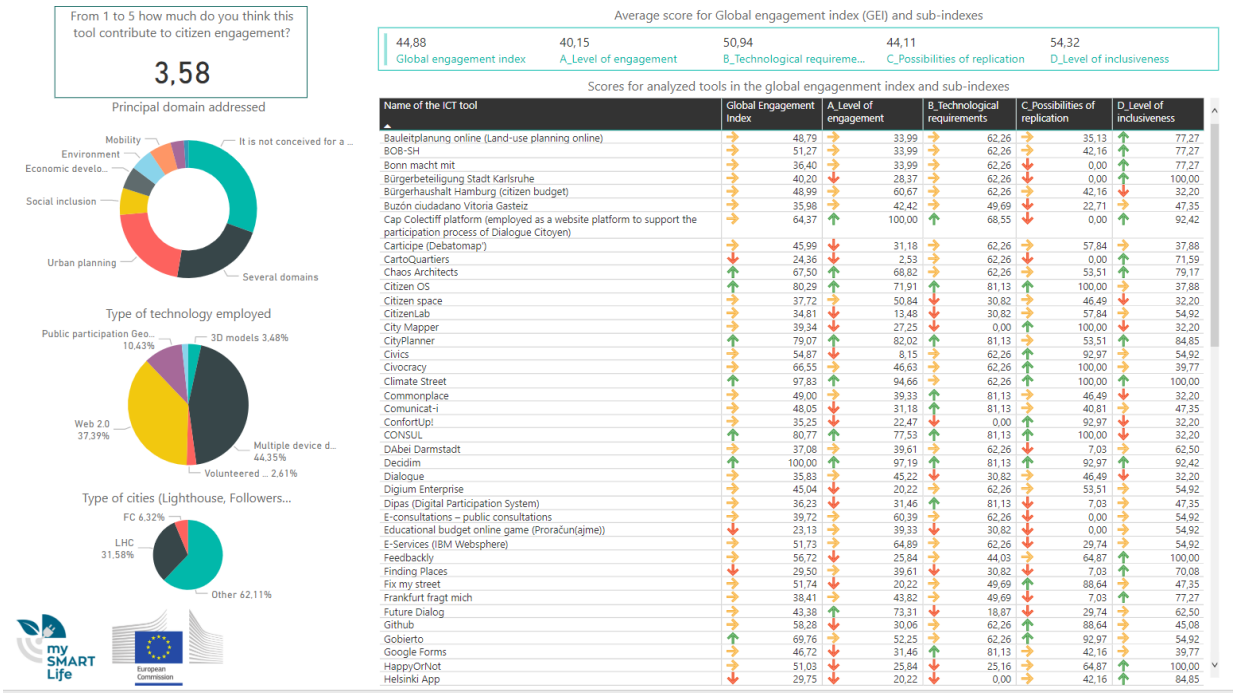


Figure 5: Summary screen

The second screen (Figure 6) includes the database of individual ICT engagement tools assessed by index and sub-indexes.



Name of the ICT tool	Global Engagement Index	A_Level of engagement	B_Technological requirements	C_Possibilities of replication	D_Level of inclusiveness
Bauleitplanung online (Land-use planning online)	48,79	33,99	62,26	35,13	77,27
BOB-SH	51,27	33,99	62,26	42,16	77,27
Bonn macht mit	36,40	33,99	62,26	0,00	77,27
Bürgerbeteiligung Stadt Karlsruhe	40,20	28,37	62,26	0,00	100,00
Bürgerhaushalt Hamburg (citizen budget)	48,99	60,67	62,26	42,16	32,20
Buzón ciudadano Vitoria Gasteiz	35,98	42,42	49,69	22,71	47,35
Cap Colectiff platform (employed as a website platform to support the participation process of Dialogue Citoyen)	64,37	100,00	68,55	0,00	92,42
Participe (Debatomap')	45,99	31,18	62,26	57,84	37,88
CartoQuartiers	24,36	2,53	62,26	0,00	71,59
Chaos Architects	67,50	68,82	62,26	53,51	79,17
Citizen OS	80,29	71,91	81,13	100,00	37,88
Citizen space	37,72	50,84	30,82	46,49	32,20
CitizenLab	34,81	13,48	30,82	57,84	54,92
City Mapper	39,34	27,25	0,00	100,00	32,20
CityPlanner	79,07	82,02	81,13	53,51	84,85
Civics	54,87	8,15	62,26	92,97	54,92
Civocracy	66,55	46,63	62,26	100,00	39,77
Climate Street	97,83	94,66	62,26	100,00	100,00
Commonplace	49,00	39,33	81,13	46,49	32,20
Comunicat-i	48,05	31,18	81,13	40,81	47,35
ConfortUp!	35,25	22,47	0,00	92,97	32,20
CONSUL	80,77	77,53	81,13	100,00	32,20
DAbei Darmstadt	37,08	39,61	62,26	7,03	62,50
Decidim	100,00	97,19	81,13	92,97	92,42
Dialogue	35,83	45,22	30,82	46,49	32,20
Digium Enterprise	45,04	20,22	62,26	53,51	54,92
Dipas (Digital Participation System)	36,23	31,46	81,13	7,03	47,35
E-consultations – public consultations	39,72	60,39	62,26	0,00	54,92
Educational budget online game (Proračun(ajme))	23,13	39,33	30,82	0,00	54,92
E-Services (IBM Websphere)	51,73	64,89	62,26	29,74	54,92
Feedbackly	56,72	25,84	44,03	64,87	100,00
Finding Places	29,50	39,61	30,82	7,03	70,08
Fix my street	51,74	20,22	49,69	88,64	47,35
Frankfurt fragt mich	38,41	43,82	49,69	7,03	77,27
Future Dialog	43,38	73,31	18,87	29,74	62,50
Github	58,28	30,06	62,26	88,64	45,08
Gobierto	69,76	52,25	62,26	92,97	54,92
Google Forms	46,72	31,46	81,13	42,16	39,77
HappyOrNot	51,03	25,84	25,16	64,87	100,00
Helsinki App	29,75	20,22	0,00	42,16	84,85

Figure 6: Index & sub-indexes screen

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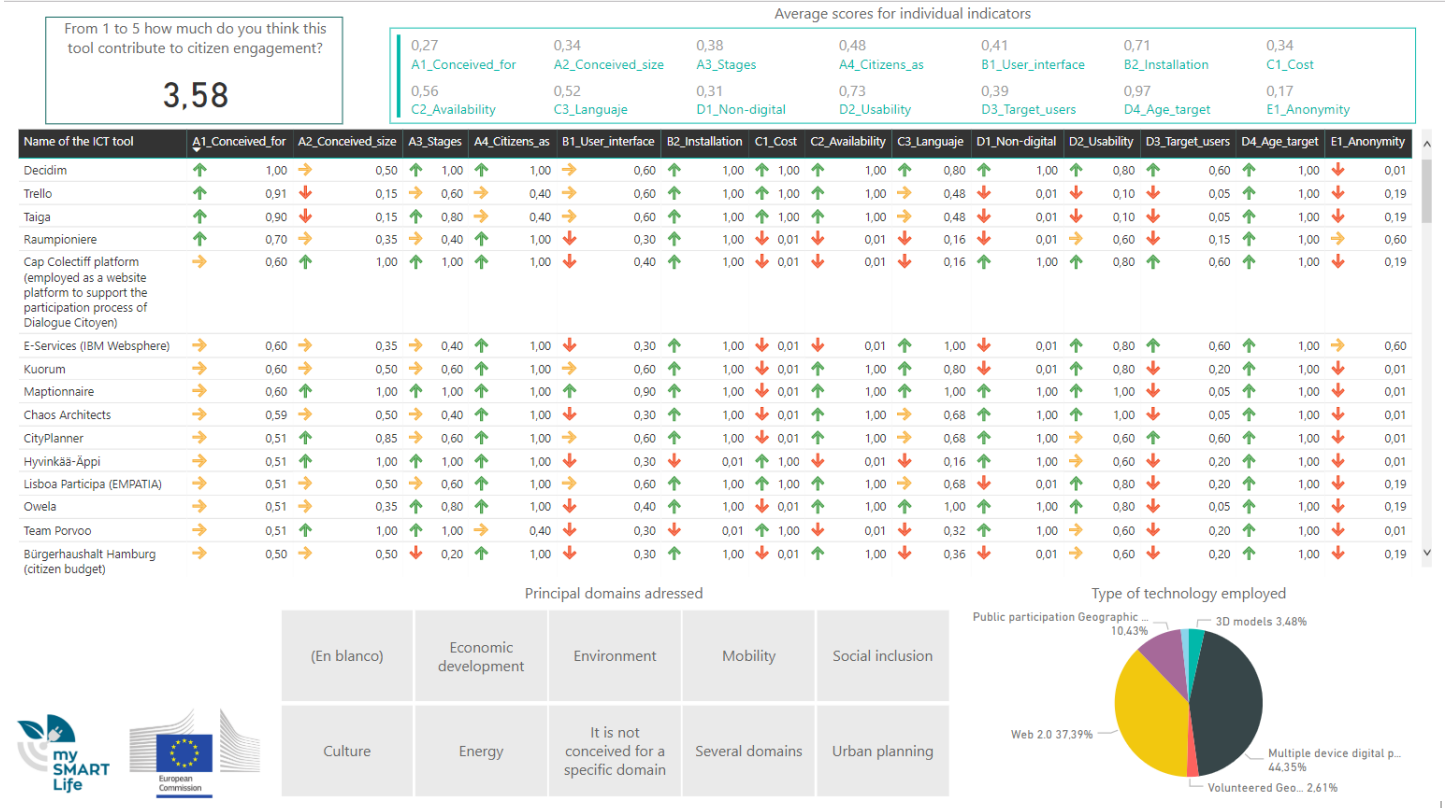
The final screen (Figure 7) includes the database of ICT tools assessed by individual indicators.



Name of the ICT tool	A1_Conceived_for	A2_Conceived_size	A3_Stages	A4_Citizens_as	B1_User_interface	B2_Installation	C1_Cost	C2_Availability	C3_Languaje	D1_Non-digital	D2_Usability	D3_Target_users	D4_Age_target	E1_Anonymity
Decidim	1,00	0,50	1,00	1,00	0,60	1,00	1,00	1,00	0,80	1,00	0,80	0,60	1,00	0,01
Trello	0,91	0,15	0,60	0,40	0,60	1,00	1,00	1,00	0,48	0,01	0,10	0,05	1,00	0,19
Taiga	0,90	0,15	0,80	0,40	0,60	1,00	1,00	1,00	0,48	0,01	0,10	0,05	1,00	0,19
Raumpioniere	0,70	0,35	0,40	1,00	0,30	1,00	0,01	0,01	0,16	0,01	0,60	0,15	1,00	0,60
Cap Colectiff platform (employed as a website platform to support the participation process of Dialogue Citoyen)	0,60	1,00	1,00	1,00	0,40	1,00	0,01	0,01	0,16	1,00	0,80	0,60	1,00	0,19
E-Services (IBM Websphere)	0,60	0,35	0,40	1,00	0,30	1,00	0,01	0,01	1,00	0,01	0,80	0,60	1,00	0,60
Kuorum	0,60	0,50	0,60	1,00	0,60	1,00	0,01	1,00	0,80	0,01	0,80	0,20	1,00	0,01
Maptionnaire	0,60	1,00	1,00	1,00	0,90	1,00	0,01	1,00	1,00	1,00	1,00	0,05	1,00	0,01
Chaos Architects	0,59	0,50	0,40	1,00	0,30	1,00	0,01	1,00	0,68	1,00	1,00	0,05	1,00	0,01
CityPlanner	0,51	0,85	0,60	1,00	0,60	1,00	0,01	1,00	0,68	1,00	0,60	0,60	1,00	0,01
Hyvinkää-Äppi	0,51	1,00	1,00	1,00	0,30	0,01	1,00	0,01	0,16	1,00	0,60	0,20	1,00	0,01
Lisboa Participa (EMPATIA)	0,51	0,50	0,60	1,00	0,60	1,00	1,00	1,00	0,68	0,01	0,80	0,20	1,00	0,19
Owela	0,51	0,35	0,80	1,00	0,40	1,00	0,01	1,00	1,00	1,00	0,80	0,05	1,00	0,19
Team Porvoo	0,51	1,00	1,00	0,40	0,30	0,01	1,00	0,01	0,32	1,00	0,60	0,20	1,00	0,01
Bürgerhaushalt Hamburg (citizen budget)	0,50	0,50	0,20	1,00	0,30	1,00	0,01	1,00	0,36	0,01	0,60	0,20	1,00	0,19

Figure 7: Individual indicators screen

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5. Analysis

5.1. Qualitative analysis

5.1.1. Introduction to the qualitative analysis

The qualitative analysis presented on the following covers aspects that could not be divided from the outset into categories or measured by hard quantifiable factors. While the quantitative approach of the study aims to evaluate and compare the individual tools in terms of specific criteria, the qualitative approach rather seeks to provide an overview of the potentials and weaknesses of digital tools. The digital engagement tools considered in this study are very diverse and are applied in cities of different sizes and within different participation cultures. In total, the tools cover a very wide range of different approaches to participation. According to their diversity, different specific potentials and strengths, but also weaknesses, can be attested to the individual tools as a result of the qualitative part of the analysis.

5.1.2. Main goals oft he tools

In principle, it can be assumed that digital tools are provided by the public sector with the intention of benefitting from certain advantages over analogue methods and instruments. While some tools only offer an online alternative to conventional analogue methods for participation, other tools offer a wider range of extended functions and options. The digital availability of the tools can basically increase the reach of participation, involve more citizens, and promote active citizenship. Most of the tools considered in this study relate to urban planning procedures; other tools relate to urban services and infrastructure, environmental concerns, climate protection, and municipal budget planning. The digital availability of the tools improves the interaction between citizens and public authorities and it also offers the possibility for citizens to establish contact with each other. This arrangement allows opinions to be sought on specific issues, the expression of concerns, and damage that can be reported. It is a means of communication that implies that information may be gathered and that knowledge may be disseminated.

5.1.3. Main strenghts of the tools

Tools for online participation offer the potential of several advantages over conventional analogous participation procedures. According to their diversity, the individual tools also have different specific strengths. In many cases, the survey considered that the availability of a tool is a fundamental strength, as an online alternative to conventional analogue instruments. Here, it is considered a strength that citizens can involve themselves in various fields of urban development and can obtain information. Flexible use from home is also seen as a fundamental strength of digital participation tools.

Further strengths relate more specifically to the online functions of digital participation tools: Initially, user-friendliness and simple and uncomplicated usage were considered strengths in many tools. Visual

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appearance was also often mentioned as particularly positive and underlined by features such as a responsive and a customizable interface.

Additional strengths for online tools include extended functions that are not allowed by analogue participation tools: the analysis shows that digital tools can easily combine different functions and formats and are covered with only one tool. Also, digital tools can bear the potential that of being easily available in different languages and, thus, and offering extra features such as uploading photos and creating 3D models.

Another area in which many of the decisive strengths of digital participation tools are noted rather than analogue processes, are in the field of communications. Many tools make it possible to generate new knowledge and citizens can exchange, discuss, and receive answers in real time. These interactive communication processes strengthen closer contact between citizens and politics/administration. Citizens can become more involved and are closer to public processes.

5.1.4. Main weaknesses of the tools

In addition to the various advantages provided by digital participation tools, it is also important to consider possible disadvantages and weaknesses. First of all, new digital tools must be placed in the public domain, yet too few citizens use this new option, unless digital tools are actively marketed.

Although, many tools offer opportunities for improved communication between citizens and the public sector, this option must be actively used. If there is no response to concerns, comments, and ideas from the public or reactions are delayed, then the tool will not be able to fulfil its function. When using digital tools, it must be taken into account that people who do not have access to the tool, due to a lack of technical prerequisites, are not in principle excluded from participation.

Tools must be simple, easy to use, and in technical terms properly functioning, in order to motivate citizens to use digital tools. A tool should also be visually designed to appeal to citizens. Some tools appear not to meet these requirements and can seem confusing and complicated. Providers must also ensure that a tool remains up-to-date from a technical point of view. Other criticisms are directed toward the conception and the design of the tools. Sometimes, questions are given and there is no possibility of opening further topics. While analogue participation allows citizens to make oral and written additions, digital tools require pre-programmed masks.

It is also particularly important for digital participation tools that data protection measures are in place and, above all, that personal data cannot be viewed.

5.1.5. Social inclusiveness and security of the tools

The answers to the question of whether specific groups of society might be excluded from using the digital tools considered in this study can be answered in a very straightforward manner: as most of the

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tools seem rather easy and uncomplicated to use, only citizens that are generally not using Internet services or are without a smartphone are excluded from using the tool.

As regards security against external manipulation, the digital participation tools under analysis are evaluated in different ways. Many tools are clearly considered secure. The main reasons given for this are extensive registrations based on personal IDs or Google/Facebook accounts. It means that only users who have provided their personal data can use the tools.

Some other tools, where no registration or only simply registration is necessary, can be rated as less secure. There is clearly a risk of false information and false reports when using the tools here.

5.1.6. Conclusion qualitative analysis

Overall, the digital tools are perceived as a positive enrichment and are, therefore, recommended for use in further participation processes. On the one hand, this appreciation is because user effort and costs are low, so many citizens can easily be reached. On the other hand, most tools are perceived to be user-friendly and enriching alternatives to instruments of analogue participation. In that way, they offer a great deal of potential for obtaining opinions from citizens and promoting democratic co-determination, active citizenship, and the involvement of citizens in public decision-making processes.

However, some tools are criticized insofar as their future use may be limited. The reasons given here are high costs as a barrier or the fact that the tool is not available in a local language. Some other tools are also criticized as too unspecific and are recommended as a complementary, but not as sole form of participation.

5.2. Quantitative analysis

5.2.1. Introduction to the quantitative analysis

The distribution of the ICT tools sample analysed (see Table 8) had a higher volume of cities non participating on mySMARTLife Project (59 tools). From those participating in the Project, the majority of tools analyzed correspond to Lighthouse cities, being Helsinki the city which uses more ICT tools for citizen engagement.

Table 8: Sample analyzed according the type of cities

Type of city	N. of tools	Cities	N. of tools
Lighthouse cities	30	Hamburg	7
		Helsinki	17
		Nantes	6
Follower cities	6	Bydgoszcz	1

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		Rijeka	4
		Palencia	1
Other cities	59	Several cities	59

From the tools gathered the 44% of the tools are specifically developed by/for a city, being less transferable or replicable. If the results are considered by type of city (see Table 9), mySMARTLife cities increase this porcentaje till the 83% in Follower cities and 77% in Lighthouse cities.

Table 9: Percentage of tools developed specifically for the city by type of cities

Type of city	N. of tools	% Developed specifically for the city
Lighthouse cities	30	77%
Follower cities	6	83%
Other cities	59	39%

The tools gathered by the Project cities as well as its punctuation in the different indexes analysed could be consulted in the following table (Table 10).

The quantitative analysis was developed with Power BI software. Although the information content in this section is a summary of the results, the dynamic database with a list of the tools under analysis and their scores under different indicators, sub-indexes, and a global engagement index can be consulted at the following link: https://labur.eus/0nQmM

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Table 10: Ranking of the tools gathered from mySMARTLife project in the different indexes

City	Name of the ICT tool	Principal domain addressed	Contribution to CE (1/5)	A_Level of engagement	B_Technological requirements	C_Possibilities of replication	D_Level of inclusiveness	E_Data security	GEI
Hamburg	Bauleitplanung online (Land-use planning online)	Urban planning	3	34,0	62,3	35,1	77,3	18,2	48,8
	Bürgerhaushalt Hamburg (citizen budget)	Economic development	4	60,7	62,3	42,2	32,2	18,2	49,0
	Dipas (Digital Participation System)	Urban planning	4	31,5	81,1	7,0	47,3	18,2	36,2
	Finding Places	Urban planning	4	39,6	30,8	7,0	70,1	0,0	29,5
	Meldemichel	Several domains	5	28,4	81,1	0,0	39,8	18,2	30,8
	Online Participation "Grasbrook"	Urban planning	4	34,0	62,3	42,2	77,3	18,2	51,3
	Smarticipate	Urban planning	4	36,5	62,3	64,9	39,8	18,2	50,7
Helsinki	Chaos Architects	Several domains	3	68,8	62,3	53,5	79,2	0,0	67,5
	CityPlanner	Several domains	5	82,0	81,1	53,5	84,8	0,0	79,1
	Climate Street	Several domains	4	94,7	62,3	100,0	100,0	0,0	97,8
	Digium Enterprise	Several domains	2	20,2	62,3	53,5	54,9	0,0	45,0
	E-Services (IBM Websphere)	Several domains	4	64,9	62,3	29,7	54,9	59,6	51,7
	Feedbackly	It is not conceived for a specific domain	4	25,8	44,0	64,9	100,0	0,0	56,7
	Future Dialog	It is not conceived for a specific domain	4	73,3	18,9	29,7	62,5	38,4	43,4
	Github	Several domains	5	30,1	62,3	88,6	45,1	18,2	58,3
	Google Forms	Several domains	2	31,5	81,1	42,2	39,8	0,0	46,7

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	HappyOrNot	Social inclusion	4	25,8	25,2	64,9	100,0	0,0	51,0
	Helsinki App	It is not conceived for a specific domain	1	20,2	0,0	42,2	84,8	0,0	29,8
	Hyvinkää-Äppi	Several domains	4	97,5	0,0	35,1	69,7	0,0	49,6
	Kerrokantasi	Urban planning	4	60,4	62,3	29,7	84,8	0,0	57,7
	Maptionnaire	Several domains	5	100,0	100,0	64,9	79,2	0,0	93,4
	OmaStadi	Social inclusion	5	53,7	62,3	100,0	71,6	18,2	76,9
	Taiga	It is not conceived for a specific domain	4	62,1	81,1	81,6	7,6	18,2	62,9
	Trello	It is not conceived for a specific domain	4	56,7	81,1	81,6	7,6	18,2	61,1
Nantes	Cap Colectiff platform	It is not conceived for a specific domain	4	100,0	68,6	0,0	92,4	18,2	64,4
	CartoQuartiers	Several domains	2	2,5	62,3	0,0	71,6	0,0	24,4
	Mon project renov	Energy	1	5,6	62,3	0,0	32,2	0,0	15,5
	Nantes dans ma poche	Several domains	2	3,9	0,0	0,0	47,3	0,0	0,0
	Plateforme DECLIC	Energy	3	42,7	68,6	35,1	77,3	59,6	53,6
	Plateforme Solaire	Energy	1	0,0	62,3	0,0	62,5	0,0	21,2
Bydgoszcz	Limesurvey	It is not conceived for a specific domain	4	27,0	81,1	57,8	100,0	0,0	65,8
Palencia	Palencia Open Government Web Portal	It is not conceived for a specific domain	3	43,8	62,3	0,0	39,8	100,0	30,3
ka	E-consultations – public consultations	It is not conceived for a specific domain	5	60,4	62,3	0,0	54,9	0,0	39,7

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	Educational budget online game (Proračun(ajme))	Social inclusion	5	39,3	30,8	0,0	54,9	0,0	23,1
	Moja Rijeka	It is not conceived for a specific domain	5	30,1	62,3	0,0	54,9	18,2	29,5
	Rijeka programme of local partnership	Urban planning	5	30,1	30,8	0,0	54,9	0,0	20,0

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5.2.2. Average results

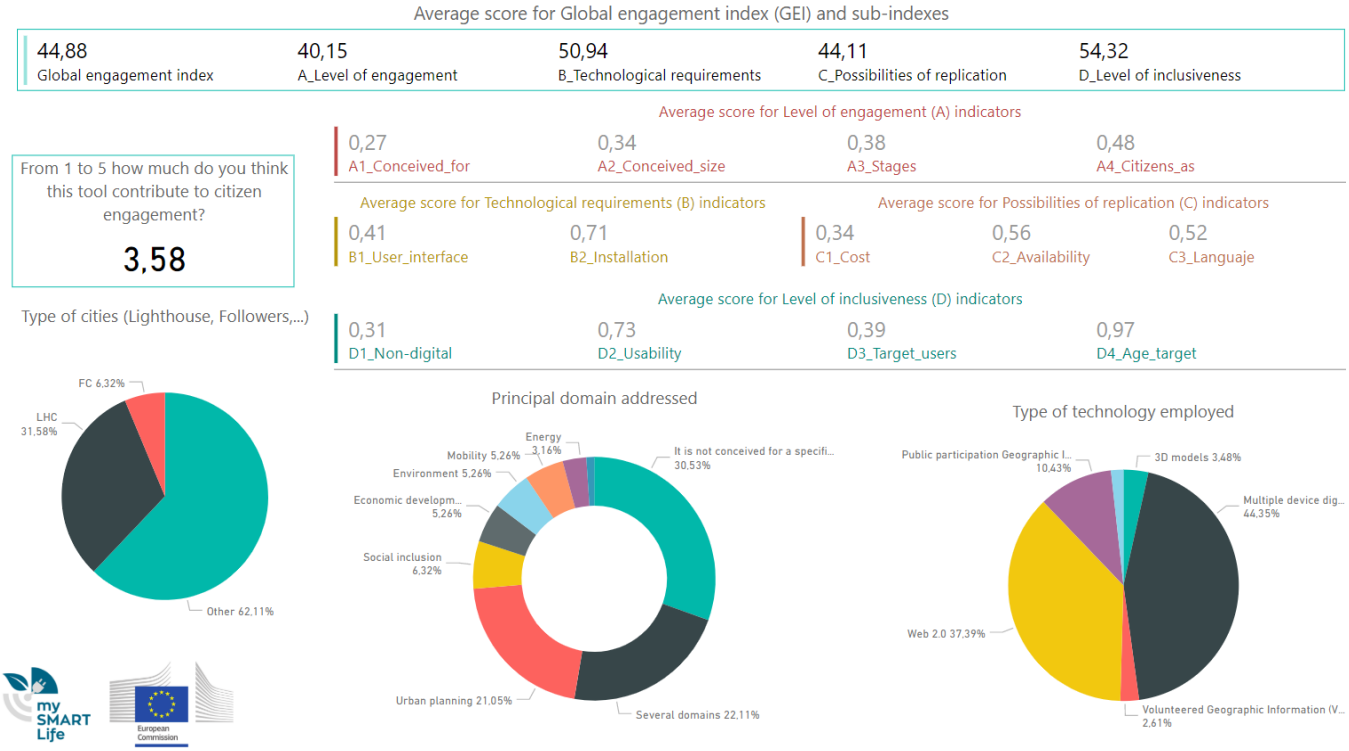

Figure 8: Average figures for all ICT database tools

Although the Global Engagement Index ranges from 0 to 100, the average score of the 95 ICT tools under analysis (see Figure 8) is less than half (44.88%), but the average perception of how much the tools contribute to citizen engagement is 3.58 (from 1 to 5).

The technological requirements and the level of inclusiveness of the sub-indexes are ranked more highly than the level of engagement and the possibilities of replication of the sub-indexes.

5.2.3. Comparison by type of city

The ICT tools database resulting from the questionnaire has been classified into 3 main categories according to the source from which the data was gathered: from the Lighthouse cities participating in the Project, from the Follower cities, or from other cities or experiences.

From among the 95 ICT engagement tools under analysis (see Figure 9), 38% were gathered from the cities participating in mySmartLife project, and 62% from other experiences/cities.

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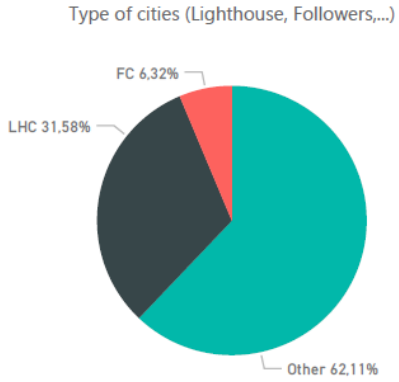

Figure 9: Distribution of ICT tools by type of city

In the following figures (Figure 10, Figure 11, Figure 12), average figures by type of city can be consulted. The average figures refer to the Global Engagement Index (GEI), its constituent sub-indexes, and its indicators.

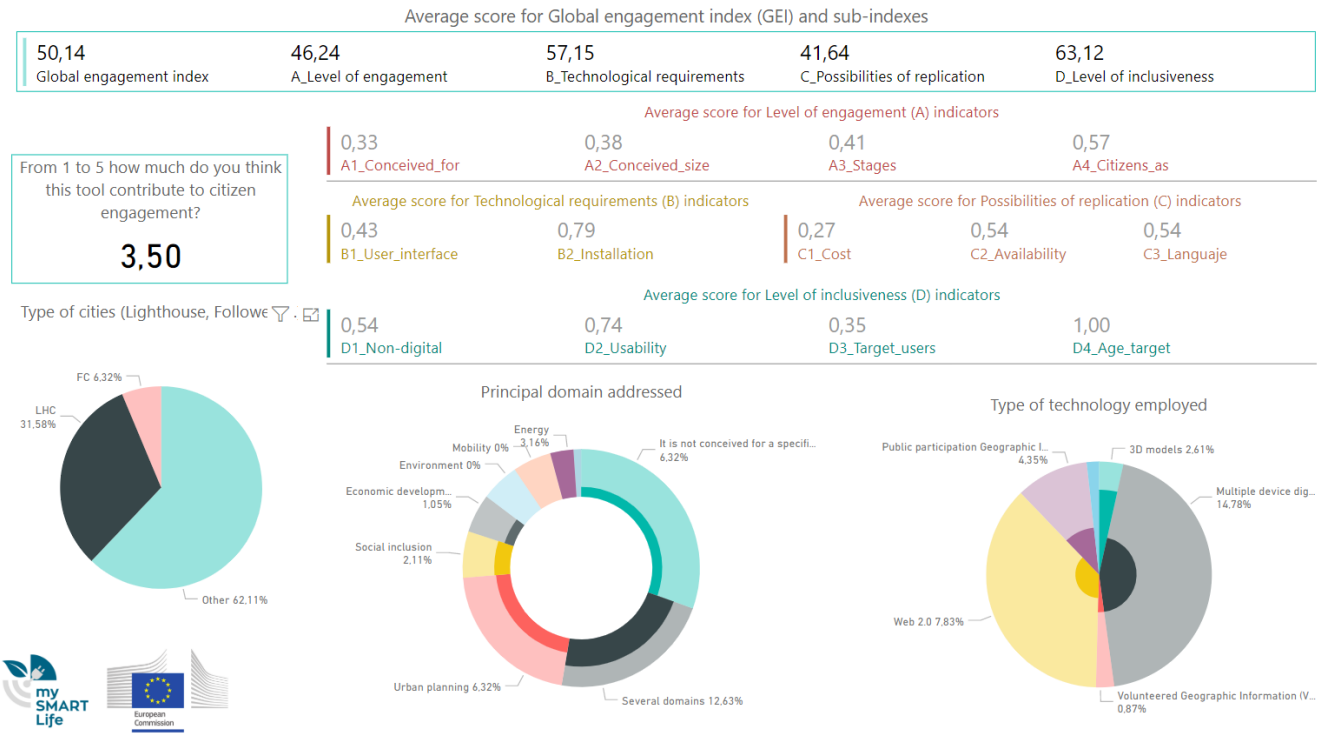

Figure 10: Average figures for Lighthouse cities

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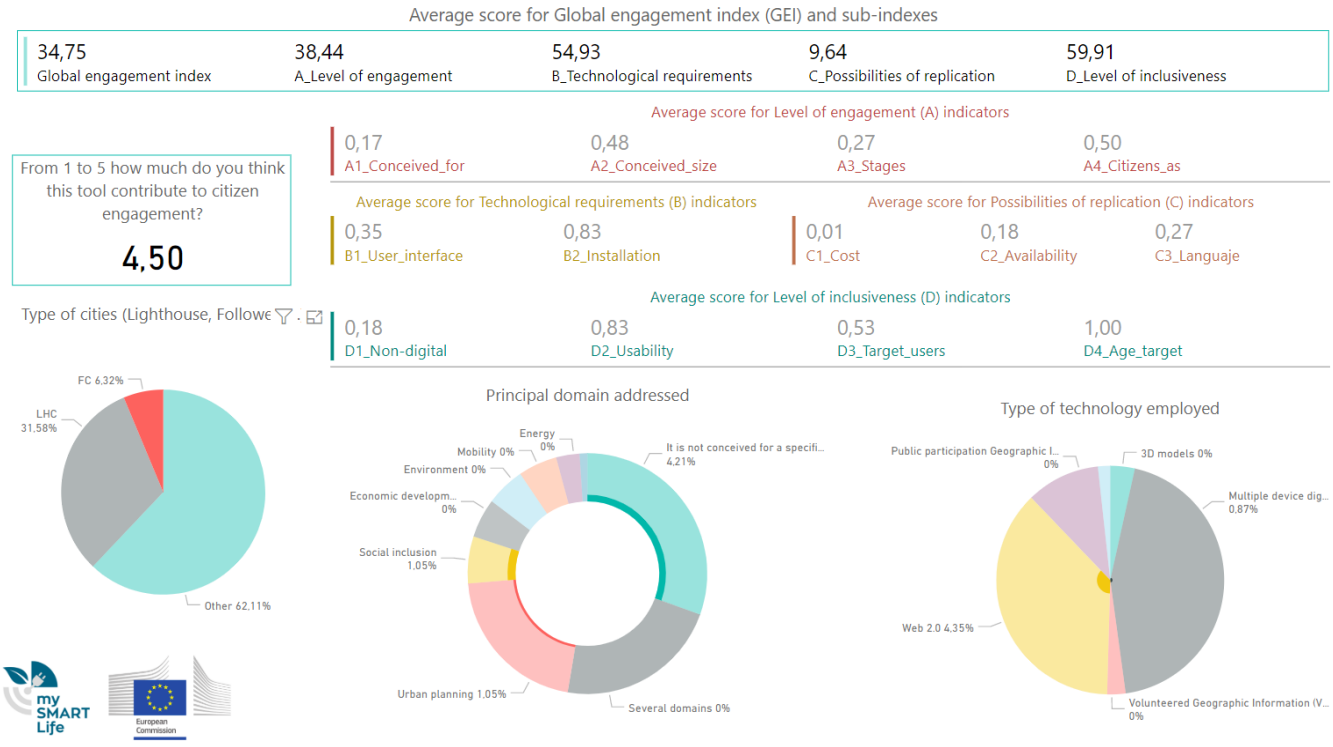

Figure 11: Average figures for follower cities

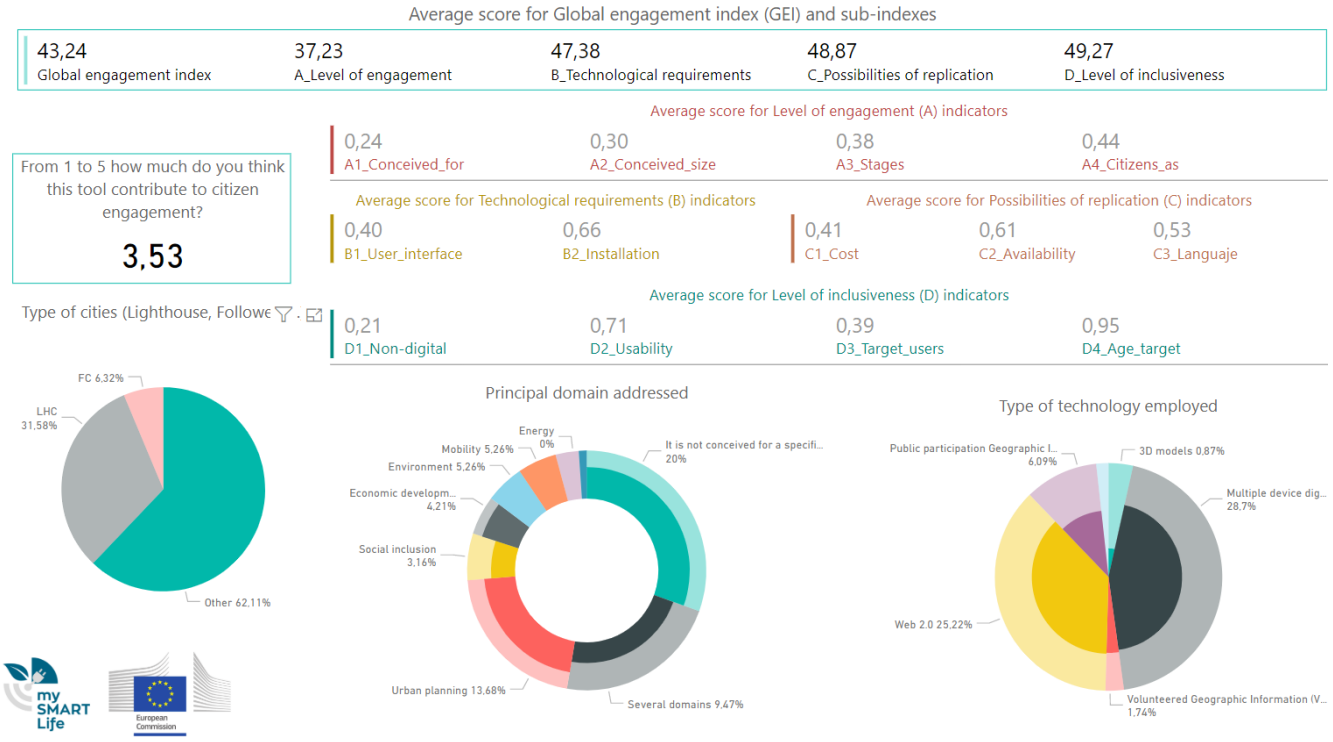

Figure 12: Average figures for other experiences/cities

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Comparing the GEI for the three groups, the highest average score is for the tools employed by Lighthouse cities (50,1), but the qualitative assessment of how these tools contribute to citizen engagement has its highest average score among the Follower cities (4,5).

Considering the sub-indexes, the Lighthouse cities present the highest average scores for Level of engagement (46,24), Technological requirements (57,15), and Level of inclusiveness (63,12). Other experiences or cities present the highest average scores for Possibilities of replication (48,87), mainly influenced by Availability (C2), and Cost (C1) indicators in which other cities had higher average scores than Lighthouse and Follower cities.

5.2.4. Comparison per main domains addressed

From the ICT engagement tools under analysis (see Figure 13), urban planning is the main specific domain that is addressed (21%), 31% of the tools are not conceived for a specific domain, and 22% are conceived for several domains. The remaining 26% of the tools are distributed between Social inclusion (6%), Mobility (5%), Environment (5%), Economic development (5%), Energy (3%), and Culture (1%).

In the following figures (Figure 14, Figure 15, Figure 16) average figures for the three main groups could be consulted. The average figures refer to the GEI, its constituent sub-indexes, and its indicators.

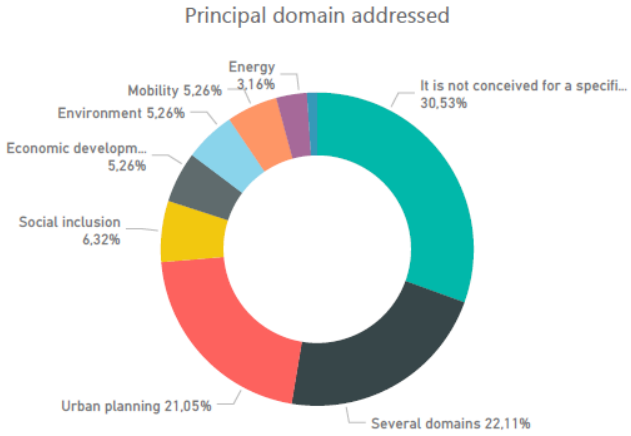

Figure 13: Distribution of ICT tools by principal domain addressed

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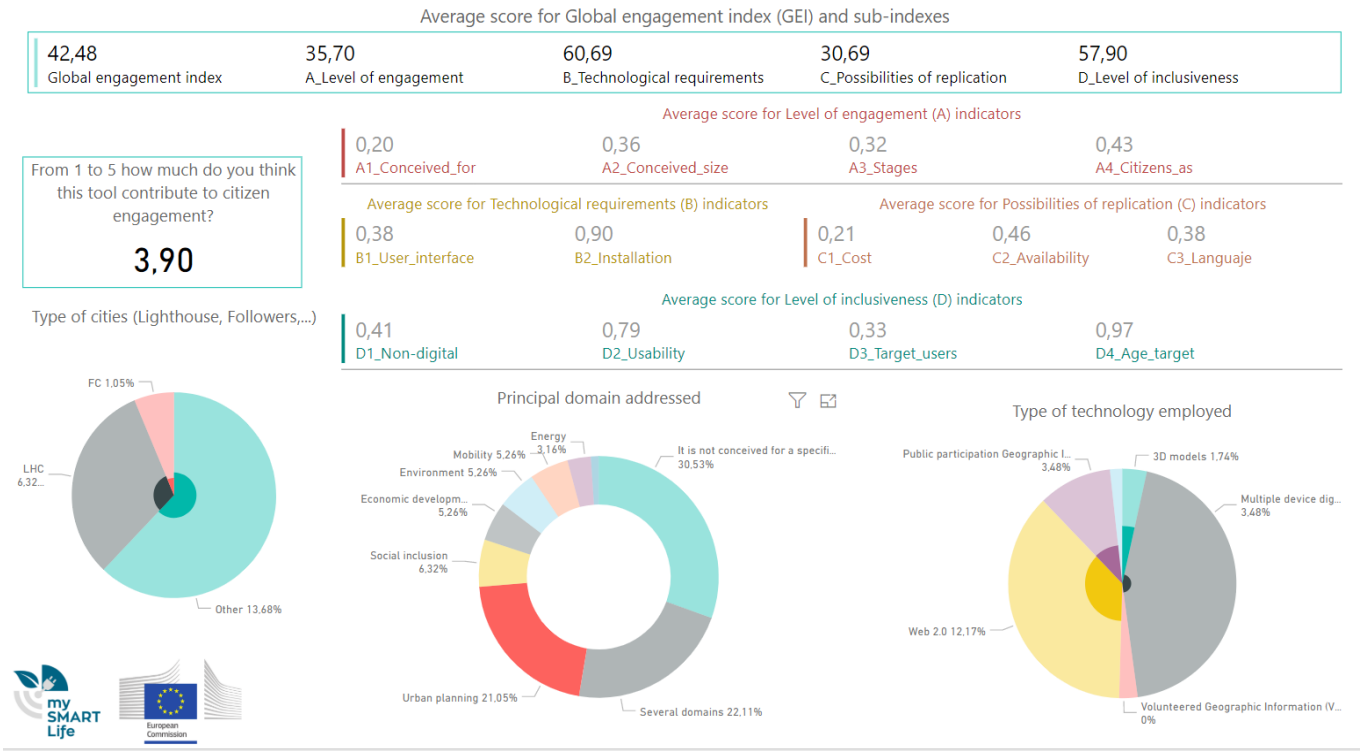

Figure 14: Average figures for urban-planning ICT tools

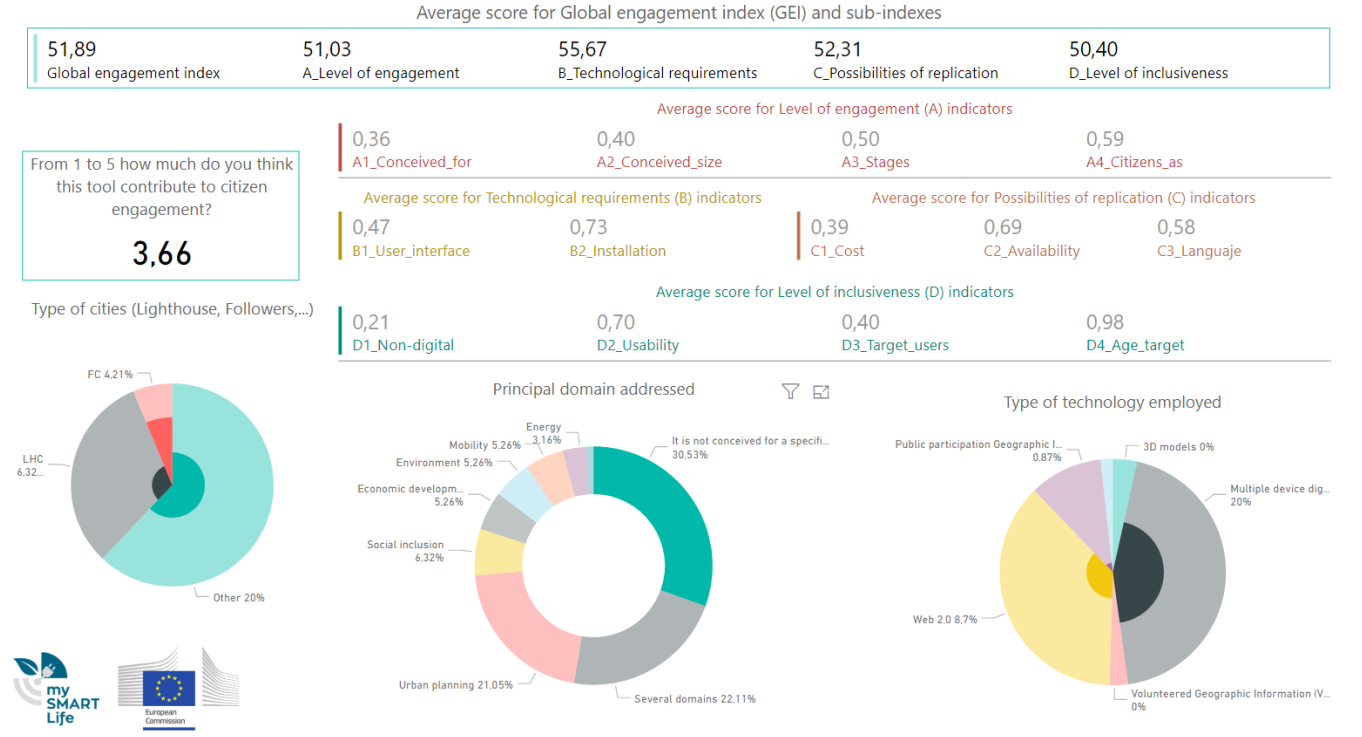

Figure 15: Average figures for ICT tools not conceived for a specific domain

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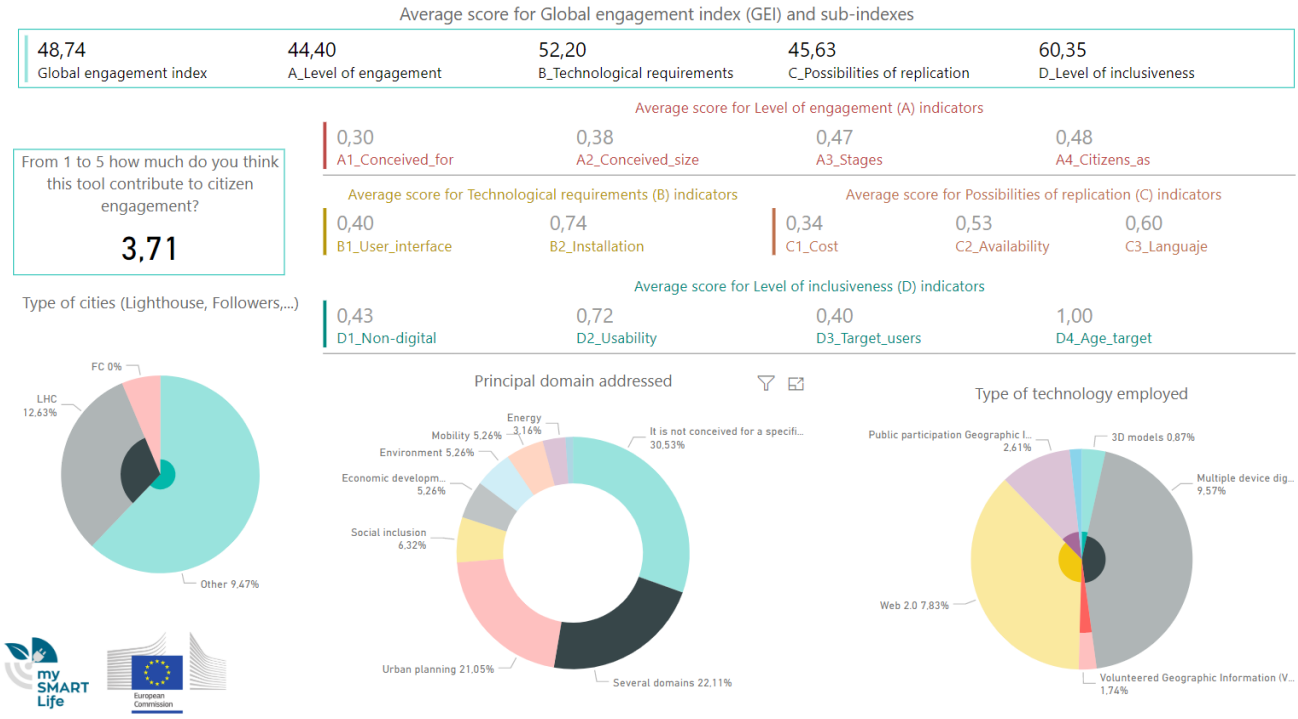

Figure 16: Average figures for ICT tools conceived for several domains

Comparing the Global Engagement Index (GEI) for the three groups, the highest average score is for the group of tools not conceived for a specific domain (51,89), but the qualitative assessment of how these tools contribute to citizen engagement has its highest average score for the tools conceived for urban planning (3,9).

Considering the sub-indexes, those tools which are not conceived for a specific domain present the highest average scores for Level of engagement (51,03) and Possibilities of replication (52,31). Those conceived for urban planning present the highest value in Technological requirements (60,69) sub-index, and those conceived for several domains present the highest value for Level of inclusiveness (60,35) index.

5.2.5. Highest scoring tools

In the following figures, the database of the tools under analysis is filtered, by selecting the highest scoring tools (those with a score higher than 66.6) in the GEI (Figure 17) and each of the 4 sub-indexes under analysis (Figure 18, Figure 19, Figure 20, Figure 21).

In the GEI, only 8 tools had a score over 66.6, and only one of them (Decidim) scored over 66.6 in all the sub-indexes. This tool is also seen to have the highest score in the qualitative assessment of how much it contributes to citizen engagement and it is not connected to a specific domain.

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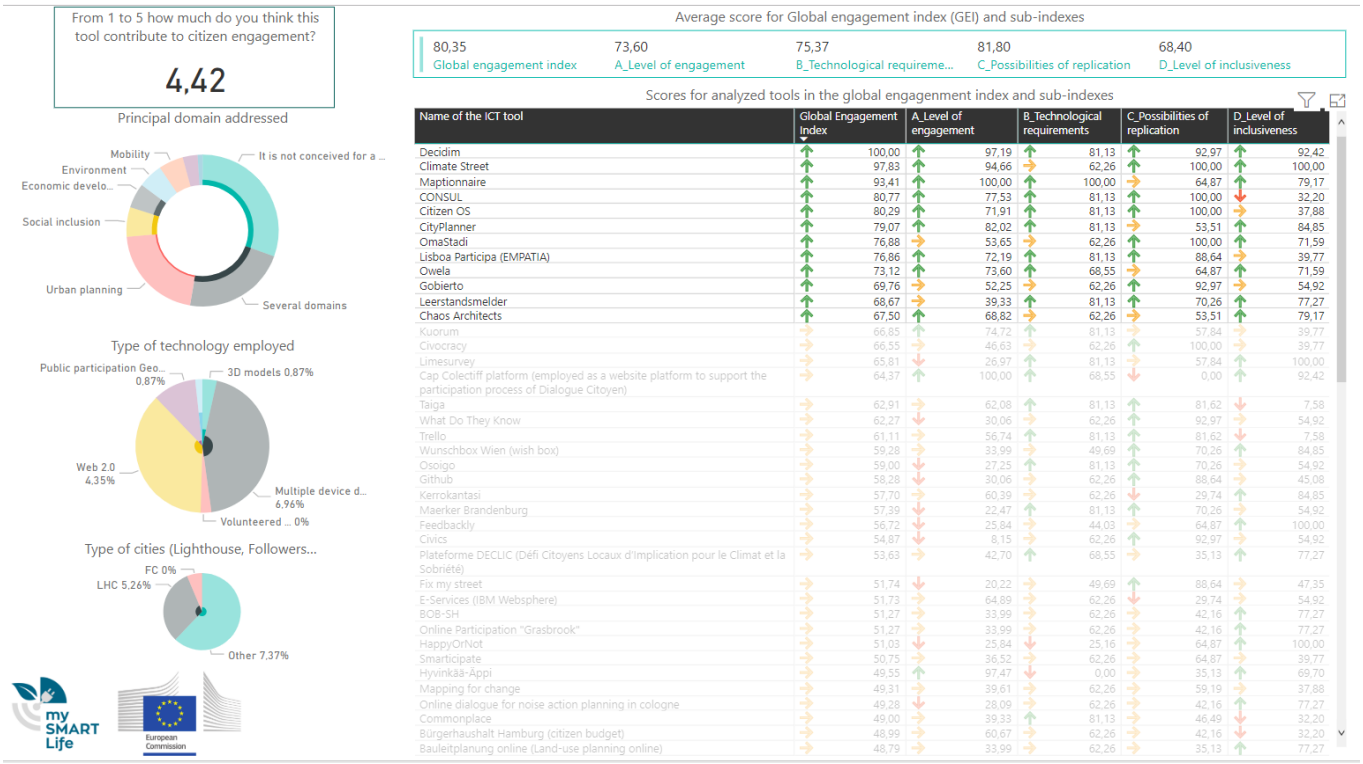

Name of the ICT tool	Global Engagement Index	A_Level of engagement	B_Technological requirements	C_Possibilities of replication	D_Level of inclusiveness
Decidim	100,00	97,19	81,13	92,97	92,42
Climate Street	97,83	94,66	62,26	100,00	100,00
Maptionnaire	93,41	100,00	100,00	64,87	79,17
CONSUL	80,77	77,53	81,13	100,00	32,20
Citizen OS	80,29	71,91	81,13	100,00	37,88
CityPlanner	79,07	82,02	81,13	53,51	84,85
OmaStadi	76,88	53,65	62,26	100,00	71,59
Lisboa Participa (EMPATIA)	76,86	72,19	81,13	88,64	39,77
Owela	73,12	73,60	68,55	64,87	71,59
Gobierto	69,76	52,25	62,26	92,97	54,92
Leerstandsmelder	68,67	39,33	81,13	70,26	77,27
Chaos Architects	67,50	68,82	62,26	53,51	79,17
Kuorum	66,85	74,72	81,13	57,84	39,77
Civocracy	66,55	46,63	62,26	100,00	39,77
Limesurvey	65,81	26,97	81,13	57,84	100,00
Cap Colectiff platform (employed as a website platform to support the participation process of Dialogue Citoyen)	64,37	100,00	68,55	0,00	92,42
Taiga	62,91	62,08	81,13	81,62	7,58
What Do They Know	62,27	30,06	62,26	92,97	54,92
Trello	61,11	56,74	81,13	81,62	7,58
Wunschbox Wien (wish box)	59,28	33,99	49,69	70,26	84,85
Osoigo	59,00	27,25	81,13	70,26	54,92
Github	58,28	30,06	62,26	88,64	45,08
Kerrokantasi	57,70	60,39	62,26	29,74	84,85
Maerker Brandenburg	57,39	22,47	81,13	70,26	54,92
Feedbackly	56,72	25,84	44,03	64,87	100,00
Civics	54,87	8,15	62,26	92,97	54,92
Plateforme DECLIC (Défi Citoyens Locaux d'Implication pour le Climat et la Sobriété)	53,63	42,70	68,55	35,13	77,27
Fix my street	51,74	20,22	49,69	88,64	47,35
E-Services (IBM Websphere)	51,73	64,89	62,26	29,74	54,92
BOB-SH	51,27	33,99	62,26	42,16	77,27
Online Participation "Grasbrook"	51,27	33,99	62,26	42,16	77,27
HappyOrNot	51,03	25,84	25,16	64,87	100,00
Smarticipate	50,75	36,52	62,26	64,87	39,77
Hyvinkää-Äppi	49,55	97,47	0,00	35,13	69,70
Mapping for change	49,31	39,61	62,26	59,19	37,88
Online dialogue for noise action planning in cologne	49,28	28,09	62,26	42,16	77,27
Commonplace	49,00	39,33	81,13	46,49	32,20
Bürgerhaushalt Hamburg (citizen budget)	48,99	60,67	62,26	42,16	32,20
Bauleitplanung online (Land-use planning online)	48,79	33,99	62,26	35,13	77,27

Figure 17: Highest scoring tools from the GEI index

In the Level of engagement sub-index (A), 15 tools are ranked with scores over 66.6 (see Figure 18). From among those 15, Maptionnaire and Cap Colectif are the best ranked. Maptionnaire is also ranked with a 5 in the qualitative assessment on its contribution to increase citizen engagement and Cap Colectiff, in the same ranking, with a 4. Both tools are unconnected with a specific domain.

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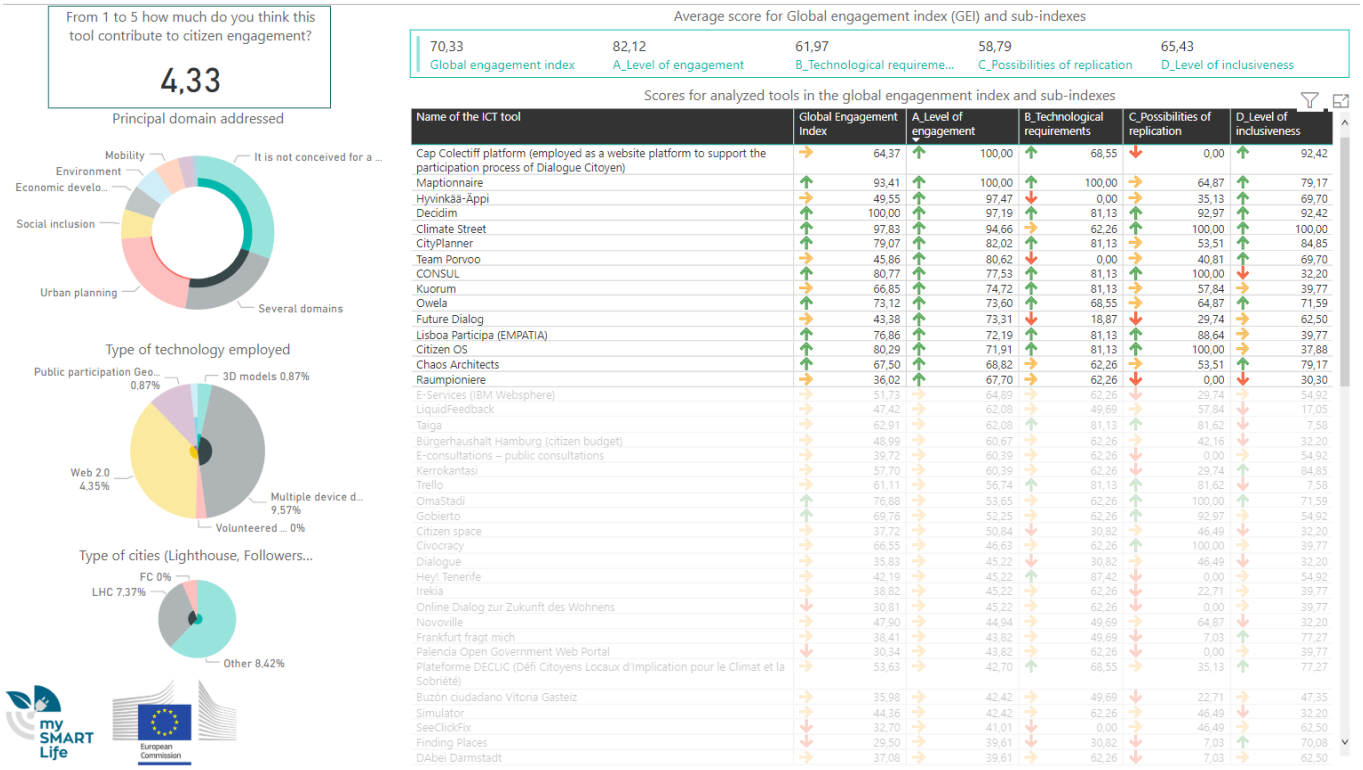

Figure 18: Highest scoring tools from Level of engagement (A) sub-index

In the Technological requirements (B) sub-index, 22 tools are ranked with scores over 66.6 (see Figure 19). From these, Maptionnaire is once again the best ranked.

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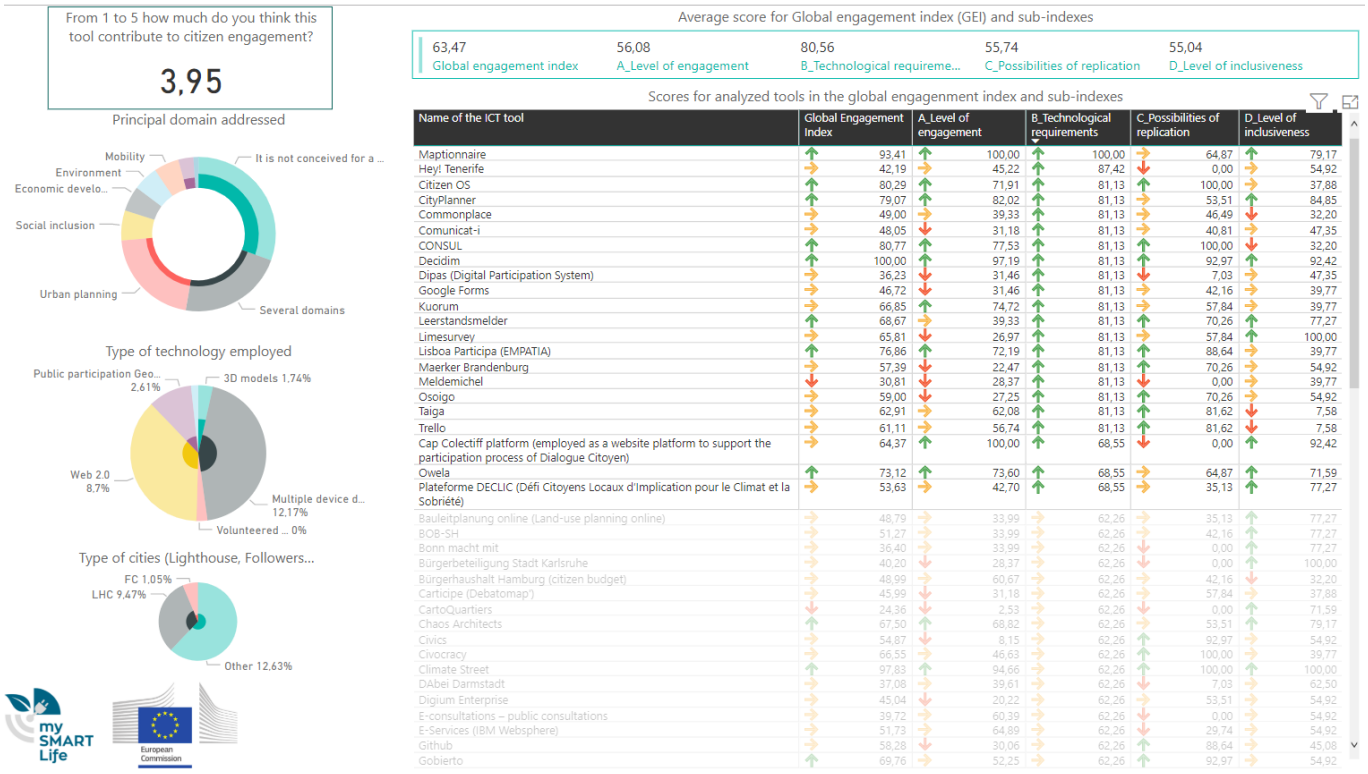

Figure 19: Highest scoring tools from Technological requirements (B) sub-index

With regard to the Possibilities of replication (C) sub-index, 23 tools are ranked with a score over 66.6 (see Figure 20). From these, Citizen OS, City Mapper, Civocracy, Climate Street, Consul, and Oma Stadi are the best ranked. Consul and Oma Stadi also ranked with a 5 in the qualitative assessment of their contributions to citizen engagement. Consul is not connected to a specific domain, although Oma Stadi is connected to social inclusion.

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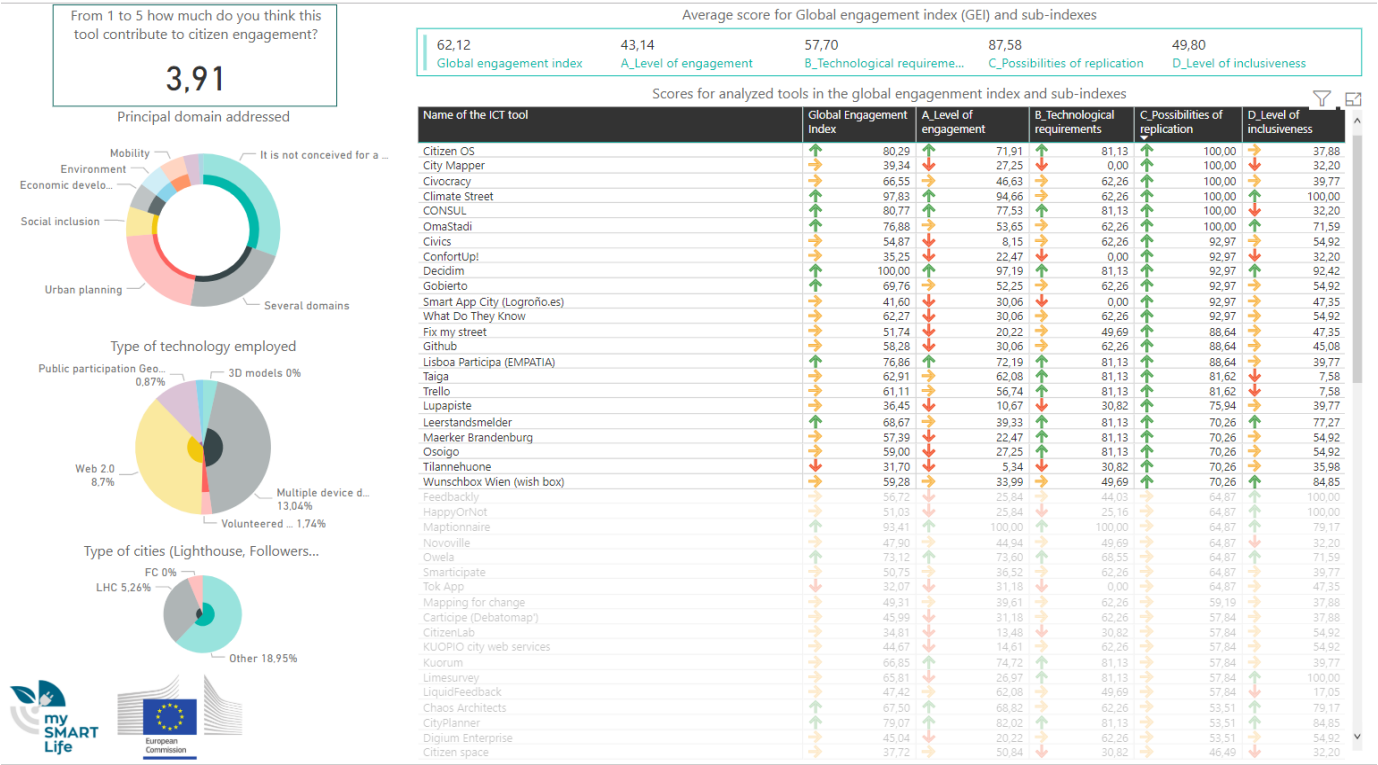

Name of the ICT tool	Global Engagement index	A_Level of engagement	B_Technological requirements	C_Possibilities of replication	D_Level of inclusiveness
Citizen OS	80,29	71,91	81,13	100,00	37,88
City Mapper	39,34	27,25	0,00	100,00	32,20
Civocracy	66,55	46,63	62,26	100,00	39,77
Climate Street	97,83	94,66	62,26	100,00	100,00
CONSUL	80,77	77,53	81,13	100,00	32,20
OmaStadi	76,88	53,65	62,26	100,00	71,59
Civics	54,87	8,15	62,26	92,97	54,92
ConfortUp!	35,25	22,47	0,00	92,97	32,20
Decidim	100,00	97,19	81,13	92,97	92,42
Gobierto	69,76	52,25	62,26	92,97	54,92
Smart App City (Logroño.es)	41,60	30,06	0,00	92,97	47,35
What Do They Know	62,27	30,06	62,26	92,97	54,92
Fix my street	51,74	20,22	49,69	88,64	47,35
Github	58,28	30,06	62,26	88,64	45,08
Lisboa Participa (EMPATIA)	76,86	72,19	81,13	88,64	39,77
Taiga	62,91	62,08	81,13	81,62	7,58
Trello	61,11	56,74	81,13	81,62	7,58
Lupapiste	36,45	10,67	30,82	75,94	39,77
Leerstandsmelder	68,67	39,33	81,13	70,26	77,27
Maerker Brandenburg	57,39	22,47	81,13	70,26	54,92
Osoigo	59,00	27,25	81,13	70,26	54,92
Tilannehuone	31,70	5,34	30,82	70,26	35,98
Wunschbox Wien (wish box)	59,28	33,99	49,69	70,26	84,85
Feedbackly	56,72	25,84	44,03	64,87	100,00
HappyOrNot	51,03	25,84	25,16	64,87	100,00
Maptionnaire	93,41	100,00	100,00	64,87	79,17
Novoville	47,90	44,94	49,69	64,87	32,20
Owela	73,12	73,60	68,55	64,87	71,59
Smarticipate	50,75	36,52	62,26	64,87	39,77
Tok App	32,07	31,18	0,00	64,87	47,35
Mapping for change	49,31	39,61	62,26	59,19	37,88
Carticipe (Debatomap')	45,99	31,18	62,26	57,84	37,88
CitizenLab	34,81	13,48	30,82	57,84	54,92
KUOPIO city web services	44,67	14,61	62,26	57,84	54,92
Kuorum	66,85	74,72	81,13	57,84	39,77
Limesurvey	65,81	26,97	81,13	57,84	100,00
LiquidFeedback	47,42	62,08	49,69	57,84	17,05
Chaos Architects	67,50	68,82	62,26	53,51	79,17
CityPlanner	79,07	82,02	81,13	53,51	84,85
Digium Enterprise	45,04	20,22	62,26	53,51	54,92
Citizen space	37,72	50,84	30,82	46,49	32,20

Figure 20: Highest scoring tools from Possibilities of replication (C) sub-index

In the Level of inclusiveness (D) sub-index, 30 tools are ranked over the 66.6 score (see Figure 21). From these, Bürgerbeteiligung Stadt Kalsruhe, Climate street; Feedbackly, HappyOrNot, and Limesurvey are the best ranked. All of them were ranked with a 4 in the qualitative assessment on how contribute to citizen engagement. Except for HappyOrNot, which was conceived for social inclusion domain, and Bürgerbeteiligung Stadt Kalsruhe, conceived for urban planning, the rest of the tools are not attached to any one specific domain.

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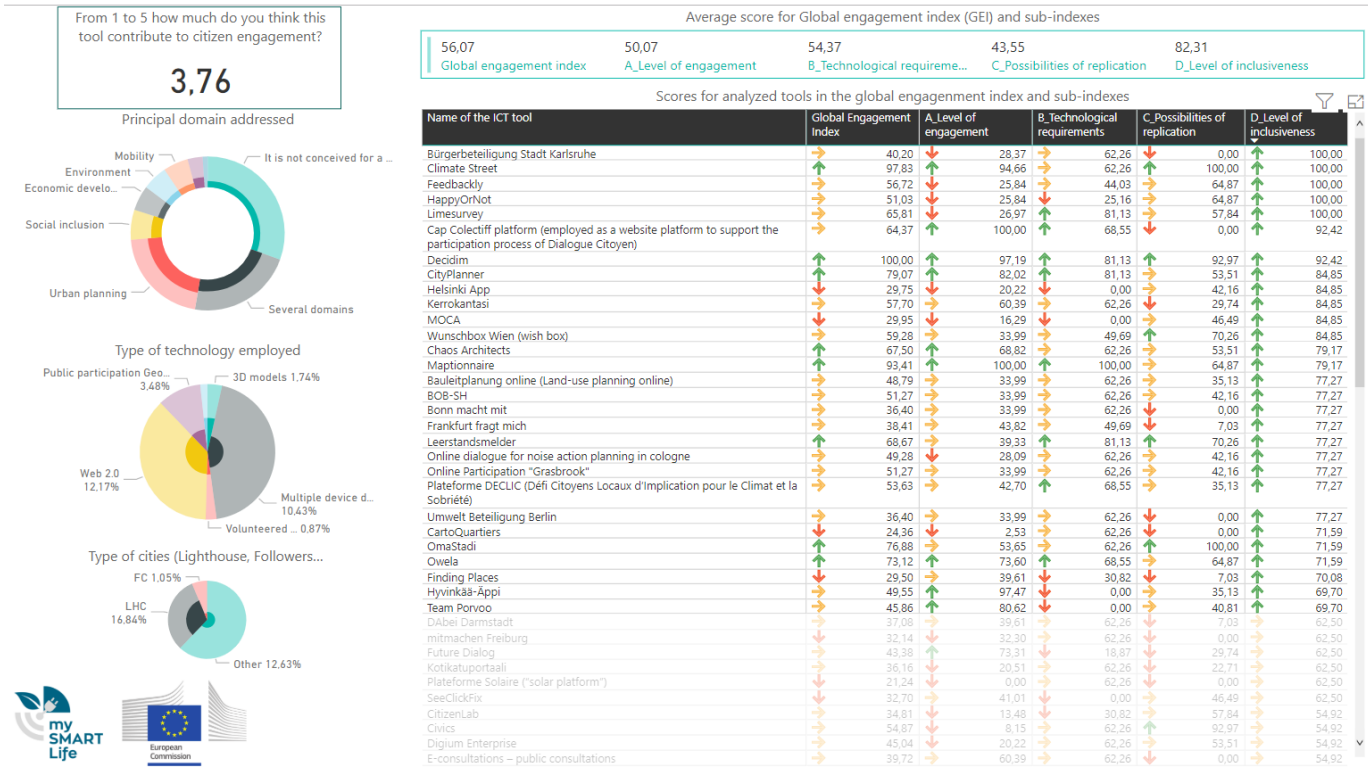

Name of the ICT tool	Global Engagement index	A_Level of engagement	B_Technological requirements	C_Possibilities of replication	D_Level of inclusiveness
Bürgerbeteiligung Stadt Karlsruhe	40,20	28,37	62,26	0,00	100,00
Climate Street	97,83	94,66	62,26	100,00	100,00
Feedbackly	56,72	25,84	44,03	64,87	100,00
HappyOrNot	51,03	25,84	25,16	64,87	100,00
Limesurvey	65,81	26,97	81,13	57,84	100,00
Cap Colectiff platform (employed as a website platform to support the participation process of Dialogue Citoyen)	64,37	100,00	68,55	0,00	92,42
Decidim	100,00	97,19	81,13	92,97	92,42
CityPlanner	79,07	82,02	81,13	53,51	84,85
Helsinki App	29,75	20,22	0,00	42,16	84,85
Kerrokantasi	57,70	60,39	62,26	29,74	84,85
MOCA	29,95	16,29	0,00	46,49	84,85
Wunschbox Wien (wish box)	59,28	33,99	49,69	70,26	84,85
Chaos Architects	67,50	68,82	62,26	53,51	79,17
Maptionnaire	93,41	100,00	100,00	64,87	79,17
Bauleitplanung online (Land-use planning online)	48,79	33,99	62,26	35,13	77,27
BOB-SH	51,27	33,99	62,26	42,16	77,27
Bonn macht mit	36,40	33,99	62,26	0,00	77,27
Frankfurt fragt mich	38,41	43,82	49,69	7,03	77,27
Leerstandsmelder	68,67	39,33	81,13	70,26	77,27
Online dialogue for noise action planning in cologne	49,28	28,09	62,26	42,16	77,27
Online Participation "Grasbrook"	51,27	33,99	62,26	42,16	77,27
Plateforme DECLIC (Défi Citoyens Locaux d'Implication pour le Climat et la Sobriété)	53,63	42,70	68,55	35,13	77,27
Umwelt Beteiligung Berlin	36,40	33,99	62,26	0,00	77,27
CartoQuartiers	24,36	2,53	62,26	0,00	71,59
OmaStadi	76,88	53,65	62,26	100,00	71,59
Owela	73,12	73,60	68,55	64,87	71,59
Finding Places	29,50	39,61	30,82	7,03	70,08
Hyvinkää-Äppi	49,55	97,47	0,00	35,13	69,70
Team Porvoo	45,86	80,62	0,00	40,81	69,70
DAbei Darmstadt	37,08	39,61	62,26	7,03	62,50
mitmachen Freiburg	32,14	32,30	62,26	0,00	62,50
Future Dialog	43,38	73,31	18,87	29,74	62,50
Kotikatuportaali	36,16	20,51	62,26	22,71	62,50
Plateforme Solaire ("solar platform")	21,24	0,00	62,26	0,00	62,50
SeeClickFix	32,70	41,01	0,00	46,49	62,50
CitizenLab	34,81	13,48	30,82	57,84	54,92
Civics	54,87	8,15	62,26	92,97	54,92
Digium Enterprise	45,04	20,22	62,26	53,51	54,92
E-consultations – public consultations	39,72	60,39	62,26	0,00	54,92

Figure 21: Highest scoring tools from Level of inclusiveness (D) sub-index

5.2.6. Conclusions quantitative analysis

When comparing the tools under analysis by type of city, the ones employed by the Lighthouse cities scored better for engagement, but worse for replication possibilities, probably because they are (to a greater extent) customized.

When comparing the addressed domains of these tools, 31% of the tools are generic, in other words, not conceived for any specific thematic domain. The domain for which there are more tools is urban planning, which comprises at least 21% of the tools under analysis (also included in the group of tools conceived for several domains that represent 22% of the tools under analysis).

The groups of tools with the highest GEI scores are those that are not conceived for a specific domain, although in the qualitative assessment the group with the best average score is the urban planning domain.

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6. Conclusions

6.1. Conclusions on how the results contribute to MySMARTLife project

mySMARTLife project is aimed at the development of an Urban Transformation Strategy to support cities in the definition of transition models, as a suitable path to reach high levels of excellence in their development processes, addressing the main city challenges and progressing to smart people and smart economy concepts. The main instrument to achieve this very ambitious strategy will be the definition of Advanced Urban Planning, consisting of an integrated approach to the planned city interventions on the basis of a rigorous impact assessment, active citizen engagement in the decision-making process, and a structured business approach, from the city business model perspective, to the economic framework for large companies and local SMEs and Start-Ups.

According to this framework, this deliverable specifically contributes to the involvement of citizen engagement in the development of an Urban Transformation Strategy, specifically through the analysis of the most appropiate ICT tools for citizen engagement, the strengths and weaknesses of these kind of tools, and how they should be conducted and managed in an engagement process.

It is crucial to highlight that ICT tools could themselves be a precious instrument for an inclusive participation process (they could serve to increase the reach of participation, involve more citizens and promote active citizenship), but for this purpose they would need to accomplish the following conditions:

- In order to motivate citizens to participate, the tools should be simple, easy to use, technically well-functioning, with visually appealing designs for citizens and (as far as possible) flexible, to include new topics/ functionalities that were not initially foreseen.
- They must be made known through active and extensive marketing campaigns to engage citizens.
- Administrators must make active use (without late responses or lack of response), to fulfil their function and to maintain the motivation of citizens.
- People with a lack of technical prerequisites should not in principle be excluded. Different ways of including them should be studied (e.g.: combining non-digital processes or on-site devices with human guidance/support).
- They must be technically up-to-date.

It is also important to mention that ICT tools, in themselves, make no contribution to citizen engagement. They should be articulated in the citizen engagement strategy, providing the tools with the necessary political commitment, clear expectations with regard to the results of participation and treatment, and with the necessary allocation of resources (for technical updating and administrator updating -giving feedback to citizens, maintaining the contents, etc.-). In that sense, the list of tools that can be used is extensive:

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there are tools specifically designed for certain topics and domains, other more general ones (e.g. surveying tools), and others which integrate several tools in a unique platform. The most important aspect is to select the tool/s that fit in best with the needs of the participation strategy of a city and to use them rationally. In any case, it is recommended that the participation strategy, the tools employed, and all the information should be centralized in a unique web portal or app. Dispersion is not recommended, as it would create disinformation and would likewise disperse any potential participation. Clarity, simplicity, user friendliness, and a high level on expectation (indicating response dates and decision-making stages) should be the pillars of the participation strategy and for tool selection and integration.

6.2. Reflection of the methodology employed

After the presentation of the analysis results, the following section serves to critically reflect the applied methodology. The reflection is intended to show the implicit limitations and possible inaccuracies of the empirical study carried out. This is intended to create a basis for the proper interpretation of the available results.

The main objective of the benchmarking was to compare different ICT tools for engaging citizens in the urban transformation and management of a smart city. Based on the study of current literature dealing with trends in ICT solutions for citizen engagement, analytical criteria for the benchmarking were defined. The selected criteria have been transferred to a data collection template in which contributing partners have entered the information on the individual considered tools.

In order to ensure that all contributing partners have a common understanding of the analysis categories, all criteria of the study as well as the underlying intentions for the analysis were discussed and clarified together in advance. However, as a number of individuals gathered the information on the specific tools, the assessments are inevitably derived from different subjective and personal perceptions.

The contribution of several partners, on the one hand, has the advantage that many diverse experiences could be drawn on and a large number of tools could be identified. On the other hand, this approach has the disadvantage that the partially open questions were answered from a subjective perspective and interpreted and evaluated differently. The results of the benchmarking study are therefore neither completely objective nor have they been generated according to the same rational evaluation standards. Another point that influenced the evaluation of the tools is the fact that some of the tools were already known and tested by the contributors. Other tools were only researched and could only be evaluated on the basis of available information, but not from personal experience.

Overall, the methodology and approach used in this benchmarking study is considered by the authors to be very suitable and appropriate for the research objective, even from a retrospective perspective. Nevertheless, it is important to reflect critically on them in order to become aware of which limitations the evidence this study implies.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731297.

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8. Annexes

8.1. Annex I: Template for data gathering

Table 11: Criteria employed for the analysis of ICT engagement tools

	Criteria	Categories
General Information	Name of the ICT tool	
	Include the Website link (if available)	
	Is this tool employed by…?	☐ Nantes ☐ Helsinki ☐ Hamburg ☐ Bydgoszcz ☐ Rijeka ☐ Palencia ☐ Other city/ies. If it is identified by the experience of one city, Which one? _____
	The cost of the tool for the city is…?	☐ Free ☐ Subject to any payment (purchase, subscription, etc.) ☐ Not applicable
	Is this tool…?	☐ Generic (Available for any city) ☐ Specific (Developed for/by the city) ☐ Other. Please, specify: _____
	In how many languages are **the instructions /tutorial** of this tool available? Which are?	
	In how many languages is **this tool** available? Which are?	
	Does this tool allow the	☐ Yes

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	possibility of translation to local languages?	☐ No ☐ Not specified
	Principal domain addressed (mark the primary one)	☐ Mobility ☐ Energy ☐ Urban planning ☐ Environment ☐ Social inclusion ☐ Culture ☐ Economic development ☐ Several ☐ It is not conceived for a specific domain
	What do you think the main goal of the tool is?	
Participation level	This tool is conceived for…?	☐ Information ☐ Consultation ☐ Interaction ☐ Co-production ☐ Self-Organization ☐ Other/s. Please specify: _____
	This tool is conceived for…	☐ Smaller issues (e.g. maintenance) ☐ Medium scale decisions (e.g. neighbourhood intervention) ☐ Large scale decisions (e.g. policy making) ☐ Other/s. Please specify: _____
	Which stage/s of the decision-making process are addressed with this tool?	☐ Define a problem (Agenda setting) ☐ Define challenges for the problems identified (Analysis) ☐ Create the solution (policy, programme, action, initiative…) ☐ Implement the solution ☐ Monitor the implemented solution (evaluation and review)

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		☐ Other/s. Please specify: _____
	Additional functionalities of the tool	☐ Incidents reporting ☐ Initiatives voting ☐ Collecting ideas from citizens ☐ Crowdfunding (citizens investments) ☐ Communicate or visualize plans or projects to citizens ☐ Monitoring ☐ Create networks ☐ Create project pages/ set up websites ☐ Other/s. Please specify: _____
	Does this tool include any of these characteristics to **motivate the participation of citizens**?	☐ Gaming (serious game) ☐ Rewards (benefits for participate) ☐ Personal uses (e.g. tourism information or booking services, transport data information, local services or events information, sports and running apps, etc.) ☐ Other/s. Please specify: _____
	In your opinion, does this tool help people to consider **citizens as**…?	☐ Democratic participants (gather citizen's opinion to know their interests) ☐ Co-creators (contribute to the policy making) ☐ ICT users (tools for their own use that help policy makers make decisions based on the information obtained) ☐ None of them ☐ Other. Please specify: _____
	Does this tool allow for the possibility of incorporating results from other non-digital participation processes?	☐ Yes ☐ No ☐ Not specified
Technological	Type of technology used	☐ Multiple device digital participatory platforms ☐ Web 2.0

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		☐ Public participation Geographic Information Systems (PPGIS) ☐ Volunteered Geographic Information (VGI) ☐ 3D Models ☐ Other/s. Please, specify: _____
	User interface	☐ Smartphone/Tablet app ☐ Website ☐ On-line participation services ☐ Social networks and virtual communities ☐ Specific device indoor or outdoor (e.g. touch screen) ☐ Other/s. Please, specify: _____
	Requires installation	☐ Yes ☐ No
	Anonymity level	☐ Registration not required ☐ Requires registration with an email account ☐ Requires registration linked to social networks (google +, Facebook) ☐ Requires identification with personal data (cellphone number, ID, etc.) ☐ Other
	Usability	☐ Easy for anyone (with independency of their age or ICT knowledge level) ☐ Easy for an average Internet user ☐ Easy for an average smartphone or Internet user ☐ Easy for a medium/advance user (e.g. know how to use the mobile for the interaction with QR codes) ☐ Easy for an ICT skilled user ☐ Other/s. Please, specify: _____
	Target users	☐ Professional users (city planners, experts, etc.) or companies ☐ Non-professional users but with specific skills (e.g. ability to understand maps, ability to understand laws, etc.) ☐ Non-professional users but with basic education

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		☐ Anyone
	Is this tool oriented towards a specific age target?	☐ Children ☐ Teenagers ☐ 18-30 years ☐ 30-50 years ☐ 50-64 years ☐ >64 years ☐ No
Tool assessment	Number of users of the tool (if info. available)	
	Number of active users of the tool (if info. available)	
	User rate of the tool from 0 to 10 (if info. available)	
	On a scale from 1 to 5 (where 5 is the maximum), how much do you think that this tool contributes to increase citizen engagement?	
	In your opinion, what are the main strengths of this tool?	
	And the main weaknesses and barriers?	
	In your opinion, is there any specific group that could be excluded from using this tool? Please explain.	
	Do you think this tool is	

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	secure against external manipulation? Please explain.	
	Do you want to add any comment?	
	Would you use it in future engagement processes? Why?	

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8.2. Annex II: Questionnaire employed for data gathering

Data gathering (D.1.5): ICT tools for engaging the citizen in the urban transformation and management of a Smart city

Dear partner, please fill in one questionnaire per ICT tool analyzed.

*Obligatorio

1. **What partner do you represent?** *
Marca solo un óvalo.

- ◯ CAR
- ◯ HCU
- ◯ VTT
- ◯ FVH
- ◯ TEC

General information about the ICT tool

2. **Name of the ICT tool** *

_____

3. **Include the Website link (if available)**

_____

4. **Is this tool employed by...?** *
Marca solo un óvalo.

- ◯ Nantes
- ◯ Helsinki
- ◯ Hamburg
- ◯ Bydgoszcz
- ◯ Rijeka
- ◯ Palencia
- ◯ Otro: _____

5. **The cost of the tool for the city is...?**
Marca solo un óvalo.

- ◯ Free
- ◯ Subject to any payment (purchase, subscription, etc.)
- ◯ Not Applicable
- ◯ Otro: _____

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6. **Is this tool…?**
Marca solo un óvalo.

- ◯ Generic (Available for any city)
- ◯ Specific (Developed for/by the city)
- ◯ Otro: _____

7. **In how many languages are the instructions/tutorial of this tool available?**

_____

8. **Which are?**

_____

9. **In how many languages is this tool available?**

_____

10. **Which are?**

_____

11. **Does this tool allow the possibility of translation to local languages?**
Marca solo un óvalo.

- ◯ Yes
- ◯ No
- ◯ Not specified

12. **Principal domain addressed (mark the primary one)**
Marca solo un óvalo.

- ◯ Mobility
- ◯ Energy
- ◯ Urban planning
- ◯ Environment
- ◯ Social inclusion
- ◯ Culture
- ◯ Economic development
- ◯ Several domains
- ◯ It is not conceived for a specific domain

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13. **What do you think the main goal of the tool is?**

_____

_____

_____

_____

_____

Participation level

14. **This tool is conceived for…?**
Selecciona todos los que correspondan.

- [ ] Information
- [ ] Consultation
- [ ] Interaction
- [ ] Co-production
- [ ] Self-Organization
- [ ] Otro: _____

15. **This tool is conceived for…**
Marca solo un óvalo.

- ◯ Smaller issues (e.g. maintenance)
- ◯ Medium scale decisions (e.g. neighbourhood intervention)
- ◯ Large scale decisions (e.g. policy making)
- ◯ Otro: _____

16. **Which stage/s of the decision-making process are addressed with this tool?**
Selecciona todos los que correspondan.

- [ ] Define a problem (Agenda setting)
- [ ] Define challenges for the problems identified (Analysis)
- [ ] Create the solution (policy, programme, action, initiative…)
- [ ] Implement the solution
- [ ] Monitor the implemented solution (evaluation and review)
- [ ] Otro: _____

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17. **Additional functionalities of the tool**
Selecciona todos los que correspondan.

- [ ] Incidents reporting
- [ ] Initiatives voting
- [ ] Collecting ideas from citizens
- [ ] Crowdfunding (citizens investments)
- [ ] Communicate or visualize plans or projects to citizens
- [ ] Monitoring
- [ ] Create networks
- [ ] Create project pages/ set up websites
- [ ] Otro: _____

18. **Does this tool include any of these characteristics to motivate citizens in participating?**
Selecciona todos los que correspondan.

- [ ] Gaming (serious games)
- [ ] Rewards (benefits for participate)
- [ ] Personal uses (e.g. tourism information or booking services, transport data information, local services or events information, sports and running apps, etc.)
- [ ] Otro: _____

19. **In your opinion, this tool contributes to consider citizens as...?**
Marca solo un óvalo.

- ◯ Democratic participants (gather citizen's opinion to know their interests)
- ◯ Co-creators (contribute to the policy making)
- ◯ ICT users (tools for their own use that help policy makers make decisions based on the information obtained)
- ◯ None of them
- ◯ Otro: _____

20. **Allows this tool the possibility of incorporate results from other non-digital participation processes?**
Marca solo un óvalo.

- ◯ Yes
- ◯ No
- ◯ Not specified

Technological requirements

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21. **Type of technology used**
Selecciona todos los que correspondan.

- [ ] Multiple device digital participatory platforms
- [ ] Web 2.0
- [ ] Public participation Geographic Information Systems (PPGIS)
- [ ] Volunteered Geographic Information (VGI)
- [ ] 3D Models
- [ ] Otro: _____

22. **User interface**
Selecciona todos los que correspondan.

- [ ] Smartphone/Tablet app
- [ ] Website: On-line participation services
- [ ] Website: Social networks and virtual communities
- [ ] Specific device indoor or outdoor (e.g. touch screen)
- [ ] Otro: _____

23. **Requires installation**
Marca solo un óvalo.

- ◯ Yes
- ◯ No
- ◯ Otro: _____

24. **Anonymity level**
Marca solo un óvalo.

- ◯ Registration not required
- ◯ Requires registration with an email account
- ◯ Requires registration linked to social networks (google +, Facebook)
- ◯ Requires identification with personal data (cellphone number, ID, etc.)
- ◯ Otro: _____

25. **Usability**
Marca solo un óvalo.

- ◯ Easy for anyone (with independency of their age or ICT knowledge level)
- ◯ Easy for an average Internet user
- ◯ Easy for an average smartphone or Internet user
- ◯ Easy for a medium/advance user (e.g. know how to use the mobile for the interaction with QR codes)
- ◯ Easy for an ICT skilled user
- ◯ Otro: _____

Target audience

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26. **Target users**
Selecciona todos los que correspondan.

- [ ] Professional users (city planners, experts, etc.) or companies
- [ ] Non-professional users but with specific skills (e.g. ability to understand maps, ability to understand laws, etc.)
- [ ] Non-professional users but with basic education
- [ ] Anyone
- [ ] Otro: _____

27. **Is this tool oriented to a specific age target?**
Marca solo un óvalo.

- ◯ Children
- ◯ Teenagers
- ◯ 18-30 years
- ◯ 30-50 years
- ◯ 50-64 years
- ◯ >64 years
- ◯ No
- ◯ Otro: _____

Tool assessment

28. **Number of users of the tool (if info. available)**

_____

29. **Number of active users of the tool (if info. available)**

_____

30. **User rate of the tool from 0 to 10 (if info. available)**

_____

31. **From 1 to 5 (being 5 the maximum) how much do you think this tool contributes to increase citizen engagement?**
Marca solo un óvalo.

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

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32. **In your opinion, which are the main strengths of this tool?**

33. **And the main weaknesses and barriers?**

34. **In your opinion, is there any specific group that could be excluded of using this tool? Please explain.**

35. **Do you think this tool is secure against external manipulation? Please explain.**

36. **Do you want to add any comment?**

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37. **Would you use it in future engagement processes? Why?**

Con la tecnología de
Google Forms

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8.3. Annex III: List of ICT engagement tools analysed

Table 12: Listo f ICT engagement tools analysed

Name of the ICT tool	Include the Website link (if available)
Bauleitplanung online (Land-use planning online)	https://bauleitplanung.hamburg.de/
BOB-SH	https://www.bob-sh.de/
Bonn macht mit	https://www.bonn-macht-mit.de
Bürgerbeteiligung Stadt Karlsruhe	https://beteiligung.karlsruhe.de/
Bürgerhaushalt Hamburg (citizen budget)	http://www.beteiligungskompass.org/article/show/409
Buzón ciudadano Vitoria Gasteiz	https://www.vitoria-gasteiz.org/wb021/was/areaAction.do?idioma=es&accion=areas&idBuzon=1
Cap Colectiff platform (employed as a website platform to support the participation process of Dialogue Citoyen)	https://dialoguecitoyen.metropole.nantes.fr/projects and https://cap-collectif.com/plateforme/
Carticipe (Debatomap')	www.carticipe.net & www.carticipe.net/carticipe-debatomap-in-english
CartoQuartiers	www.cartoquartiers.fr
Chaos Architects	https://www.chaosarchitects.com/
Citizen OS	https://citizenos.com
Citizen space	https://www.delib.net/citizen_space
CitizenLab	https://www.citizenlab.co/case-studies
City Mapper	www.citymapper.com
CityPlanner	https://cityplanneronline.com/site/
Civics	https://civics.cc/es/acerca
Civocracy	www.civocracy.com
Climate Street	https://ilmastokatu.fi/en/
Commonplace	https://www.commonplace.is/
Comunicat-i	www.comunicati.es
ConfortUp!	https://www.tecnalia.com/en/energy-and-environment/news/well-being-and-life-quality-are-key-factors-for-urban-comfort-in-the-cities.htm
CONSUL	http://consulproject.org/en/
DAbei Darmstadt	https://da-bei.darmstadt.de/
Decidim	https://decidim.org
Dialogue	https://www.delib.net/dialogue/tour

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Digium Enterprise	
Dipas (Digital Participation System)	https://www.hamburg.de/dipas
E-consultations – public consultations	https://www.rijeka.hr/en/themes-for-citizens/active-citizenship/consultations-with-the-interested-public/?noredirect=en_GB
Educational budget online game (Proračun(ajme))	https://www.rijeka.hr/en/themes-for-citizens/active-citizenship/participatory-budgeting/educational-budget-game-proracunajme/?noredirect=en_GB
E-Services (IBM Websphere)	https://asiointi.hel.fi/wps/portal/login-etusivu/!ut/p/z1/04_Sj9CPykssy0xPLMnMz0vMAfIjo8ziQy0tPEzcPIwM_C3MDQwcA9ydndwMLY0MDMz0wwkpiAJKG-AAjgb6wWmZQDOiCCkryI2o8HRUVAQA6JeR1Q!!/dz/d5/L0lHSkovd0RNQUprQUVnQSEhLzROVkUvZW4!/
Feedbackly	https://www.feedbackly.com/
Finding Places	https://findingplaces.hamburg/
Fix my street	www.fixmystreet.com & www.fixmystreet.org
Frankfurt fragt mich	https://www.ffm.de/frankfurt/de/home/info/id/995
Future Dialog	https://futuredialog.co/
Github	https://github.com/City-of-Helsinki
Gobierto	www.gobierto.es
Google Forms	
HappyOrNot	https://www.happy-or-not.com/en/
Helsinki App	https://hri.fi/data/fi/showcase/helsinkiapp
Hey! Tenerife	https://www.heytenerife.es/es/index.html
Hyvinkää-Äppi	Google play/Apple store
Irekia	https://www.irekia.euskadi.eus/es/proposals
KEKO	http://keko.ymparisto.fi/
Kerrokantasi	kerrokantasi.hel.fi/?lang=en
Kotikatuportaali	https://kotikatu.espoo.fi/
KUOPIO city web services	https://www.kuopio.fi/asioi-verkossa
Kuorum	https://kuorum.org/es/
Lappeenrannan bussit	Apple store/Google play
Leerstandsmelder	https://www.leerstandsmelder.de/
Limesurvey	
LiquidFeedback	https://liquidfeedback.org/

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Lisboa Participa (EMPATIA)	www.lisboaparticipa.pt (www.empatia-project.eu)
Lupapiste	https://www.lupapiste.fi
Maerker Brandenburg	https://maerker.brandenburg.de/bb
Mapping for change	www.mappingforchange.org.uk
Maptionnaire	https://maptionnaire.com/
Mejora Bilbao (Bilbo Hobetuz)	[App in Google Play and App Store]
Meldemichel	https://www.hamburg.de/melde-michel/
Mi Ciudad App	https://appmiciudad.com/
mitmachen Freiburg	https://mitmachen.freiburg.de/stadtfreiburg/de/home
MOCA	www.mocaplatform.com
Moja Rijeka	https://www.mojarijeka.hr/tuzibaba/gradski-prijevoz/
Mon project renov	https://monprojetrenov.nantesmetropole.fr/
Nantes dans ma poche	https://www.nantes.fr/nantes-dans-ma-poche
Novoville	www.novoville.com
NYC Parks	https://tree-map.nycgovparks.org/
OmaStadi	https://omastadi.hel.fi/?locale=en
Online Dialog zur Zukunft des Wohnens	https://www.step-wohnen.de/dialoge
Online dialogue for noise action planning in cologne	
Online Participation "Grasbrook"	http://geoportal-hamburg.de/beteiligung_grasbrook/
Osoigo	https://www.osoigo.com/
Owela	https://owela.fi
Palencia Open Government Web Portal	http://gobiernoabierto.aytopalencia.es/web/gobierno-abierto
Parkhive	
Plateforme DECLIC (Défi Citoyens Locaux d'Implication pour le Climat et la Sobriété)	http://www.familles-a-energie-positive.fr/
Plateforme Solaire ("solar platform")	https://nantes-metropole.insunwetrust.solar
Raumpioniere	https://www.raumpioniere.at
Rijeka programme of local partnership	https://www.rijeka.hr/teme-za-gradane/aktivno-gradanstvo/participativno-budzetiranje-ukljucivanje-gradana-odlucivanje-proracunu/rijecki-program-lokalnog-partnerstva/
SeeClickFix	https://seeclickfix.com/pages/all-solutions
Simulator	https://www.delib.net/simulator/

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Smart App City (Logroño.es)	www.smartappcity.com
Smarticipate	https://www.smarticipate.eu/
SmartSantanderRA	[APP in Google Play or Play Store]
Taiga	https://tree.taiga.io/project/juyrjola-linked-events/timeline
Team Porvoo	Google play/Apple store
Tilannehuone	https://www.tilannehuone.fi/halytysmap.php
Tok App	https://tokapp.com/ & https://tokapp.com/ayuntamientos/
Trafikkagenten	https://www.trafikkagenten.no/
Trello	https://trello.com/b/nYa3Ez5F/helsinki-iot-platform-user-stories
Umwelt Beteiligung Berlin	https://www.umwelt-beteiligung-berlin.de/
VR junat kartalla (Trains on map)	junatkartalla.vr.fi
What Do They Know	www.whatdotheyknow.com
Wilma	
Wunschbox Wien (wish box)	https://www.wienzufuss.at/wunschbox/
Bauleitplanung online (Land-use planning online)	https://bauleitplanung.hamburg.de/
BOB-SH	https://www.bob-sh.de/
Bonn macht mit	https://www.bonn-macht-mit.de
Bürgerbeteiligung Stadt Karlsruhe	https://beteiligung.karlsruhe.de/
Bürgerhaushalt Hamburg (citizen budget)	http://www.beteiligungskompass.org/article/show/409
Buzón ciudadano Vitoria Gasteiz	https://www.vitoria-gasteiz.org/wb021/was/areaAction.do?idioma=es&accion=areas&idBuzon=1
Cap Colectiff platform (employed as a website platform to support the participation process of Dialogue Citoyen)	https://dialoguecitoyen.metropole.nantes.fr/projects and https://cap-collectif.com/plateforme/
Carticipe (Debatomap')	www.carticipe.net & www.carticipe.net/carticipe-debatomap-in-english
CartoQuartiers	www.cartoquartiers.fr

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Chaos Architects	https://www.chaosarchitects.com/
Citizen OS	https://citizenos.com
Citizen space	https://www.delib.net/citizen_space
CitizenLab	https://www.citizenlab.co/case-studies
City Mapper	www.citymapper.com
CityPlanner	https://cityplanneronline.com/site/
Civics	https://civics.cc/es/acerca
Civocracy	www.civocracy.com
Climate Street	https://ilmastokatu.fi/en/
Commonplace	https://www.commonplace.is/
Comunicat-i	www.comunicati.es
ConfortUp!	https://www.tecnalia.com/en/energy-and-environment/news/well-being-and-life-quality-are-key-factors-for-urban-comfort-in-the-cities.htm
CONSUL	http://consulproject.org/en/
DAbei Darmstadt	https://da-bei.darmstadt.de/
Decidim	https://decidim.org
Dialogue	https://www.delib.net/dialogue/tour
Digium Enterprise	
Dipas (Digital Participation System)	https://www.hamburg.de/dipas
E-consultations – public consultations	https://www.rijeka.hr/en/themes-for-citizens/active-citizenship/consultations-with-the-interested-public/?noredirect=en_GB
Educational budget online game (Proračun(ajme))	https://www.rijeka.hr/en/themes-for-citizens/active-citizenship/participatory-budgeting/educational-budget-game-proracunajme/?noredirect=en_GB
E-Services (IBM Websphere)	https://asiointi.hel.fi/wps/portal/login-etusivu/!ut/p/z1/04_Sj9CPykssy0xPLMnMz0vMAfIjo8ziQy0tPEzcPIwM_C3MDQwcA9ydndwMLY0MDMz0wwkpiAJKG-AAjgb6wWmZQDOiCCkryI2o8HRUVAQA6JeR1Q!!/dz/d5/L0lHSkovd0RNQUprQUVnQSEhLzROVkUvZW4!/

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Feedbackly	https://www.feedbackly.com/
Finding Places	https://findingplaces.hamburg/
Fix my street	www.fixmystreet.com & www.fixmystreet.org
Frankfurt fragt mich	https://www.ffm.de/frankfurt/de/home/info/id/995
Future Dialog	https://futuredialog.co/
Github	https://github.com/City-of-Helsinki
Gobierto	www.gobierto.es
Google Forms	
HappyOrNot	https://www.happy-or-not.com/en/
Helsinki App	https://hri.fi/data/fi/showcase/helsinkiapp
Hey! Tenerife	https://www.heytenerife.es/es/index.html
Hyvinkää-Äppi	Google play/Apple store
Irekia	https://www.irekia.euskadi.eus/es/proposals
KEKO	http://keko.ymparisto.fi/
Kerrokantasi	kerrokantasi.hel.fi/?lang=en
Kotikatuportaali	https://kotikatu.espoo.fi/
KUOPIO city web services	https://www.kuopio.fi/asioi-verkossa
Kuorum	https://kuorum.org/es/
Lappeenrannan bussit	Apple store/Google play
Leerstandsmelder	https://www.leerstandsmelder.de/
Limesurvey	
LiquidFeedback	https://liquidfeedback.org/
Lisboa Participa (EMPATIA)	www.lisboaparticipa.pt (www.empatia-project.eu)
Lupapiste	https://www.lupapiste.fi
Maerker Brandenburg	https://maerker.brandenburg.de/bb
Mapping for change	www.mappingforchange.org.uk

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Maptionnaire	https://maptionnaire.com/
Mejora Bilbao (Bilbo Hobetuz)	[App in Google Play and App Store]
Meldemichel	https://www.hamburg.de/melde-michel/
Mi Ciudad App	https://appmiciudad.com/
mitmachen Freiburg	https://mitmachen.freiburg.de/stadtfreiburg/de/home
MOCA	www.mocaplatform.com
Moja Rijeka	https://www.mojarijeka.hr/tuzibaba/gradski-prijevoz/
Mon project renov	https://monprojetrenov.nantesmetropole.fr/
Nantes dans ma poche	https://www.nantes.fr/nantes-dans-ma-poche
Novoville	www.novoville.com
NYC Parks	https://tree-map.nycgovparks.org/
OmaStadi	https://omastadi.hel.fi/?locale=en
Online Dialog zur Zukunft des Wohnens	https://www.step-wohnen.de/dialoge
Online dialogue for noise action planning in cologne	
Online Participation "Grasbrook"	http://geoportal-hamburg.de/beteiligung_grasbrook/
Osoigo	https://www.osoigo.com/
Owela	https://owela.fi
Palencia Open Government Web Portal	http://gobiernoabierto.aytopalencia.es/web/gobierno-abierto
Parkhive	
Plateforme DECLIC (Défi Citoyens Locaux d'Implication pour le Climat et la Sobriété)	http://www.familles-a-energie-positive.fr/
Plateforme Solaire ("solar platform")	https://nantes-metropole.insunwetrust.solar
Raumpioniere	https://www.raumpioniere.at
Rijeka programme of local partnership	https://www.rijeka.hr/teme-za-gradane/aktivno-gradanstvo/participativno-budzetiranje-ukljucivanje-gradana-odlucivanje-proracunu/rijecki-program-lokalnog-partnerstva/

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SeeClickFix	https://seeclickfix.com/pages/all-solutions
Simulator	https://www.delib.net/simulator/
Smart App City (Logroño.es)	www.smartappcity.com
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Taiga	https://tree.taiga.io/project/juyrjola-linked-events/timeline
Team Porvoo	Google play/Apple store
Tilannehuone	https://www.tilannehuone.fi/halytysmap.php
Tok App	https://tokapp.com/ & https://tokapp.com/ayuntamientos/
Trafikkagenten	https://www.trafikkagenten.no/
Trello	https://trello.com/b/nYa3Ez5F/helsinki-iot-platform-user-stories
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