

SYNCHRONICITY

GA no:	732240
Action full title:	SynchroniCity: Delivering an IoT enabled Digital Single Market for Europe and Beyond
Call/Topic:	Large Scale Pilots
Type of action:	Innovation Action (IA)
Starting date of action:	01.01.2017
Project duration:	33 months
Project end date:	30.09.2019
Deliverable number:	D1.10
Deliverable title:	First set of citizen-centred methods and tools
Document version:	1.0
WP number:	WP1
Lead beneficiary:	imec
Main author(s):	Francesca Spagnoli (imec), Mia Kruse Rasmussen (AI), Paul Thurston (FCC)
Internal reviewers:	Katariina Malmberg (ENOLL), Luis Muñoz (UNICAN), Shenja van der Graaf (imec), Martin Brynskov (AU)
Type of deliverable:	Report
Dissemination level:	Public
Delivery date from Annex 1:	M6
Actual delivery date:	M6



Co-funded by the
European Union

This deliverable is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 732240.

Executive Summary

This report constitutes Deliverable no. 1.10 (First set of citizen-centred methods and tools) of the SynchroniCity project. The report has been prepared by Francesca Spagnoli (imec), with the support of Mia Kruse Rasmussen (AI) and Paul Thurston (FCC).

This document aims to provide a clear picture of the needs of the reference zones in terms of co-creation and guidance on the methodologies and tools to apply in order to successfully perform pilots with citizens and stakeholders, by involving them in the whole lifecycle of service and/or product development. The objective is not to define a new methodology, which is out of scope of this deliverable. On the contrary, by building on existing citizen-centred models and tools, successfully applied in different contexts, we aim to establish first a solid framework on co-creation approaches within the smart cities environment; secondly, to provide guidance to the reference zones so as to concretely and easily identify which co-creation methodologies should be implemented within the use cases exploited by the cities. This process, is strictly connected both to the engagement of citizens and stakeholders in defining the services that have to be developed within SynchroniCity for the data marketplace and consequent platforms' deployment and operations (in WP2 and in WP3). Co-creation methodologies should also be put in place for validating the services piloted in the reference zones, both at users, stakeholders, SMEs and citizens' level (as in WP4).

This document is intended to be the first version of the citizen-centred methods and tools for reference zones and it will be updated in M12 in order to constantly capture during the first year of the SynchroniCity project, the current and future needs of the cities and stakeholders. Both this version of the deliverable and the next one, will implement a concrete bottom-up approach by engaging the reference zones in exchanging inputs for finalising the co-creation methodology for SynchroniCity.

Abbreviations:

IoT = Internet of Things

LSP = Large-scale Pilot

WP = Work Package

vs.= versus

Table of contents

1	INTRODUCTION.....	9
1.1	Co-creation guiding principles in SynchroniCity	10
2	DEFINITION OF CENTRAL CONCEPTS.....	12
2.1	Co-creation for the smart cities.....	12
2.2	Participatory design vs. co-creation.....	17
2.3	Engagement vs. empowerment	18
2.4	Smart citizenship and “citizensourcing” for policy making.....	19
3	GENERAL PRINCIPLES OF CO-CREATING WITH USERS	21
3.1	Philosophy of open innovation	21
3.2	The role of living labs in the innovation process	23
3.3	Stakeholders’ engagement strategies	24
4	CO-CREATION METHODS AND TOOLS IN A SMART CITY	27
4.1	Personas	28
4.2	Lego serious play™	30
4.3	Gamification	31
4.4	Bodystorming	32
4.5	Appraisal interviews.....	33
4.6	Basis SWOT workshops.....	35

4.7 Strategic roadmaps	36
4.8 Social network analysis	37
4.9 Role play	38
4.10 Living Lab	39
5 EMPOWERMENT PROFILES OF THE REFERENCE ZONES	42
5.1 Results from the questionnaire and the interviews	42
5.2 Profiles and co-creation guidance for the reference zones	45
5.2.1 Antwerpen	45
5.2.2 Carouge	54
5.2.3 Eindhoven	59
5.2.4 Helsinki	66
5.2.5 Manchester	72
5.2.6 Milan	78
5.2.7 Porto	86
5.2.8 Santander	92
5.3 Guidelines to implement co-creation methodologies	96
5.3.1 Personas	96
5.3.2 Lego serious play™	98
5.3.3 Gamification	99
5.3.4 Bodystorming	100
5.3.5 Appraisal interviews	101

5.3.6 Basis swot workshops	103
5.3.7 Strategic roadmaps	104
5.3.8 Social network analysis	105
5.3.9 Role play	106
5.3.10 Living labs	107
6 CONCLUSIONS AND NEXT STEPS	109
REFERENCES.....	112
APPENDIX 1 QUESTIONNAIRE TO THE REFERENCE ZONES	118
APPENDIX 2 SET OF QUESTIONS FOR THE INTERVIEWS TO THE REFERENCE ZONES.....	122
APPENDIX 3 REFERENCE ZONES' CO-CREATION CARDS	124

Table of figures

Figure 1 Systematisation of Smart Cities Types	15
Figure 2 Changes in the way we think about people within the design process	17
Figure 3 Prerequisites of innovation.....	22
Figure 4 Antwerpen co-creation card: Living Labs	49
Figure 5 Antwerpen co-creation card: Basis SWOT Workshops.....	50
Figure 6 Antwerpen co-creation card: Personas	51
Figure 7 Antwerpen co-creation card: Appraisal interviews.....	52
Figure 8 Antwerpen co-creation card: Strategic Roadmaps	53

Figure 9 Carouge co-creation card: Living Labs	56
Figure 10 Carouge co-creation card: Gamification.....	57
Figure 11 Carouge co-creation card: Personas	58
Figure 12 Eindhoven co-creation card: Living labs	61
Figure 13 Eindhoven co-creation card: Gamification	62
Figure 14 Eindhoven co-creation card: Personas	63
Figure 15 Eindhoven co-creation card: Social Network Analysis.....	64
Figure 16 Eindhoven co-creation card: Strategic roadmaps	65
Figure 17 Helsinki co-creation card: Living Labs	68
Figure 18 Helsinki co-creation card: Personas	69
Figure 19 Helsinki co-creation card: Gamification.....	70
Figure 20 Helsinki co-creation card: Strategic roadmaps.....	71
Figure 21 Manchester co-creation card: Living labs	74
Figure 22 Manchester co-creation card: Gamification	75
Figure 23 Manchester co-creation card: Appraisal interviews	76
Figure 24 Manchester co-creation card: Basis SWOT workshops.....	77
Figure 25 Milan co-creation card: Gamification	81
Figure 26 Milan co-creation card: Appraisal interviews	82
Figure 27 Milan co-creation card: Basis SWOT workshops.....	83
Figure 28 Milan co-creation card: Strategic Roadmaps.....	84
Figure 29 Milan co-creation card: Role play	85

Figure 30 Porto co-creation card: Basis SWOT workshops..... 89

Figure 31 Porto co-creation card: Personas 90

Figure 32 Porto co-creation card: Lego serious play™ 91

Figure 33 Santander co-creation card: Living labs 94

Figure 34 Santander co-creation card: Appraisal interviews..... 95

1 INTRODUCTION

The document is deliberately divided into two main parts. The first part sets out the framework for co-creation and the main guiding principles on methodologies to follow within the context of SynchroniCity (strictly linked to smart cities and IoT), in order to fully exploit the potentialities of this model. Indeed, in the literature many definitions occurred, in some cases conflicting. For this reason, it is required to clearly define a unique process and the steps that both reference zones and the partners of the project should pursue. As a result of the literature review, ten methodologies have been selected to be presented to and applied by the Reference Zones (e.g. the cities involved in SynchroniCity). The second part of the deliverable, building on the real needs of the cities in terms of co-creation, detected through an online questionnaire and in-depth interviews, provides suggestions on methodologies and tools to be used by the cities, taking into account specific objectives within their use cases for SynchroniCity.

Chapter 2 describes central concepts on co-creation, such as the differences between co-creation, co-design and participatory design, the steps needed to successfully implement this process, the similarities between engagement and co-creation practices that should not be misleading and the potential of the “citizen-sourcing” practice.

Chapter 3 presents co-creation guiding principles. Chapter 4 clearly explains the objectives, tasks, tools, rewarding systems and success factors to put in place by applying the selected co-creation methodologies. Moreover, a set of requirements on how to implement them and a specific description of the steps to follow, time required and level of difficulty involved is included.

Chapter 5, by linking the factsheets on co-creation methodologies and by taking into account the results from the online questionnaire and in-depth interviews with the cities, shows the current co-creation status of each reference zone in terms of objectives, methodologies and tools implemented. Furthermore, in this Chapter, several cards for each city are included, in order to visualise which categories of stakeholders to involve by implementing each methodology currently in use by them and what tools can best support the reference zones to achieve the expected goals, together with a short explanation of the methodology.

Suggestions on other methodologies and tools to put in place by the cities for their use cases are also presented, by exploiting the potential benefits for each specific context.

In Appendix 1 and 2, both the text of the online questionnaire and the questions guiding the in-depth interviews are included. In Appendix 3, a link is included to a shared folder, and files can be downloaded by the cities from the SynchroniCity website, so as to enable the reference zones to access two sets of cards as pdf files to be printed for promotional purposes. These cards visualise the current use of co-creation methodologies by each city and suggestions on potential other methodologies to apply. This has been explicitly requested by some of them, during the in-depth interviews, to be used as a tool in parallel to the deliverable, constituting the guide for co-creation approaches to actively apply in their cities.

1.1 Co-CREATION GUIDING PRINCIPLES IN SYNCHRONICITY

We provide below specific definitions of concepts used in this document to be implemented in a Smart City (IoT) environment and that are required to serve as a baseline of the co-creation approach identified within the SynchroniCity framework. The concepts presented here are crucial to clarify the main differences between co-creation and participatory design (and all related definitions), which is still a relevant topic in the literature, especially to identify the user engagement approach to follow for service design (cfr. Voorberg et al., 2014; Günter, 2016; Sanders & Stappers, 2008; Alves, 2013). A special focus is also assigned to the “open innovation” and “living labs” concepts, as all the Smart Cities involved in SynchroniCity are taking advantage of working with open data for generating novel ideas (as a result from the questionnaire and interviews with the cities).

Topic	Definition
<i>Co-creation</i>	An effective process to generate ideas by sharing knowledge and experiences, connecting products and services to the real users. A co-creation process requires these steps to be implemented: definition of the objectives, co-design of services and products, co-

	production phase for refining the outcomes and identifying requirements, co-evaluation of the solutions, co-implementation for an actual use of the products and services and for generating the first results.
<i>Participatory design</i>	An approach focused on defining a service idea together with all the stakeholders, acting as testers of the product or service developed during the design phase, but not involved in the entire process.
<i>Engagement</i>	The process of involving citizens in governmental practices, mainly for providing feedback to the governments about services and products and to influence policy making decisions.
<i>Empowerment</i>	The process of concretely enabling citizens to act as first actors of the smart cities by sharing their data with city governments for the explicit purpose to improve governmental infrastructures and services, thus collaborating in the whole co-creation lifecycle and producing a relevant impact on driving smart cities' sustainability.
<i>Citizensourcing</i>	An approach to smart cities outsourcing governmental practices to citizens in order to suggest solutions for solving the local problems in an efficient and timely way. Citizensourcing requires a high level of accountability of governmental practices.
<i>Open innovation</i>	A process in which ideas can come both from citizens, municipalities, companies and other third parties to develop services ready for the market through the use of open data and open source software.
<i>Living lab</i>	An open and trusted environment for implementing real-life experimentation processes where stakeholders co-create innovative products and services.
<i>Stakeholder</i>	Any individual or group who has an interest in the outcome of an action provided by an organisation or a company.

2 DEFINITION OF CENTRAL CONCEPTS

In this chapter we provide a short description of the framework and baseline concepts for implementing co-creation activities within a Smart City, and more specifically in an IoT-based context. What follows is a description of what co-creation entails here, the different phases of a co-creation process that will guide the Reference Zones to implement such approaches within their cities. We also discuss the differences between participatory design and co-creation, the concept of user engagement vs. user empowerment. Indeed, in applying co-creation processes, end-users have to not be only engaged, but empowered to play an active role in the activities and adding value to the products and services co-developed. Finally, the central concepts of Smart citizenship and “citizensourcing” for policy making are described, relevant to be implemented within Smart Cities.

2.1 CO-CREATION FOR THE SMART CITIES

In the literature, there are many different definitions of co-creation and several disciplines often are involved within this approach, especially co-design, participatory design and open innovation. Co-creation has been linked with many applications, without a coherent framework to follow (Schrage, 1995; Payne et al., 2007; Roser et al. 2009). Originally co-creation has been defined as the participation of end-users in the process of developing a product or a service (Von Hippel, 1987). In the private sector end-users are customers. In the public sector they are citizens.

De Koning et al. (2016), have provided an analysis of 50 co-creation methods and definitions, presenting a first comprehensive framework of this concept. According to the authors, in literature the co-creation term has been approached by following four different models, which are: the *co-creation spectrum*, the *co-creation types*, the *co-creation steps* and the *joint space of co-creation*. The latest category provides a simplistic view of co-creation, where two entities share value inputs and outputs through a bidirectional process. The *spectrum of co-creation* approach shows the similarities with other theories and methodologies, such as open innovation and participatory design, but it assigns a lower level of collaboration to the users and their involvement it is not relevant for the development of

the final output. The *types of co-creation* category defines the process by identifying three criteria: when the co-creation happens, the amount of direct benefit or change produced and the level of collaboration among the parties. Within this approach, five models have been detected to depict the different co-creation types: personal offering, real-time self-service, mass-customization, co-design and community design. The *steps of co-creation* category defines the phases to follow in implementing this approach. Generally, co-creation is seen both as an innovation approach and as a design workshop following a never ending process based on sharing ideas, combining and selecting them, and starting again with the process.

According to De Koning et al. (2016), what seems to be clear and commonly agreed upon in the analysis of the literature, is that co-creation tends to refer to the active involvement of end-users sharing ideas with firms at various stages of the production process (this is also reflected in Prahalad & Ramaswamy, 2000; Vargo & Lusch, 2004). The core principle of co-creation is engaging people to create valuable experiences together, while enhancing network economics (Ramaswamy & Gouillart, 2010). A central element of the transition to co-creation is the ability to develop and manage effectively two-way communications and information systems (Leavy, 2012). In literature, authors have been provided three different definitions of the co-creation term according to the perspective of involving citizens in the process (Voorberg et al., 2014):

- Citizens as co-implementers of public services: they only perform some implementation tasks.
- Citizens as co-designers: they decide how a service should be designed.
- Citizens as initiators: they trigger themselves an initiative and the government follows their approach.

Within the context of Smart Cities and IoT projects, we support that these definitions are not representing the active role we are aiming to assign to the citizens and the complex set of stakeholders that will be involved in the Reference Zones, especially within SynchroniCity. To this end, we apply the following definition of co-creation provided by Leading Cities (2012): *“the active flow of information and ideas among five sectors of society: government, academia, business, non-profits and citizens - the Quintuple Helix - which allows for participation, engagement, and empowerment in, developing policy, creating programs, improving services and tackling systemic change with each dimension of society represented from the beginning”*.

As suggested by the Frontier Strategy (2009), there are three types of co-creation approaches that can be implemented:

- The “*Club of Experts*” style of co-creation is best suitable for very specific, time-pressured challenges that demand expertise and breakthrough ideas. Contributors meet certain specific participation criteria and are generally found through an active selection process.
- *Crowd of People*: anyone can join. For any given challenge, there might be a person with a brilliant idea to be taken into account.
- *Coalition of parties*: each of the parties brings a specific asset or skill to the party.
- *Community of kindred spirits*: groups of people with similar interests and goals come together and create.

Co-design is a specific instance of co-creation. It refers to the collaborative creativity of experts and non-experts working together within the design development process. *Co-production* occurs when more than one person is involved in making ‘something happen’ after the design process. Working out what to do, is a design work; doing it, is production. Co-creation is a new process including both co-design and co-production. Co-creation provides additional value to existing technologies (Correia et al., Citizen City Initiative, 2016).

What does co-creation is not?

In Smart Cities projects, citizens should be engaged since the beginning, in a continuous process to effectively transform ideas into action and contribute to the co-creation activities. Within SynchroniCity, involving a number of cities (and more will join after the Open Call for SMEs that will be partners of cities in real consortia), it would be relevant to have a list of the different tasks, as comprehensive as possible, in which citizens will be involved for co-designing services and products, throughout the whole lifecycle of the project. Taking into account the different forms of citizen participation already applied to Smart Cities projects in Europe provided by Günter (2016), we can divide the citizens in 6 groups depending on their degree of involvement, as from Figure 1.

		DEGREE OF CITIZENS' PARTICIPATION*	SMART CITY PROJECT TYPE (TECHNOLOGY)	BEST PRACTICE EXAMPLE PROJECTS	ENTRY BARRIER (SKILLS/ RESOURCES NEEDED)	MOTIVATION FOR CITIZENS TO PARTICIPATE	NON-DIGITAL EFFECTS
Increased public involvement	Design for citizens	0 - CITIZENS AS DATA PROVIDERS (no corresponding category)	Internet of Everything (IoE); Participatory sensing; Big Data	StreetBump (Boston); El Pulso de la ciudad (Santander)	Low: availability of app-compatible smartphone; willingness to share personal data is required	Improving city services	None
	Design with citizens	1 - CITIZENS AS FEEDBACK AND INPUT PROVIDERS (inform)	e-Government, Social Media; problem reporting apps	FixMyStreet (UK), Sag's mir (Cologne), #askboris (Boris Johnson, Mayor of London)	Low: when access to Smart-phone/ Internet or social media account is available	Improving city services; giving direct feedback to city matters	None
		2 - CITIZENS AS DATA HACKERS (educate)	Open Data; Hackathons	Bristol is open (UK); DataGov (UK); OSCity (the Netherlands)	Medium: when data is made intelligible through adequate programs; IT skills needed for Hackathons	Being able to make a point about a matter of concern; transparency and accountability	Partially: only in the case of Hackathons
		3 - CITIZENS AS NEIGHBORHOOD INNOVATORS (gather information, perspectives; define issues)	Urban Living Labs; Technology Testbeds; Innovation Districts	Smart Kalasatama (Helsinki); CityZEN (Amsterdam)	Medium: being resident to the Living Lab neighborhood	Impact on the neighborhood; financial incentives; environmental consciousness	Partially: not necessarily in the case of Smart Home/ Smart Grid projects
	Design by citizens	4 - CITIZENS AS IDEA GENERATORS AND BUDGETERS (task ideas, seek advice)	Crowdsourcing ideas and services; Participatory budgeting and policy making	Madame Mayor, I have an idea (Paris); Smart Citizens Lab (Amsterdam); Better Reykjavik	Medium: when workshops are organized by the city and guidance is given on how to use the technology	Citizen empowerment; YIMBY mentality; influencing city planning and budgeting	Partially: only in combination with labs/ workshops
		5 - CITIZENS AS COLLABORATORS AND PROJECT PARTNERS (ongoing involvement)	Co-design; Co-creation	OrganiCty (EU project); The Citizen Lab (Milton Keynes)	High: due to continuous participation process high amount of time resources needed	Realization of one's own ideas and technology solutions	Yes: increasing social capital possible; mix of digital/ non-digital formats

Figure 1 Systematisation of Smart Cities Types

According to the author, only the last two categories: citizens as idea generators and budgeters; and citizens as collaborators and project partners, really enable to implement co-creation processes by playing an active role within the innovation process (von Hippel, 2005). Indeed, the others tend to assign a passive role to citizens with the only aim to inform and educate them, gather information or at maximum raise issues (this category is crossing the boundaries of the two categories namely design with and design by citizens). In this perspective, the product or service is not developed personally by citizens, but for the citizens or with the citizens, acting as testers of prototypes. Indeed, the main benefit of implementing co-creation practices is an increase of trust in governmental institutions (Richard et al., 2004), as the citizens are more informed about the public activities (Hilgers and Ihl, 2010). According to Auh et al. (2007), co-creation enables also companies and public governments to effectively increase the access to market, reduce timing and risks, and consequently improve customer loyalty.

It should be considered also that co-design and co-production are two specific phases within the co-creation process and should not be seen as completely different activities.

By taking into account these approaches and the specificities of Smart Cities projects, which main objectives are to inform citizens, create together and then execute the proposals, we can define the following steps as complementary for the effective implementation of co-creation practices:

- *Step 1: Co-Analysis*

The first step aims to define the objectives to be achieved by implementing a co-creation process. This includes taking into account the approach to select the group that should be involved in the co-creation activity and also the tools we plan to put in place. This last process is strictly related to the stakeholders' needs we want to address and to the specificities of the citizens that will be engaged. Already during this phase, it is required to be clear about the expectations, roles and responsibilities of citizens.

- *Step 2: Co-design*

Citizens are asked to share their vision, generate new ideas that can be selected for being further exploited during the co-production step and for initial specifications. The co-design approach can be applied also to services that need to be reshaped or improved. Within the Smart Cities context, co-design can be horizontal, engaging for example different municipalities in a same city or different regions in several cities. Vertical co-design can also be applied when stakeholders are involved in both way from up and down the service delivery chain including top management, departments, citizens, etc. The co-design phase requires to implement data collection processes providing suggestions and discussing them among citizens.

- *Step 4: Co-evaluation*

The fourth step aims to assess the efficacy and effectiveness of the proposed solutions. Citizens support cities to evaluate the potential impacts of products/services on the society, by taking into account mainly social issues. However, also pricing strategies and the applicability of potential business models can be further exploited through this approach. This phase includes also testing products and services with stakeholders (e.g. utilities, suppliers and customers), which have the specific background information and knowledge required for evaluating such results.

- *Step 5: Co-implementation*

During this phase, the project takes its final shape and real results are occurring. This step should be aligned with the co-design and co-production ones, in order to meet the requirements identified in step 2. By co-evaluating the products/services with current stakeholders, before the co-implementation phase, it is necessary to ensure the real usage and impact of the solutions developed. This is even more true in the smart cities context,

where products and services are designed for and with the society, which is playing an active role throughout the entire open innovation process.

The previously explained co-creation lifecycle is already implemented also by the U4IoT CSA (www.u4iot.eu) aiming to support the LSPS projects funded in the same call of SynchroniCity (<http://stembertdesign.com/cocreation-and-the-iot.html>).

2.2 PARTICIPATORY DESIGN VS. CO-CREATION

Participatory design is a process focused on the definition of a service idea implemented together with stakeholders to provide a service ready to be used. In more traditional view on participatory design, stakeholders tend to be involved in the process only as testers in the prototype phase. This process has been evolved since 80's, as shown by the following figure, from customers to users in 90's, from participants to co-creators until today (Sanders, 2005).

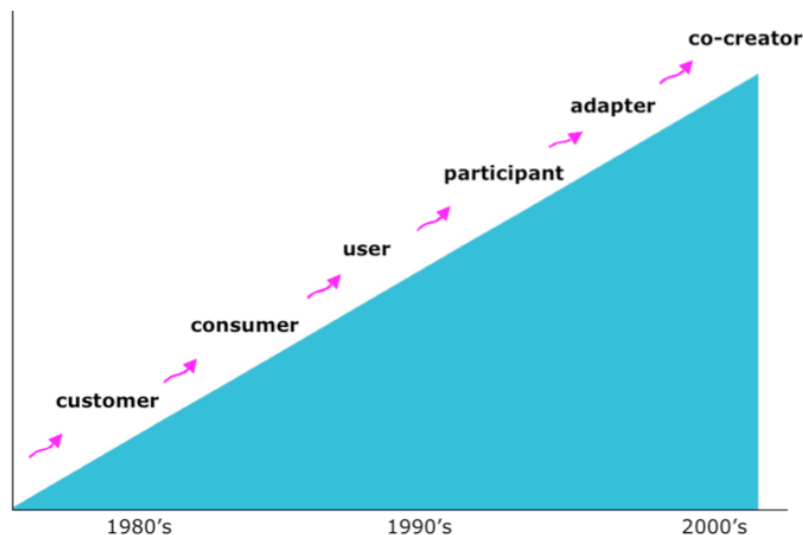


Figure 2 Changes in the way we think about people within the design process

The participatory design theory has then advanced thanks to the Scandinavian School, supporting the idea that through a participatory design approach we do not design things as objects, but socio-material assemblies, real things (Ehn, 2008; Björgvinsson, Ehn & Hillgren 2010; Emilson, Serravalli & Hillgren 2011). Co-creation has emerged for sure in connection

with the participatory design and human-centred design approaches, where the attention was focused on empowering people for decision making processes and working practices. In participatory design, people are contributing to the design processes, for this reason the connection with co-creation is strong and sometimes misleading. However, within the participatory design approach, co-creation is only seen as one of the strategies that can be applied in this context in order to increase effectiveness, especially within social innovation contexts (Cantù et al., 2013), rather than an autonomous process. Moreover, often in the participatory approach, co-creation is subordinated to co-design, to which a more relevant role is assigned, representing the collaboration process. Undoubtedly, co-creation differs from participatory design and public participation, and is especially relevant when governments require public involvement. By applying co-creative techniques, the focus should be on people as proactive citizens, rather than as consumers of services. The process is more related to the engagement of different communities, rather than only to some users in a group (Leading cities, 2012). In this context, co-creation is seen as the only effective way to support governments to be more responsive to citizens' needs and to increase effectiveness and efficiency of cities (Percy, 1984). In contrast, participatory design is managed by design experts acting as facilitators, rather than empowering citizens to make decisions for governments in the first place and be active contributors in the service development process (Langley, 2016).

2.3 ENGAGEMENT VS. EMPOWERMENT

Using digital tools to gather feedback from citizens requires more actions to them and also to change the usual engagement perspective provided by governments in the past twenty years. Indeed, according to the survey submitted by the Intelligence Unit of The Economist on "empowering cities" (2016), to 1,950 citizens and 615 business executives in 12 cities around the world (Barcelona, Berlin, Buenos Aires, Chicago, London, Los Angeles, Mexico City, New York City, Rio de Janeiro, Shanghai, Singapore and Toronto), the majority of citizens (51%) requires a wider access to digital platforms enabling them to communicate with governments, but only a small part of them (32%) is actively providing feedback on local issues. Business is more prompt to activate this process, especially within the context of improving urban infrastructures (41% of business executives and companies). What citizens and business both share is the need to find new communication channels and processes to enable them to participate in smart city initiatives. Transparency and trust are generally still considered to be the main concerns slowing the engagement process. Within the smart city context, is clear that empowering citizens can contribute to concretely solve this issue. Undoubtedly, enabling them to adequately play an active role in shaping the cities of the future, has a huge impact also on citizens' behavior, transforming the relationship between cities and governments. Within this process, citizens should not be seen only as real time

data providers, on the contrary they can really extract and provide added value from data to be used for improving decision making processes and governmental digital services. One example of this approach cited by the authors is related to the alternative transportation services in Singapore. The Beeline app (<https://www.beeline.sg/>) enables citizens to book seats on private buses in zones of the city where public transportation is not available, but they also suggest routes. The app developed by the Infocomm Development Authority of Singapore is currently being used to predict buses demand and improve schedules. This example shows the differences between the “engagement” and the “empowerment” approach. In the first case the citizens are mainly involved in governmental practices to share feedback, instead, by implementing the second process, citizens are the first actors of a smart city in generating economic and social impacts for the benefit of the society. Businesses have recognised the relevance of the new role played by citizens in smart cities, also in terms of attracting and retaining top talents (53% of business executives support that), this is especially relevant for enabling governments to nurture economic vitality within and for the cities.

2.4 SMART CITIZENSHIP AND “CITIZENSOURCING” FOR POLICY MAKING

The concept of *Smart Citizenship* assigns the capability of smart cities to support the citizens to recognise their position not only in a community (as in the traditional framework), but also in a network. This process requires the citizens to provide feedback and establish different connections in this complex context (Martelli, 2017). However, in order to enable them to activate this bidirectional approach and create new services, cities should yield them all the necessary tools. The smart citizenship approach focuses on the power of citizens, rather than on the impact of technologies, which are then seen only as an instrument for allowing them to shape new urban environments, defining policy and development processes, to take positive actions for an effective change of the society.

According to the smart citizens’ manifesto, the most relevant role of citizens is in supporting cities to improve their quality of life by refusing to be mere consumers or informers to decision makers (Hemment and Townsend, 2013). This document is the first attempt for smart citizens to claim for a prominent role in taking responsibility for their cities and adding value to technology by working together with governments. The manifesto recognises the usual skepticism of citizens to implement collaborative and co-creation practices with municipalities. In contrast, the Director of the Waag Society and the first promoter of the manifesto, supports the need to implement this change: “*citizens have to redefine what “government” actually means. We ARE our government*” (Kresin, 2013)¹. The manifesto

¹ <http://waag.org/en/blog/manifesto-smart-citizens>

upholds a previous study introducing the “*citizensourcing*” concept defined as a process originally performed by a public agent and now outsourced to large groups of people through open calls within the whole lifecycle of an initiative (Hilgers and Ihl, 2010). Citizens are acting as policy makers, often providing ideas that really improve the governmental policies (Newig, 2007), thus enhancing their adoption, since they include an analysis of users’ needs (Reed et al., 2007). Citizensourcing has been also seen in the literature as a process called *e-participation* and enabled by the new technologies for improving deliberative democracy and increasing government transparency (Prest, 2012). One example of a “citizensourcing” approach has been implemented by FixMyStreet (<https://www.fixmystreet.com>), through which citizens are invited to report problems to the government, which is assigned to answer them in a short time frame. This successful model is currently used by several cities throughout Europe.

3 GENERAL PRINCIPLES OF CO-CREATING WITH USERS

This chapter provides an overview of the central concepts related to co-creating innovation within a Smart Cities IoT-based context. We describe here the philosophy of open innovation, open source and open sensors, the role of Living Labs in the innovation process and why including a stakeholder engagement analysis before implementing co-creation processes is so relevant within the SynchroniCity framework.

3.1 PHILOSOPHY OF OPEN INNOVATION

Open innovation is a widely accepted concept both in academic and in business contexts. This is confirmed by the fact that searching the term in Google Scholar it shows 1.490.000 results. The topic has been one of the most discussed, especially within the innovation management literature in relation to economics, psychology, sociology and culture (Huizingh, 2011). The first definition of open innovation has been provided by Chesbrough (2003): *“Open innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market during the Closed Innovation Era”*. However, the concept is not totally new, it is derived from literature mostly in 70s on customer and user-driven innovation, open systems and open paradigms (Von Hippel, 2005; Selden and MacMillan, 2006).

Usually open innovation is referred to the business world and it is often related to companies and technological markets. Indeed, the open innovation concept has been applied to smart cities projects only recently (Schaffers et al. 2011) to be closely linked to innovation systems at national and regional level (Savitskaya and Torkkeli, 2011), as an application to open innovation platforms (Frey, Lüthje and Haag, 2011) and in public policies (De Jong, Kalvet and Vanhaverbeke, 2010). From this first analysis, Open Innovation has been continuously investigated also referred to the capability of generating new public policies for governments around the world and implementing open source software. More concretely, open data and open government processes have been implemented in Europe as a strategy in cities to create socio-economic value for citizens. Linked to this concept, is the open sensor networks ones, especially applied to different frameworks, such as energy, environment, mobility and healthcare. The sensors are usually distributed as autonomous nodes collecting data and monitoring environmental conditions (temperature, humidity, light, air quality, etc). By

implementing sensors and analysing data gathered, it is possible to advance the collaborative process with users, developers and citizens to create new efficient systems (Römer and Mattern, 2004). However, implementing open data policies requires to adopt also transparency and accountability ones, in order to effectively share knowledge with citizens and support the public sector and social innovation approaches through a bottom-up approach. Indeed, according to the European Commission (2016), within smart cities, open innovation can only be realised if the prerequisites of innovation are taken into account, as from the figure 3. Open innovation at all levels can only be exploited if within smart cities initiatives both open knowledge, data, access and connectivity are implemented. Collaboration should be activated by following the ‘quadruple helix structure’ including citizens, industry, knowledge institutions and municipalities (Arnkil et al., 2010). Within this framework, the IoT infrastructure enables citizens to gain ownership on their data, to consequently promote smart cities’ innovation.

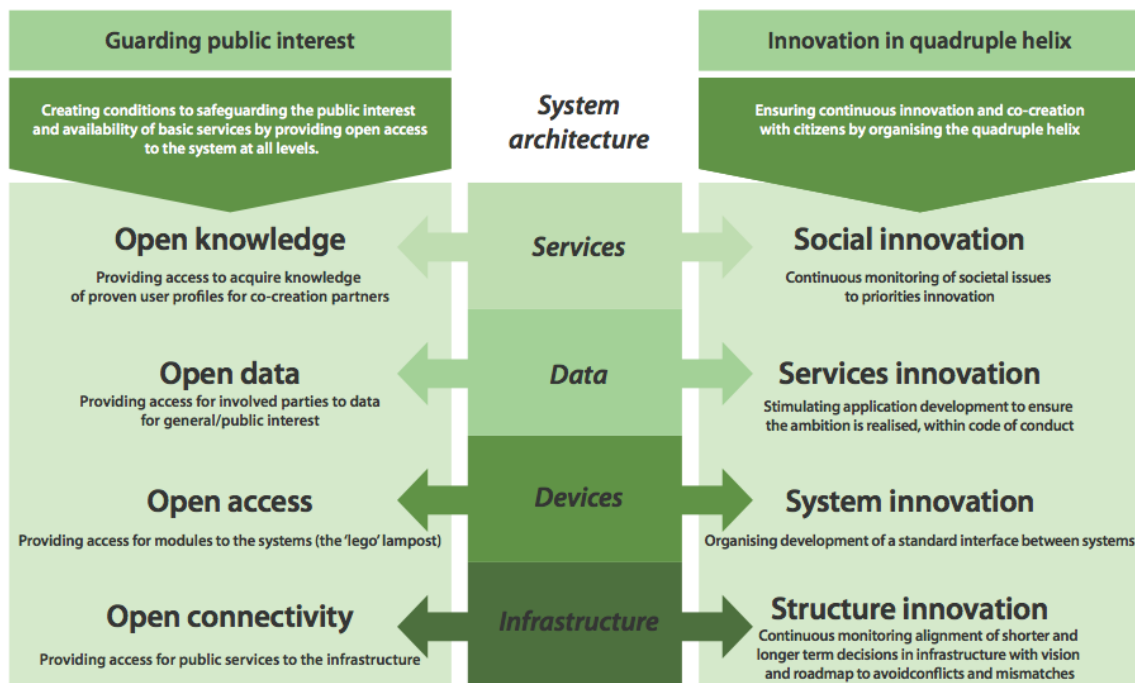


Figure 3 Prerequisites of innovation

3.2 THE ROLE OF LIVING LABS IN THE INNOVATION PROCESS

The Living Lab term emerged in the beginning of 2000 (Markopoulos and Rauterberg 2000). Originally the concept of Living Labs has been arisen in USA within the artificial lab context to describe a research facility implemented as a real home with the objective to provide observations of individuals (Intille et al. 2005).

In Europe, the concept of Living Labs is often connected to both open innovation and user innovation (Schuurman and De Marez, 2012). The dynamics of the everyday life are part of the innovation experiment to co-create new products and services (Eriksson et al., 2005; Ballon et al., 2007; Schuurman et al., 2013). Indeed, according to Prof. Ballon, a living lab is: *“a real-life test and experimentation environment where users and co-producers create innovations in a trusted, open ecosystem that enables business innovation”* (Ballon, 2015). Living Labs usually exploit a four steps approach based on contextualisation, concretisation, implementation and feedback gathering. The first phase aims to describe the framework and identify the group of users to involve in the analysis. The concretisation step is defined by the users' perception and their behavior. During the implementation phase, the users are involved in the co-creation process. In the last step, users are requested to provide their opinions on the experience in order to evaluate the change of attitudes and perceptions in relation to the products and services developed.

Within smart cities and IoT projects, Living Lab strategies can be implemented to enable users to deploy real-life experiments involving large scale panels, including both the public and private sector. This approach has a huge impact in terms of acceptance and adoption of the solutions proposed and consequently aims to stimulate a more accurate market potential by exploiting the full potential of local innovation opportunities. Five key principles guide Living Labs: continuity, openness, realism, empowerment of users and spontaneity (CoreLabs, 2007). Empowerment of users is confirmed to be one of the most relevant, together with realism, as the main objective of Living Labs is to involve its users to participate in a real process of adding value to existing technologies or exploiting new products and services. This is mostly important in the context of smart cities, as explained in section 2.3 and is strictly connected to participatory design (as in section 2.2). Effective results of the collaboration between smart cities and living labs have been achieved already, for example by SmartSantander, which has created a huge amount of common assets made available to communities through an online catalogue (Schaffer et al., 2011). User involvement is stimulated in parallel with open innovation through specific agreements relying on clear IPRs

and ownership agreements. By exploiting living lab methodologies, different cooperation models have been applied to SmartSantander to improve the effectiveness of services and technologies developed or tested.

3.3 STAKEHOLDERS' ENGAGEMENT STRATEGIES

Stakeholders' engagement is a priority when considering to involve citizens in co-creation processes. The stakeholder engagement strategy should consider the entire set of actors that could be potentially interested in contributing to improve or develop new services for governmental departments of cities. Stakeholder is any individual or group who has an interest in the outcome of an action provided by an organisation or a company. According to Hitt et al. (2001), the term emerged in 60s' as a result of a study developed at Stanford Research Institute, investigating the need to *"to understand the concerns of shareholders, employees, lenders and suppliers, in order to develop objectives that stakeholders could support"*.

Taking into account the smart cities framework, this includes both internal stakeholders and external stakeholders. The first category is made by citizens directly affected by the actions and who can play a relevant role in supporting the cities to implement changes or exploiting new services. The second category considers all the partners that are not directly affected by the changing strategies, but that is indirectly impacted, such as interest groups, private sectors, funders and clients.

First Botan and Hazleton (1989), and then Grunig (1992), they have revealed the importance of exploiting a two-way symmetrical communication approach to involve stakeholders in playing an active role in decision making practices for organisations. Usually, stakeholder engagement is also employed by institutions companies to define and trigger organisational changes at strategy level, this is the case of the "systematic approach" Eden and Ackerman, (1998). The main benefits of stakeholder engagement are: the ability to develop more effective policies and programs, reduce the time needed to deliver a service and increase its applicability in real use cases, consequently this has a huge impact also at communication and economic level. Greater collaboration among internal and external stakeholders increases also the level of trust of citizens for institutional services and enhance community confidence in governmental processes.

The first step to draft a stakeholder engagement strategy is to identify the level of stakeholder engagement for governments, business or institutions within their organisational strategy. According to the Western and Pacific Child Welfare Implementation Center (2013),

which is developing and applying tools for stakeholder engagement, there are mainly four levels of stakeholders' participation:

- **Inform:** is a one-way mean of communication to provide data to stakeholders from top down and to report decisions.
- **Consult:** stakeholders provide feedback on proposals or actions, but it is not required these data will be taken into account in the final decision making process.
- **Involve:** stakeholders propose actions that have a real implementation in the decision making process, but they are not part of the entire process, the organisation do not share their entire vision with stakeholders.
- **Collaborate/empower:** stakeholders are part of the whole complex process and have all the necessary information to actively collaborate with the organisation to implement new processes, develop new actions and the goals are shared with them since the beginning of their involvement.

Starting from the analysis of the engagement level to apply to each project, it is possible to exploit the different phases of the stakeholder engagement strategy, which are:

1. **Plan and design:** consisting of identifying goals and outcomes to deploy and create a work plan considering the entire engagement process, drafting a timeline and identifying the resources required. This process includes to conduct a stakeholder analysis to identify key stakeholders, assess their interest and potential contribution in terms of collaboration, define the level/s of stakeholders engagement desired.
2. **Internal engagement and capacity building:** organise a team, a task force or a working group for helping stakeholders in running the activities and assess if they are achieving the goals drafted in the previous step (this activity is developed by a specific implementation team).
3. **Listen and engage:** this phase is focused on increasing the level of trust in public services and is developed by running meetings among stakeholders and governments. Facilitating these meetings correctly is the most important objective of this phase. It is also relevant to identify the relationships it is needed to be implemented among stakeholders and the facilitator.
4. **Synthesize and strategize:** this step request to gather a huge amount of information acquired during the previous phases and to define a set of recommendations for future implementation of stakeholders engagement processes. This should include also an analysis on how to improve the approach and to better support stakeholders in collaborating with organisations and/or administrations.
5. **Reflect and affirm:** this is the process for feedback gathering in order to align the strategies according to the opinions of the stakeholders. This process is also aimed to identify which of the previously identified recommendations are relevant for them and should be better exploited or considered.

6. **Finalize the strategy:** the main objective of this step is to identify the actions to put forward as a result of the consultation with the stakeholders defining goals, needs and the expected time-frame of the results. This step actively engages stakeholders in designing a common action plan together with organisations and governments.
7. **Adopt and launch:** once the strategy is shared and delineated together with stakeholders, the action points have to be communicated with the general public and an implementation plan should be drafted, including a sustainability strategy.
8. **Evaluate and improve:** this step involves stakeholders in the assessment of the results achieved through the engagement strategy and measures effective and real impacts produced.

This stakeholder engagement methodology is aligned with the smart cities context, since it has been successfully applied to large scale pilots in cities' and governmental environments. The steps previously described constitute a baseline for implementing co-creation processes.

4 CO-CREATION METHODS AND TOOLS IN A SMART CITY

Starting from the analysis of the literature on co-creation in a smart city context, previously described in both Chapter 1 and Chapter 2, we have identified a set of methodologies that can be specifically applied to smart cities projects, since the analysis of this particular environment is still rather scarce in the literature. This analysis has been developed taking into account the characteristics of the services and products that can be generated by implementing IoT infrastructures, considering also the specificities of the SynchroniCity project. We provide below a series of 'factsheets' guiding the reader to identify the approach implemented by each methodology, the context, reasons to apply it and the process to follow. The guiding principles have been selected and presented to the Reference Zones involved in SynchroniCity through an online questionnaire and in-depth interviews, which results are included in Chapter 6, and constitute the baseline for presenting to each city the methodologies and tools to apply to its specific context.

It is relevant to clearly define what is a methodology and what is a tool in the co-creation process for the SynchroniCity project. Indeed, a **methodology** is the systematic and theoretical framework guiding the whole co-creation approach. A **tool** is the instrument used to practically exploit the co-creation process within different phases.

In order to better identify the tools to apply, we provide also a short description of each tool applied to the methodologies selected, as relevant for a Smart City (IoT) context.

- **Social media:** within the co-creation process, these are relevant for gathering feedback from the stakeholders during the co-evaluation and co-implementation phase. Social media also contribute to generate public values about services that have been yet defined and are entering the market.
- **Mobile contribution (apps):** they enable citizens and stakeholders to collaboratively share open data and create innovative products/services, by incubating innovation capacity. Apps involve a large number of citizens and enable them to actively participate, especially in the co-analysis phase.
- **Visual collaboration maps and mind maps:** it supports the users to visualise information, especially during brainstorming processes with large groups of actors, and quickly exploit a topic.

- **Toolkits (sensors, pictures and sharing results, etc.):** on the market there are different co-creation toolkits providing data, presenting images and concepts relevant for the brainstorming process and the co-design phase, via a website that can be easily accessible by the stakeholders.
- **Crowdmapping:** it aggregates crowd-generated contents in a social media platform, by analysing the text messages and feeds. It is useful to provide information on real-time data and connections on a social network.
- **Rating and voting:** this system enables to evaluate actual or potential services/products designed in the co-analysis and co-design phase.
- **Mock-ups:** a model or replica of a technology or a product/service, providing mainly information on its structure, used for instructional or experimental purposes.
- **Issue cards:** a physical instrument showing an insight, a picture or a description of the current situation, to support the users involved to express their different viewpoints and provide solutions to the problems.
- **Affinity Diagram:** it is a brainstorming tool presenting a series of facts, ideas, or data on a certain general theme and organizing it into clusters based on their natural relationship or affinity. It is the first step of a cause-effect analysis.
- **Character profiles:** it is an instrument for describing the personality and characteristics of a character that could potentially be the user of the services and products developed through co-creation practices. This tool lists also the activities, potential fears in adopting such products and services, and why this issue can be raised.
- **Storyboard:** it is a graphic representation of the final product/service, supporting the user to express and share the vision behind the final result of the co-design process. It aims to setting up plans to be used in the co-implementation phase.
- **Motivation Matrix:** this tool enables to focus on the different motivations of the users or clusters of customers when making a purchasing decision. It requires a clear understanding of the market.

4.1 PERSONAS

Methodology	Personas
Short description	This method is focused on using the everyday experiences of the users and their needs as a starting point when developing new

	products. This does not include real users but instead their representations. This leads to inclusion of the users' perspective in all aspects of the design process
Objectives	• Engage stakeholders (incl. citizens) • Create new services • Create new products • Generate public values • Transfer and sustainable conservation of implicit knowledge
Typologies of stakeholders	• Citizens • Industry • Public sector • Utilities • Suppliers
Level of engagement (phase)	Co-analysis and co-design
Tasks	Brainstorming processes, selection and evaluation of concepts, implementations, identifying future strategies
Tools	Issue cards, affinity diagram, character profiles
Reward systems	None
Success factors	• Improved services/products adoption measures • Increased efficiency • Improved effectiveness • Repeated use of co-created services and products • Improved quality of data collected
References	Browne et al., 2008; Nielsen, 2011

4.2 LEGO SERIOUS PLAY™

Methodology	Lego serious Play™
Short description	It is a methodology aimed at identifying the positioning of a new service offer within a specific team. It enables to start a dialogue within a group on the potential exploitation of a service at early stages of development
Objectives	• Identify stakeholders needs • create new services • create new products • generate public values • support communities of practice • transfer and sustainable conservation of implicit knowledge • improve communication processes
Typologies of stakeholders	• Citizens • service providers • utilities • industry • public sector • suppliers
Level of engagement (phase)	Co-analysis and co-design
Tasks	Identifying new processes in the service/product development phase, new organisational practices, generating ideas on novel products and on brainstorming processes
Tools	Issue cards, character profiles, affinity diagram
Reward systems	None

Success factors	• Improved innovation capabilities • increased efficiency • increased effectiveness • improved sustainability of solutions • repeated use of co-created services
References	Cantoni et al., 2009

4.3 GAMIFICATION

Methodology	Gamification
Short description	A process of enhancing a service through gameful experiences supporting users' overall value creation bringing implicit knowledge and maintaining users' engagement over time
Objectives	• Create new services • Create new products • Increase efficiency of services • Increase effectiveness of services • Create a sense of ownership with stakeholders (incl. citizens)
Typologies of stakeholders	• Citizens • Customers
Level of engagement (phase)	Co-design
Tasks	Identifying new processes in the service/product development phase, generating ideas on novel products/services, evaluation of concepts, implementations, transferring implicit and/or organisational knowledge

Tools	Social media, issue cards, apps, affinity diagram
Reward systems	Monetary prizes and professional recognition
Success factors	• Increased numbers of people participating in cities' co-creation processes • improved user satisfaction measures • improved services/products adoption measures • improved innovation capabilities • increased efficiency • improved effectiveness • increased provision of cost-efficient solutions
References	Adams, 2009; Cofini et al., 2012; Deterding et al., 2011; Huotari and Hamari, 2012; Kumar, 2013;

4.4 BODYSTORMING

Methodology	Bodystorming
Short description	It is a technique to physically experience a situation and deriving new ideas. It requires setting up an experience and physically implementing it, by providing feedback
Objectives	• Identify stakeholder needs • Engage stakeholders (incl. citizens) • Create new services • Create new products • Transfer and sustainable conservation of implicit knowledge
Typologies of stakeholders	• Citizens • Public sector • Research

	• Service providers
Level of engagement (phase)	Co-analysis and co-design
Tasks	Generating ideas on novel products/services, selection of concepts, providing comments on potential services/products, identifying future strategies
Tools	Character profiles, storyboard, issue cards
Reward systems	Monetary prizes
Success factors	• Increased numbers of people participating in cities co-creation processes • improved innovation capabilities • improved quality of data collected
References	Oulasvirta et al., 2003; Klein et al., 2006; Simsarian, 2003

4.5 APPRAISAL INTERVIEWS

Methodology	Appraisal interviews
Short description	This method aims to evaluate past performances of an activity developed within a group and identify areas of further improvement. Usually it is exploited as a formal discussion process between an employee and his/her manager. This approach can be transferred through a reversed process among citizens and public bodies/industry

Objectives	• Advance available services • Increase efficiency of services • Increase effectiveness of services • Provide financial and economic sustainability
Typologies of stakeholders	• Citizens • Service providers • Industry • Utilities • Public sector
Level of engagement (phase)	Co-evaluation and co-implementation
Tasks	Establishing performance evaluation standards
Tools	Social Media, visual collaboration maps and mind maps, toolkits
Reward systems	Create jobs, professional recognition, monetary prizes
Success factors	• Improved collaboration among different departments in a city • improved user satisfaction measures • improved services/products adoption measures and innovation capabilities • increased efficiency and effectiveness • increased provision of cost-efficient solutions • improved sustainability of solutions
References	Grote et al., 1996; Nonaka and Takeuchi, 1997; Probst et al., 2000

4.6 BASIS SWOT WORKSHOPS

Methodology	Basis SWOT workshops
Short description	This is a methodology used in bottom-up strategy development processes with different and heterogeneous stakeholder groups, especially in contexts involving regional or municipality strategy development. It helps to collect and visualise data that describe the actual situation of a group
Objectives	• Identify stakeholder needs and engage them • Increase trust on governmental services • Generate public values • Increase efficiency and effectiveness of services • Provide financial and economical sustainability of services
Typologies of stakeholders	• Citizens • Public sector • Customers
Level of engagement (phase)	Co-evaluation and co-implementation
Tasks	Governance: making sure the eco-system is reliable, trustworthy, and protects citizens, identifying future strategies and evaluating implementations of products/services
Tools	Toolkits, mock-ups, issue cards, motivation matrix
Reward systems	Community and professional recognition
Success factors	• Increased collaboration across cities and/or among different departments in a city • increased numbers of people participating in cities co-creation processes

	• improved user satisfaction measures • improved service/product adoption measures • increased efficiency and improved effectiveness • improved innovation capabilities
References	Schweikert S. et al., 2007

4.7 STRATEGIC ROADMAPS

Methodology	Strategic roadmaps
Short description	This method is focused on gathering and visualising insights of participants on which knowledge management processes may imply for the stakeholders and on how some knowledge indicators may be explained and used to increase their benefits. It provides also the pathways to achieve a desired state from a current state
Objectives	• Identify stakeholder needs • Raise the level of awareness on different topics • Generate public values • Increase efficiency and effectiveness of services • Provide financial and economical sustainability
Typologies of stakeholders	• Citizens • Customers • Industry • Research • Service providers • Public sector
Level of engagement (phase)	Co-analysis, co-evaluation and co-implementation

Tasks	Evaluation and selection of concepts, implementations
Tools	Visual collaboration maps and mindmaps, issue cards, affinity diagram, motivation matrix
Reward systems	None
Success factors	• Increased efficiency • improved effectiveness • increased provision of cost-efficient solutions • improved sustainability of solutions
References	CABA, 2002; FIATECH, 2004; IMTI, 2000; Ribak and Schaggers, 2003; Strategis, 2007; Kazi, Hannus and Zarli, 2003, ROADCON, 2003

4.8 SOCIAL NETWORK ANALYSIS

Methodology	Social network analysis
Short description	This method aims to identify, examine and support processes of knowledge sharing in social networks and provides suggestions for practical interventions to influence network actors, their relationships, and network structure to improve knowledge sharing between individuals, groups, and organisations
Objectives	• Support communities of practice • Transfer and sustainable conservation of implicit knowledge • Improve communication processes
Typologies of stakeholders	• Citizens • Customers • Industry

Level of engagement (phase)	Co-evaluation and co-implementation
Tasks	Supporting communities of practice, transferring implicit and/or organisational knowledge
Tools	Social media and crowdmapping
Reward systems	Community recognition
Success factors	• Improved user satisfaction measures • improved quality of data collected
References	Scott, 1991; Wasserman and Faust, 1994; Wellman and Berkowitz, 1988; Müller-Prothmann, 2005 and 2006

4.9 ROLE PLAY

Methodology	Role Play
Short description	This methodology aims to involve customers and/or designers to perform a hypothetical service experience and then build a potential journey through some of its future functionalities and main characteristics
Objectives	• Engage stakeholders (incl.citizens) • advance available services/products • transfer and sustainable conservation of implicit knowledge • increase efficiency of services • increase effectiveness of services • provide financial and economical sustainability of services

Typologies of stakeholders	• Citizens • customers • competitors
Level of engagement (phase)	Co-evaluation and co-implementation
Tasks	Evaluation of concepts and their implementations, establishing performance evaluation standards, transferring implicit and/or organisational knowledge
Tools	Character profiles, storyboard, issue cards
Reward systems	Monetary prizes
Success factors	• Improved user satisfaction measures • improved services/products adoption measures • increased efficiency • improved effectiveness • increased provision of cost-efficient solutions • improved sustainability of solutions
References	Buchenau & Fulton Suri, 2000; Simsarian, 2003; Svanaes & Seland, 2004; Arvola & artman, 2006

4.10 LIVING LAB

Methodology	Living Lab
Short description	It is a methodology to implement real-life experimentation processes where stakeholders co-design innovative products and services. In this process can be involved both the public and private sector, also to use effective products/services and evaluate the results of the innovation activities developed
Objectives	• Identify stakeholder needs • Engage stakeholders • Integrate available services/products • Advance available services/products • Increase efficiency of services • Increase effectiveness of services • Provide economic sustainability • Raise the level of awareness on different topics • Generate public values
Typologies of stakeholders	• Citizens • industry • customers • public sector • utilities • researchers
Level of engagement (phase)	Co-analysis, co-design and co-evaluation
Tasks	Providing comments on services/products, Identifying new processes in the service/product development phase, generating ideas on novel products/services, brainstorming processes, establishing performance evaluation standards
Tools	Visual collaboration maps and mind maps, mock-ups, issue cards, motivation matrix
Reward systems	Community recognition, monetary prizes

Success factors	• Increased numbers of people participating in cities co-creation processes • improved user satisfaction measures • improved services/products adoption measures • improved innovation capabilities • increased efficiency and effectiveness • repeated use of co-created services and products
References	Markopoulos and Rauterberg, 2000; Intille et al., 2005, Schuurman and De Marez, 2012; Eriksson et al., 2005; Ballon et al., 2007; Ballon 2015; Schuurman et al., 2013

5 EMPOWERMENT PROFILES OF THE REFERENCE ZONES

This chapter aims to support the Reference Zones involved in SynchroniCity to have a clear picture of the methodologies and tools used by the cities to implement co-creation activities within their specific environment. For each Reference Zone, a set of infographic cards are included, in order to visualise the methodologies that have been applied by the cities, and to suggest them to use the related tools, according to specific phases of the co-creation lifecycle. The cards are the result of data gathered through an online questionnaire and one-to-one interviews with each of the reference zones, regarding their experience of using co-creation.

The questionnaire is available in Appendix 1 and investigates the same categories previously presented in the factsheets in Chapter 4, as guiding principles for supporting the cities to implement effective co-creation approaches. These include:

- Objectives to achieve.
- Types of stakeholders involved or to involve.
- Level of engagement (phase).
- Methodologies already in place.
- Tasks to assign to the stakeholders.
- Tools yet adopted or not.
- Any potential rewarding system.
- Success factors to evaluate the results of the co-creation process

The final objective of the Chapter is to provide guidelines to the Reference Zones in order to best apply co-creation methodologies and tools, taking into account their specificities.

5.1 RESULTS FROM THE QUESTIONNAIRE AND THE INTERVIEWS

The questionnaire is short and required only an introductory level of information to not overwhelm the Reference Zones with unnecessary information, also considering that some cities may not have yet put in place co-creation processes at this time.

The questionnaire has been available online for the Reference Zones of SynchroniCity at the following link <https://www.surveymonkey.com/r/5D2T3V3> from May 2, 2017 until June 6 and was sent to 8 Cities' Leads.

The questionnaire is based on 11 open and closed questions. The first set of questions has been provided to understand previous experiences with co-creation. The second part is focused on the set of baseline topics derived from the co-creation factsheets and also to provide the possibility for the cities to add more information on other methodologies, tools and topics that have not been included yet. This approach has helped us to better refine the co-creation factsheets for the Reference Zones and to identify the relevant topics to better investigate within the in-depth interviews. In total all of the 8 cities have replied to the questionnaire, by providing relevant information in terms of previous involvement in co-creation practices and methodologies used.

The results from the online questionnaire have been useful for better understanding at what stage of the project cities are using co-creation and what methodologies are already in place, their main objectives, the tools and the rewarding systems used, and the current phases of development. However, several cities have declared to use some methodologies that in the literature do not apply to a specific phase (e.g. Appraisal interviews during co-analysis, which indeed should be applied during co-evaluation and co-implementation) or have not considered other ones that can best serve their co-creation needs. Through these in depth interviews, we have discussed with the Reference Zones their replies to the questionnaire and proposed to the cities the application of other methodologies.

Co-creation experience

The results from the questionnaire have clearly shown a **medium to high level** of experience of the reference zones within this context. All the cities have already put in place at least one co-creation activity. Indeed, also through the interviews, it emerged clearly that cities have very different experiences and knowledge about co-creation and this should be carefully taken into account to provide the right support to everyone. Specifically, **Antwerpen, Eindhoven, Porto, Milan** and **Santander** use co-creation often, not only for involving the citizens, but also all the stakeholders involved in the process, such as public and private companies, academia, suppliers, utilities, service providers and so on. **Helsinki** implements co-creation approaches all the time for developing digital services and for urban planning. **Carouge** and **Manchester** have less experience but are very interested in exploiting more co-creation methodologies for their use cases within the SynchroniCity project.

Use of co-creation

All the cities have declared to use co-creation mainly to **engage their stakeholders**, including citizens. Seven out of the eight cities have declared co-creation is important also for **creating new services** and **increasing the efficiency** of already existing products.

Timing

Co-creation is mostly implemented for the **co-design** phase and this reflects the need of the reference zones to implement such processes for service and product development.

Stakeholders involved

Citizens and **industry** are always engaged in co-creation activities organised by the reference zones, but also **utilities** are often the main stakeholders, especially in terms of urban planning.

Activities in which the citizens take part

All the cities use co-creation for **brainstorming processes** and six out of the eight projects implement these approaches to generate ideas on novel solutions, evaluate new concepts and to improve the governance framework within their municipalities.

Rewarding systems

Cities favor **community recognition** to reward their stakeholders to participate in co-creation activities, together with **virtual prizes**. Offering new jobs is not very applied as a rewarding system.

Co-creation methodologies used

It is impressive to detect that all the cities are currently using **Living labs** as the main methodology for co-creation activities. Five cities are also implementing **Personas**, **Gamification**, **Appraisal interviews**, **Basis SWOT workshops** and **Strategic roadmaps**.

Co-creation tools

Even if Social Network Analysis as a co-creation methodology is applied only by one city, almost all the reference zones (seven out of eight) have declared to use **social media** as a main tool for co-creating with the users. **Apps** and specific **toolkits** implemented by the cities (including sensors) are also used.

Success factors

The main metrics to evaluate the success of the co-creation activities are related to **increase the number of people participating** and **improve innovation capabilities**. Six cities have

also declared to assess the impacts of co-creation approaches against **improving sustainability** of new and already existing products and services.

5.2 PROFILES AND CO-CREATION GUIDANCE FOR THE REFERENCE ZONES

We provide below a description and a visualisation of the results gathered from the co-creation questionnaire and the interviews with each Reference Zone. The following cards visualise the co-creation methodologies and tools already implemented by the cities. These are intended to support the cities to better focus their objectives and easily identify which tools to apply and stakeholders to engage when implementing the different co-creation methodologies.

5.2.1 ANTWERPEN

The city of Antwerpen has a relevant experience in implementing co-creation methodologies within its municipality. The city implements co-creation processes usually trying to involve people as much as possible, however the level of engagement depends on the different activities to organise and on the level of innovation to achieve (e.g. incremental or disruptive innovation starting from an analysis of users' needs). Most of the creation is spontaneously driven in the city directly by the stakeholders and the municipality facilitates the co-creation activities (involving different units, departments and companies) in a number of ways and on various levels:

- Via the city lab 2050 (<http://stadslab2050.be/>), an urban innovation lab on prototyping for sustainable innovation in the city.
- Via living labs on specific topics (this is implemented all the time).
- Via its smart city initiatives.
- Via hackathons (Apps for Antwerp, Blockchain for Antwerp, ...).
- Through innovative lean and mean IT procurement procedures (buy from Startups, PCP, etc...)

The main objectives of Antwerpen to apply co-creation methodologies are to:

- Generate public values.
- Support communities of practice.
- Identify stakeholder needs.
- Engage stakeholders (incl. citizens).
- Create new services.
- Create new products.
- Advance available services/products.
- Raise the level of awareness on different topics.
- Increase efficiency of services.
- Increase effectiveness of services.
- Create a sense of ownership with stakeholders (incl. citizens)

They use co-creation methodologies within the whole co-creation lifecycle, including also their innovative procurement procedures. The main stakeholders of Antwerpen are:

- Citizens.
- Industry.
- Public sector (federal or local government departments).
- Utilities.
- Research.
- Suppliers.
- Competitors.
- Customers.
- Service providers.
- SMEs and startup businesses

They are engaged within co-creation processes for identifying new organisational practices and processes in service development, for improving governance processes, during brainstorming process for generating novel ideas and supporting communities of practice, for evaluating concepts and providing comments on existing products, in transferring implicit knowledge and for establishing performance evaluation standards. Stakeholders are rewarded for participating actively in co-creation processes both through monetary and virtual prizes, through professional and community recognition, by offering them new jobs and through actual assignments and business contracts (especially for startups). The co-creation methodologies implemented by Antwerpen are:

- Living labs.
- Personas.
- Basis SWOT Workshops.
- Appraisal Interviews.
- Strategic Roadmaps.
- Foresight techniques

In order to achieve the objectives previously mentioned, the city of Antwerpen is applying several tools for developing co-creation processes, such as social media, visual collaboration maps and mind maps, toolkits, crowdmapping, mockups, storyboards and elevator pitches (cfr. buy from startups). The success of the co-creation practices is evaluated by Antwerpen in terms of improving collaboration among different departments in a city and the innovation capabilities across cities, increasing the efficiency and effectiveness of the services developed, the number of people participating in co-creation processed and the provision of cost-efficient solutions, improving the sustainability of solutions, also by increasing the number of business contracts and the repeated use of co-created services and products.

From the analysis of the information provided in the co-creation questionnaire, and by matching them with the guiding co-creation toolset included in Chapter 4, we have identified that the municipality could take advantage of also implementing the following co-creation methodologies: **Lego serious play™** and **Role play**.

The first methodology should be used within the co-analysis and co-design phases in order to evaluate the positioning of a new offer, especially when co-creating new services and products. Indeed, Lego serious play™ perfectly responds to the needs of the city of Antwerpen to generate public values and support communities of practice by implementing brainstorming processes and identifying new organisational practices. By applying this methodology, Antwerpen, will likely be able to improve its innovation capabilities, increase the efficiency of its services, improve the sustainability of its solutions and increase the use of co-created services and products.

In terms of co-creation methodologies to be used within the co-evaluation step, Antwerpen could benefit from applying the Role Play approach. It will help the municipality to perform an hypothetical service experience and to investigate its future functionalities by engaging all

the stakeholders effectively interested in the process, advancing the existing services and products, thus establishing performance standards. This approach will increase the efficiency and also improve the sustainability of the service offer provided. **The tools to be used within both the methodologies proposed have never been implemented before by the city of Antwerpen** and this is for sure the major challenge we envisage to be supported by the Reference Zone coordinator. Indeed, the Lego serious play™ applies issue cards, character profiles and affinity diagrams; whether in addition, Role play takes advantage also of storyboards. Below, we provide a visualisation of the co-creation methodologies currently in use by the city of Antwerpen.



Figure 4 Antwerpen co-creation card: Living Labs

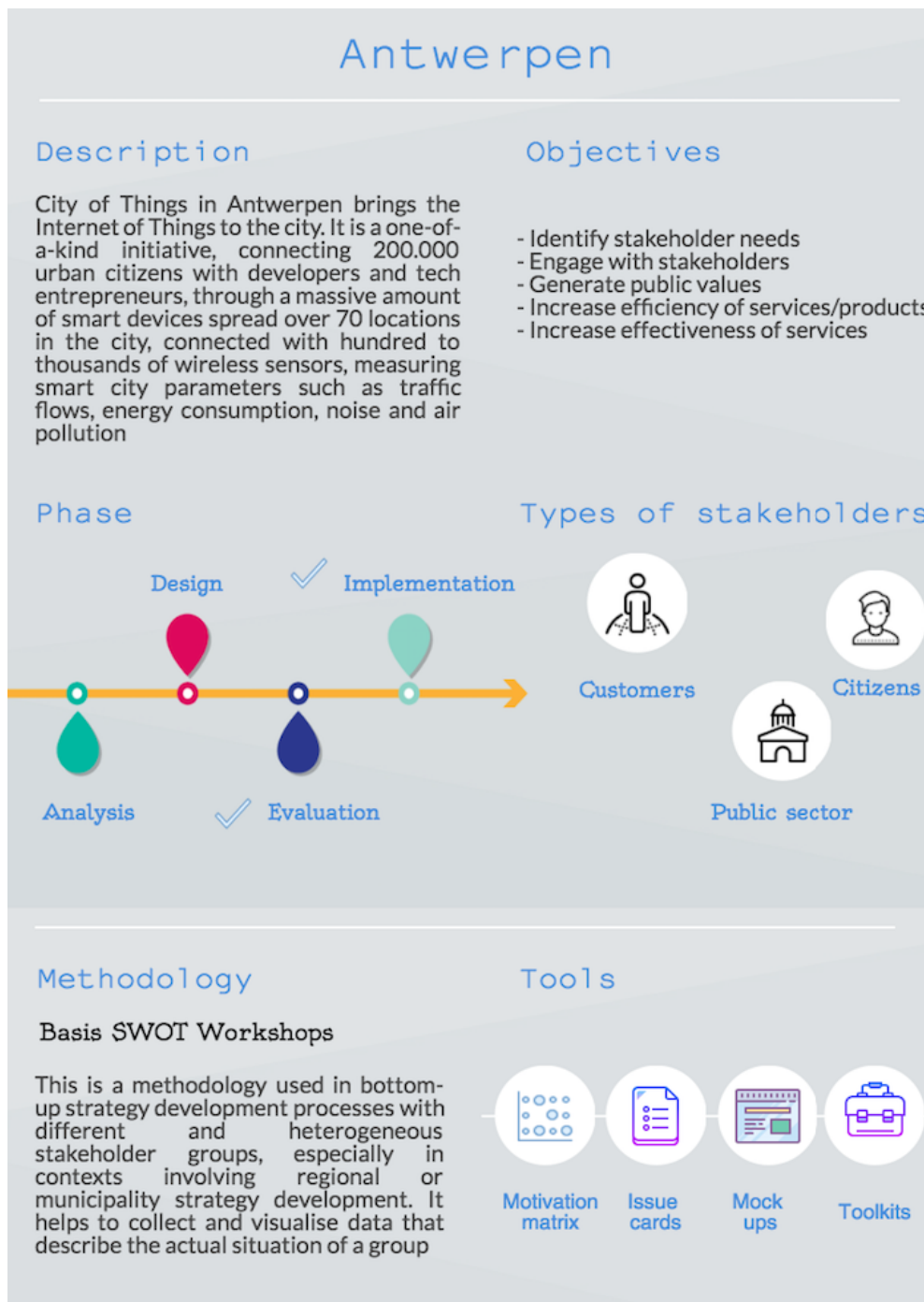


Figure 5 Antwerpen co-creation card: Basis SWOT Workshops

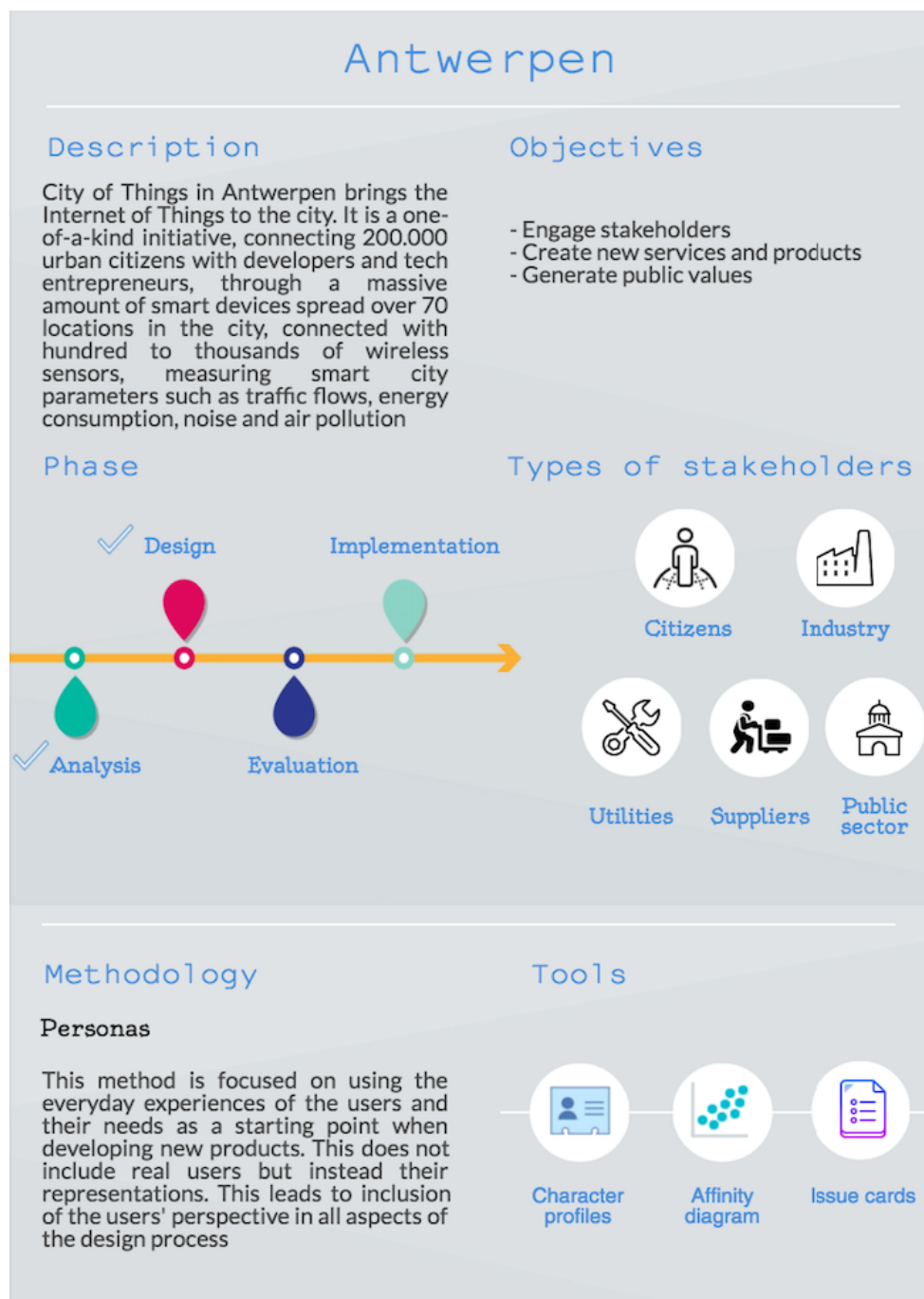


Figure 6 Antwerpen co-creation card: Personas

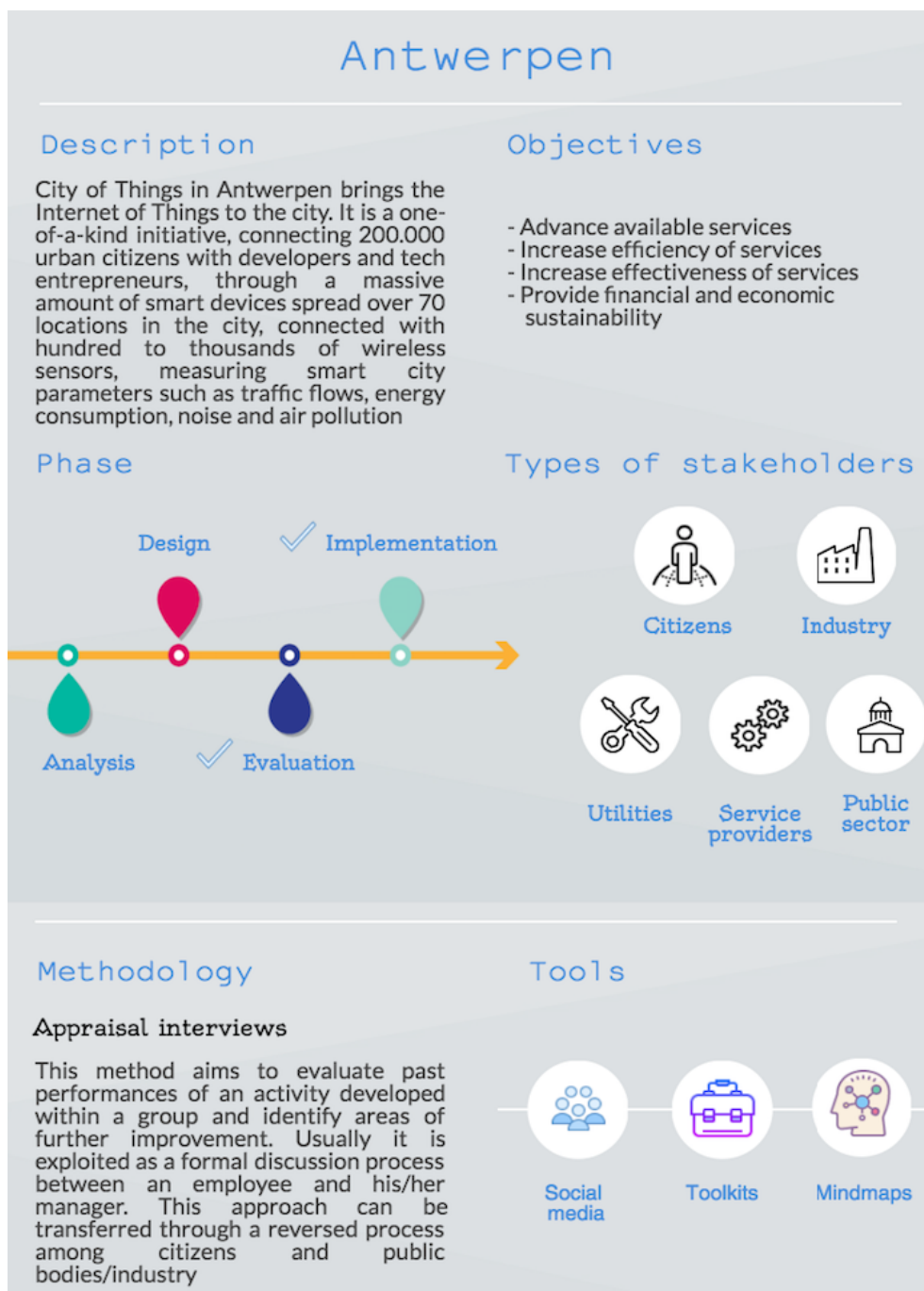


Figure 7 Antwerpen co-creation card: Appraisal interviews



Figure 8 Antwerpen co-creation card: Strategic Roadmaps

5.2.2 CAROUGE

Carouge believes that co-creation is like a social network, if nobody participates, it won't survive. At present, and mainly due to staffing issues, the city of Carouge uses co-creation occasionally and is focused on using it to create with citizens, SMEs and startups. In Carouge the city has a mixture of both state and city based programmes for co-creation. The city often works with the Geneva Lab, a co-creation lab founded by the state and working across the cities, academia and SMEs. For example, Carouge does not currently have open data available to use for co-creation purposes. However, in response to this, the city has established a pilot project with Geneva. The main objectives of implementing co-creation approaches for Carouge are to:

- Identify stakeholder needs.
- Engage stakeholders (incl. citizens).
- Create new services.
- Create new products.
- Integrate available services/products.
- Advance available services/products.
- Increase trust on governmental services.
- Generate public values.
- Support communities of practice.
- Transfer and sustainable conservation of implicit knowledge.
- Improve communication processes.
- Increase efficiency of services.
- Increase effectiveness of services.
- Provide financial and economical sustainability of services.
- Create a sense of ownership with stakeholders (incl. citizens)

Carouge uses co-creation processes in the whole co-creation lifecycle. First the city identifies problems and then reach a database of enterprises, citizens or SMEs where they look for a technological solution to the problem. The city supports that compared with other Swiss cities, Carouge is more advanced, so they are a showcase. The main stakeholders of Carouge are:

- Citizens.
- Industry.
- Utilities.
- Research.

In Carouge, the citizens mainly take part in co-creation activities for generating ideas on novel products within brainstorming processes, for evaluating and selecting concepts, in supporting communities of practice and for establishing performance evaluation standards. Community recognition is the mean used to reward citizens participating in co-creation processes in Carouge. The methodologies used are:

- SMEs and start-up database (with value chain of the enterprise).
- Living labs.
- Personas.
- Gamification

The tools implemented in co-creation activities from Carouge are mainly used by the different structures of the State of Geneva (Office Industrial Promotion, Economic Development, the IT development or the contact the city already created with its citizens). The success of such processes is evaluated in terms of increasing the collaboration across cities and the number of people participating in cities co-creation processes, thus improving the sustainability of solutions provided to the citizens.

From the analysis of the questionnaire, it emerged that even if Carouge declared to use co-creation also within the co-implementation phase, in reality there are no methodologies already included in the list that can support them within this particular process. To better exploit the benefits provided by co-creation, we suggest Carouge to apply also **Basis SWOT workshops** and **Appraisal interviews** within the co-implementation phase. Especially the first methodology, can be relevant in identifying stakeholders needs, increasing trust on governmental services and generate public values, increasing the efficiency and effectiveness of the services. In order to implement these methodologies, toolkits, mock-ups, issue cards and the motivation matrix should be put in place. The final result of implementing such a methodology can be an increase of collaboration across cities and the number of people participating in cities co-creation processes. The Appraisal interviews are useful in establishing performance and evaluation standards by applying social media, visual collaboration maps and toolkits with the aim of advancing available services, increasing the efficiency and effectiveness of already existing ones and providing financial and economic sustainability.



Figure 9 Carouge co-creation card: Living Labs

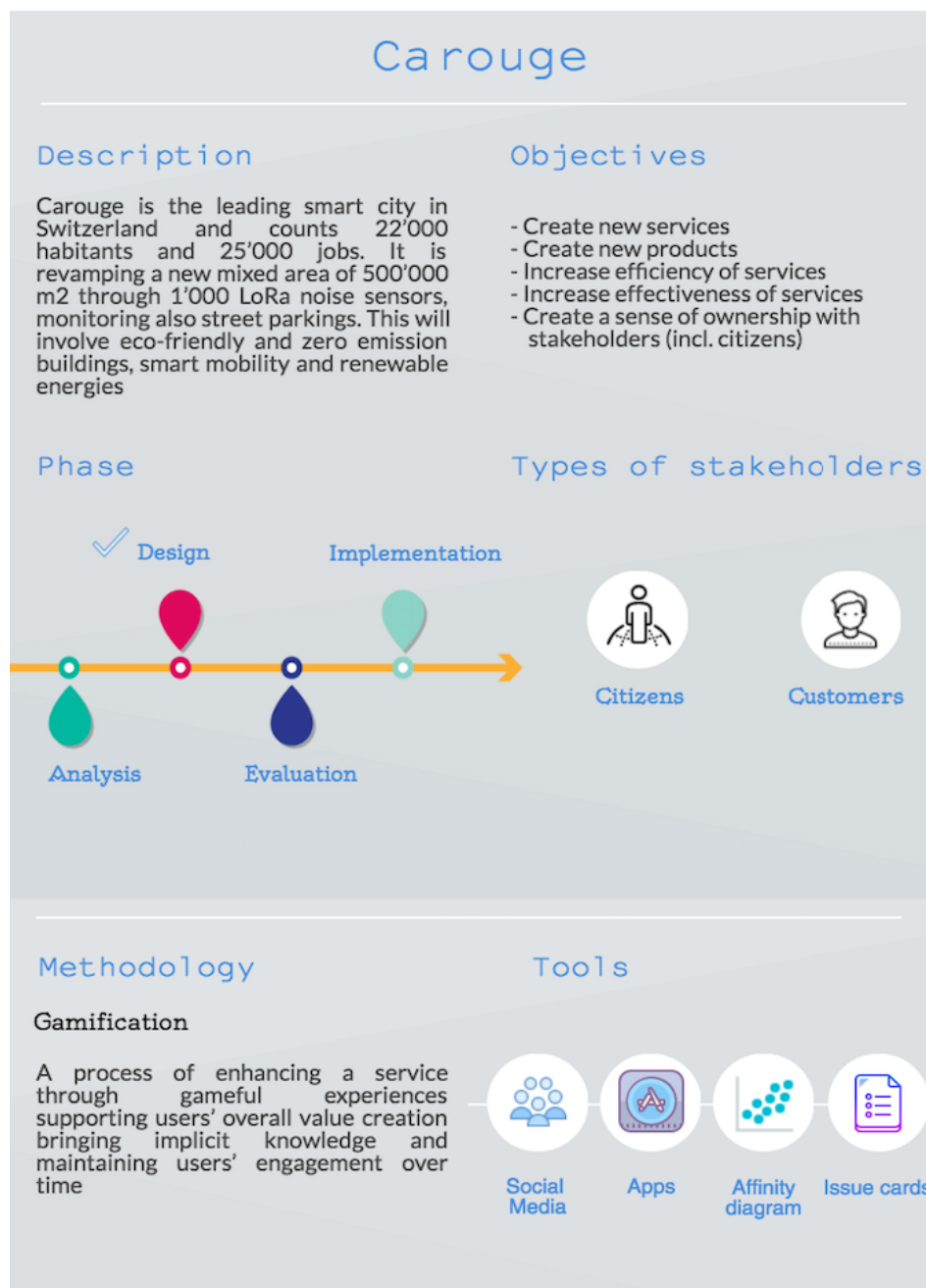


Figure 10 Carouge co-creation card: Gamification

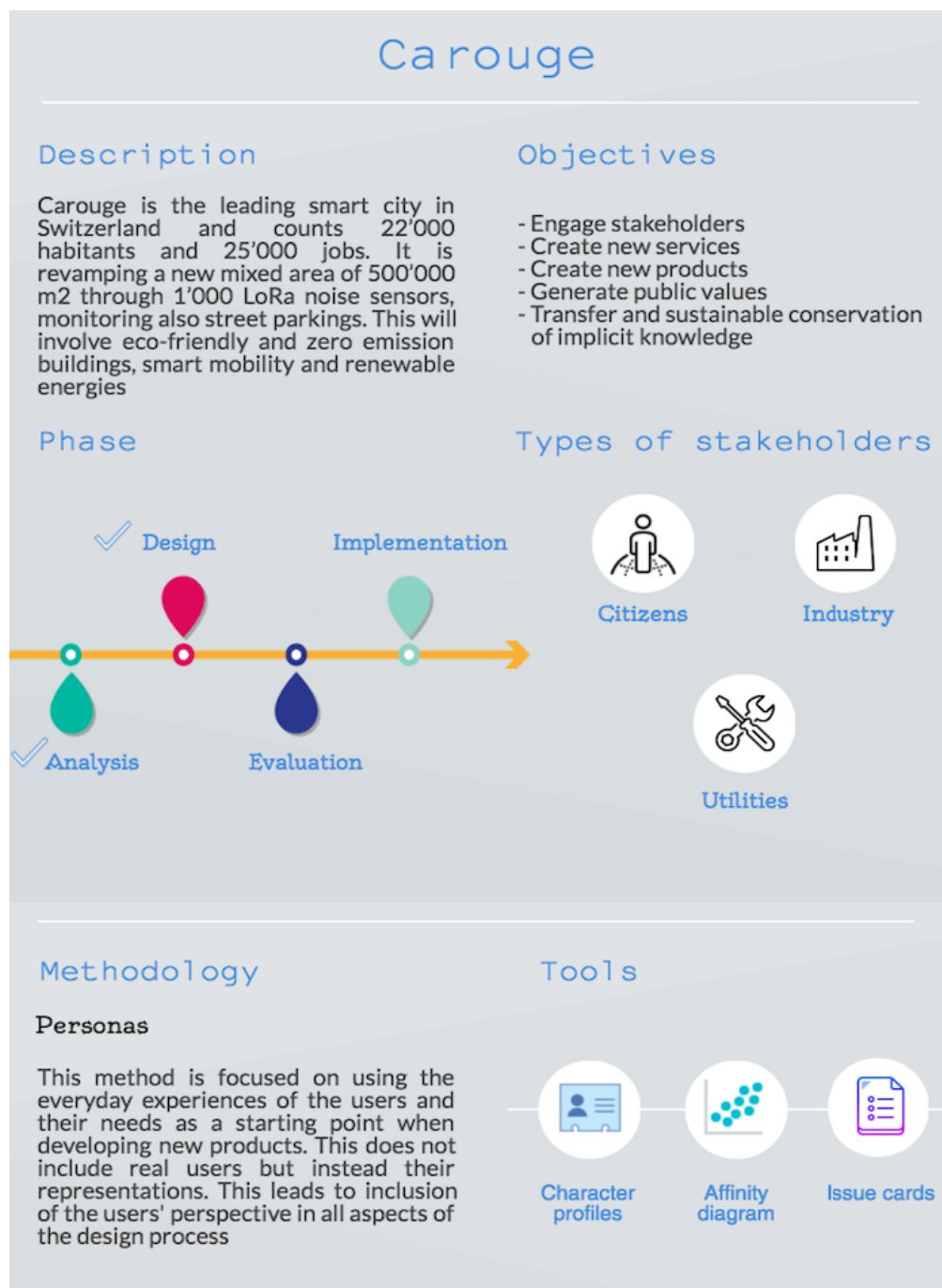


Figure 11 Carouge co-creation card: Personas

5.2.3 EINDHOVEN

The city of Eindhoven uses co-creation all the time to involve residents, entrepreneurs and institutions in developing policies and projects. Co-creation is indeed very important for the city, it is a prerequisite for a well-accepted implementation and functioning of its smart services, especially in terms of improving quality of life of the citizens. In this sense, co-creation helps to get a better insight in the needs of the citizens. The main objectives of this co-creation activity are to:

- Identify stakeholder needs.
- Engage stakeholders (incl. citizens).
- Raise the level of awareness on different topics.
- Generate public values.
- Improve communication processes.
- Increase efficiency of services.
- Create a sense of ownership with stakeholders (incl. citizens)

The whole co-creation lifecycle is involved in Eindhoven. The stakeholders engaged are:

- Citizens.
- Industry.
- Public sector (federal or local government departments).
- Utilities.
- Suppliers.
- Competitors.
- Customers.
- Service providers

The stakeholders are involved mainly to provide comments on services and product, during the brainstorming phase to generate novel ideas, select and evaluate concepts, to identify new processes in the service/product development phase. The city of Eindhoven also applies co-creation for implementing new governance process and improve the ones already in place. The city rewards its citizens for participating in co-creation activities through community recognition. The co-creation methodologies applied are:

- Living labs.
- Personas.
- Gamification.
- Strategic roadmaps.
- Social Network Analysis

The tools used for applying co-creation processes by Eindhoven are mainly social media, visual collaboration maps and mind maps, toolkits, crowdmapping, character profiles and motivational matrix. The success of the co-creation processes implemented is evaluated in terms of increasing the number of people involved, improving collaboration among different departments in a city, the quality of data collected, services adoption's measures and the sustainability of the solutions developed. The repeated use of co-created services and products is also assessed.

We suggest to Eindhoven to use also the **Basis SWOT Workshops** methodology, which could best support the city to improve the quality of data collected, since it allows to engage with different and heterogeneous stakeholder groups, and provide more insights on the quality of life of citizens, which is a primary scope for the city. Considering that Eindhoven aims to involve very different categories of stakeholders, i.e. almost all groups from the list in the questionnaire, with the only exception of researchers, this methodology is perfectly aligned with the need of the city to increase collaboration across cities and/or among different departments in a city and the number of people participating in cities co-creation processes, thus increasing the efficiency of the services developed.

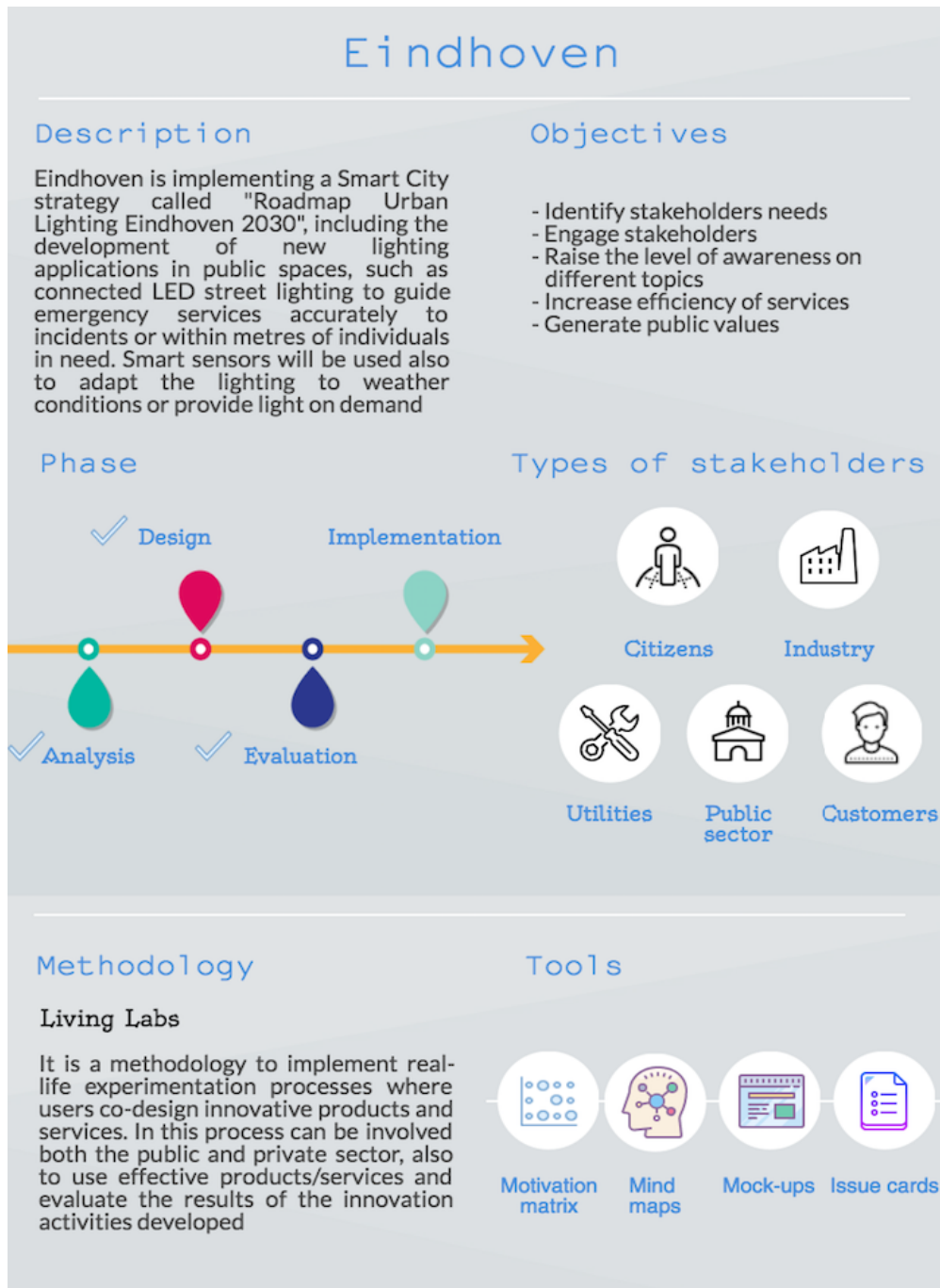


Figure 12 Eindhoven co-creation card: Living labs



Figure 13 Eindhoven co-creation card: Gamification

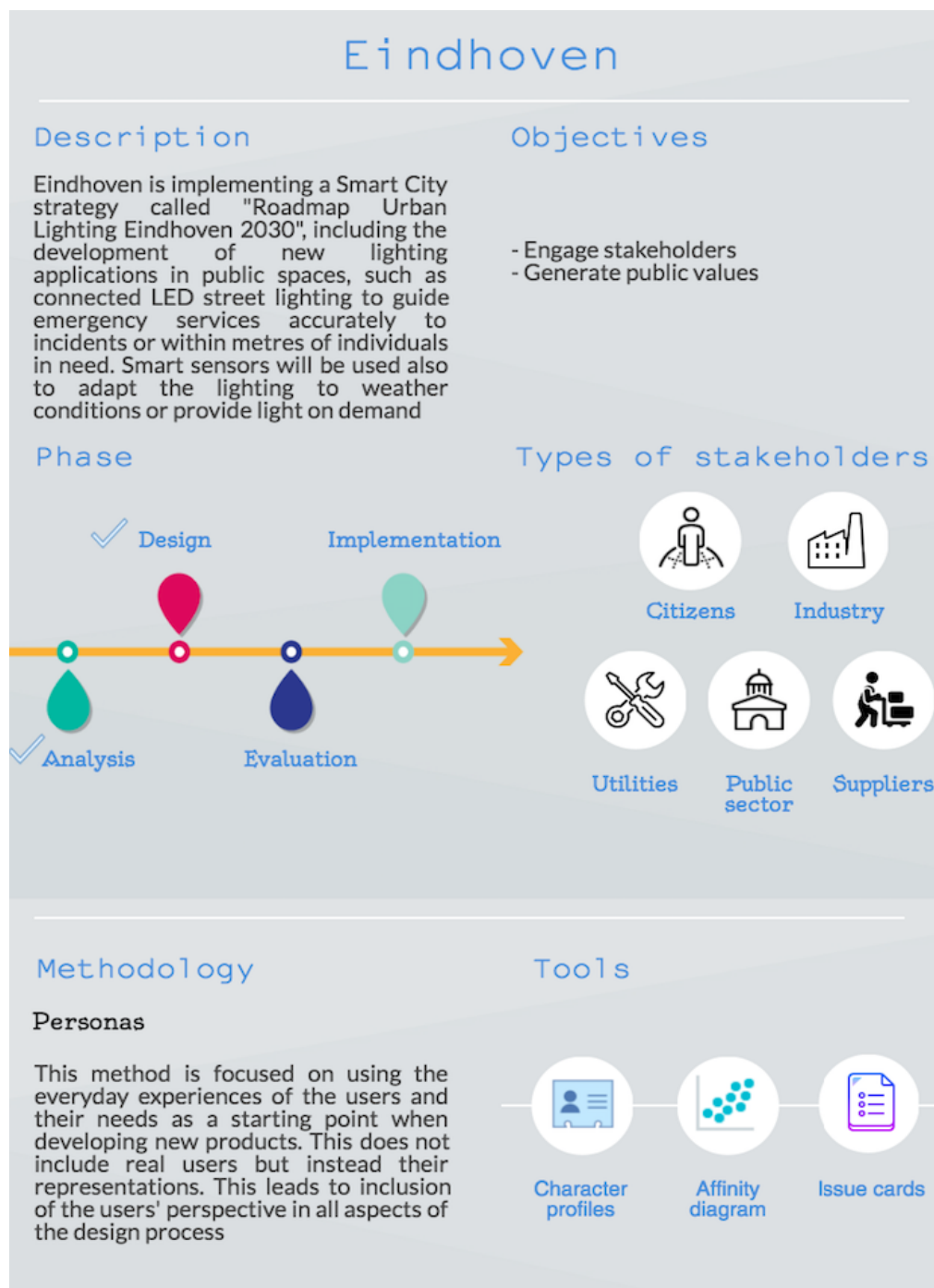


Figure 14 Eindhoven co-creation card: Personas

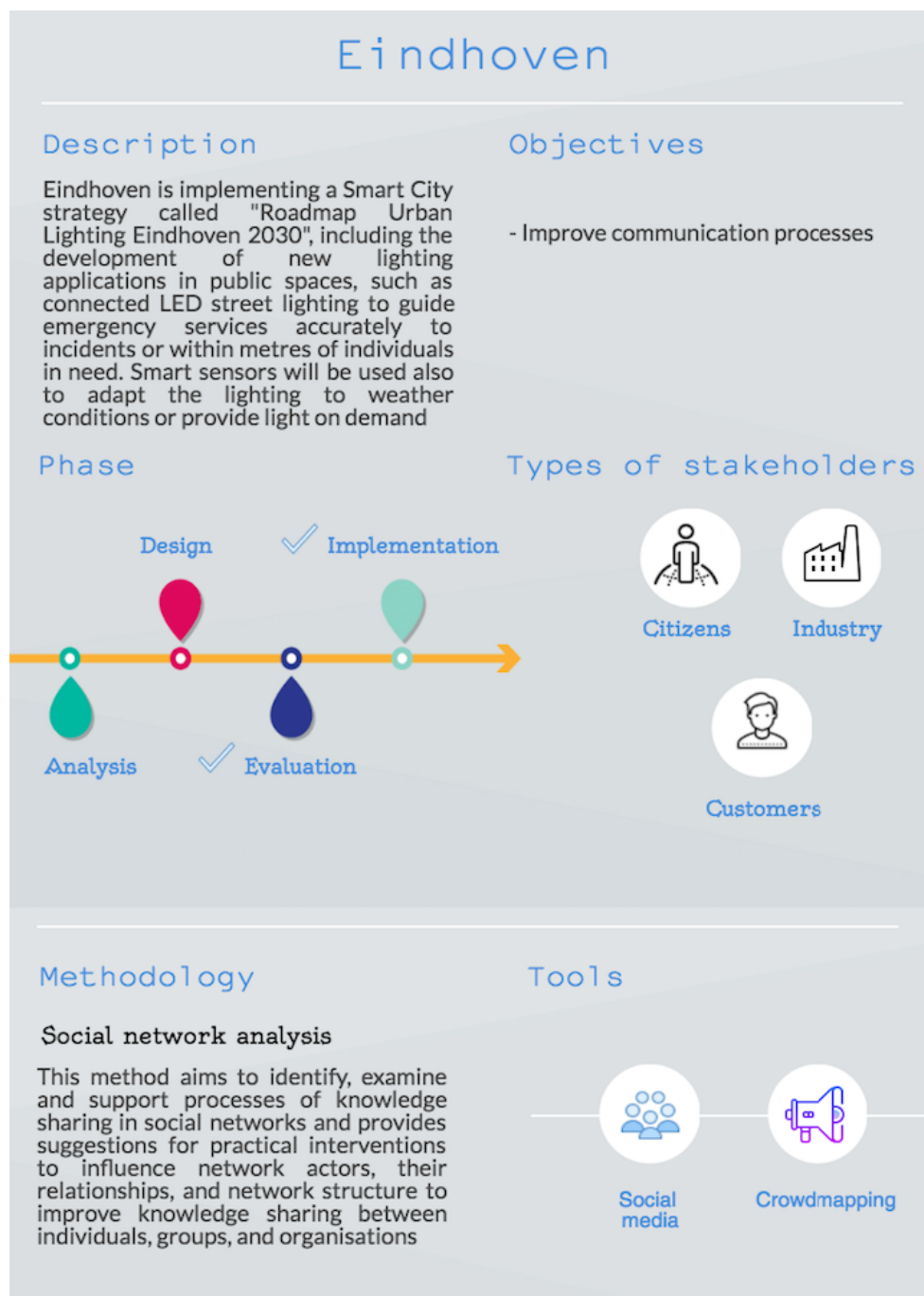


Figure 15 Eindhoven co-creation card: Social Network Analysis

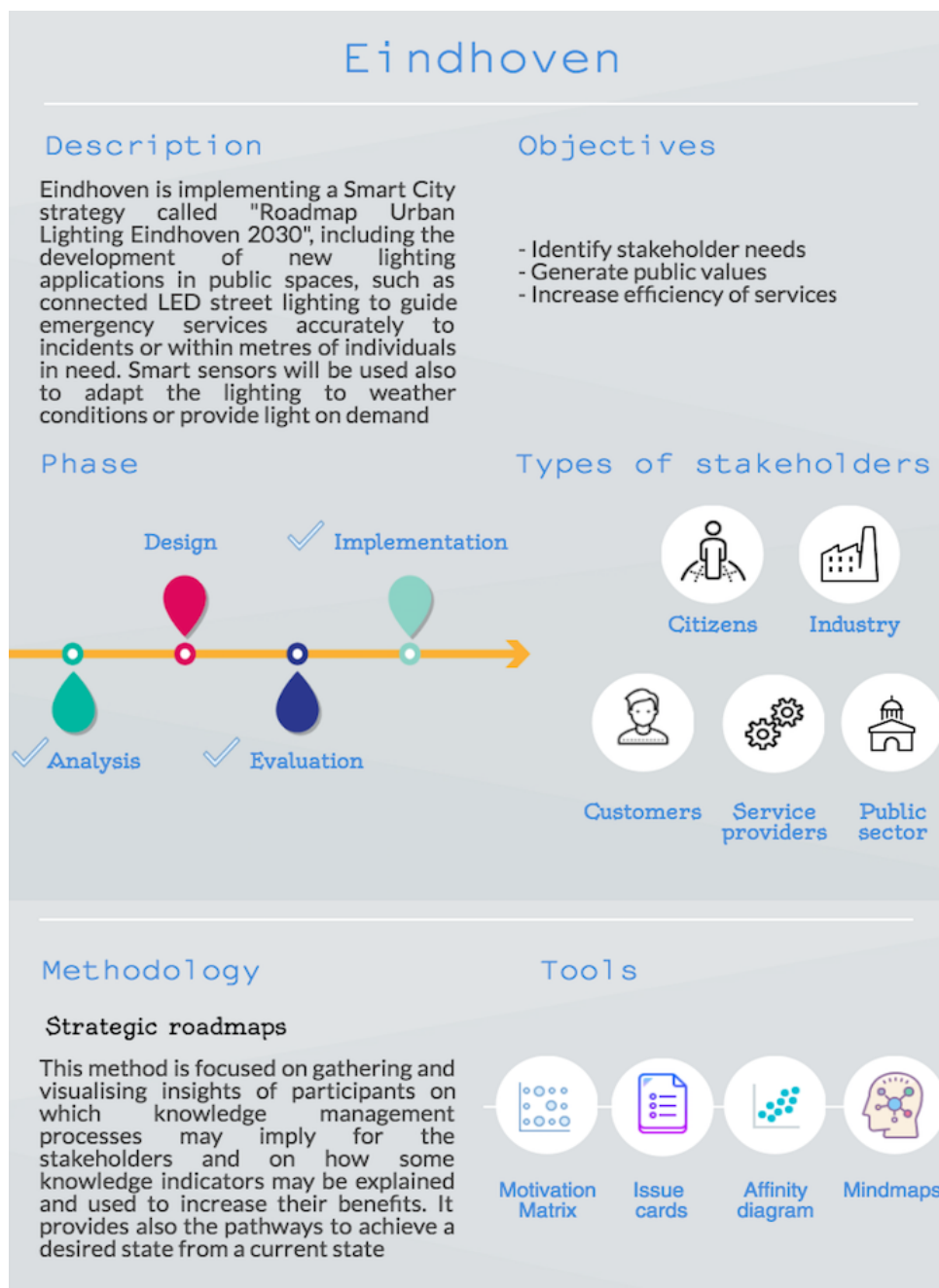


Figure 16 Eindhoven co-creation card: Strategic roadmaps

5.2.4 HELSINKI

The city of Helsinki uses co-creation all the time for digital service development, opening up data and APIs, as well as on urban planning activities. Co-design of services is the main objective of Helsinki for taking the citizens and the whole ecosystem on board. Both in relation to existing services, to get feedback or develop services further, and to get new ideas for potential services/solutions. More in detail, Helsinki implements co-creation processes to:

- Identify stakeholder needs.
- Engage stakeholders (incl. citizens).
- Create new services.
- Create new products.
- Advance available services/products.
- Raise the level of awareness on different topics.
- Increase trust on governmental services.
- Generate public values.
- Support communities of practice.
- Transfer and sustainable conservation of implicit knowledge.
- Improve communication processes.
- Increase efficiency of services.
- Increase effectiveness of services.
- Provide financial and economical sustainability of services.
- Create a sense of ownership with stakeholders (incl. citizens)

Helsinki uses co-creation also in co-evaluation and co-implementation phases. The categories of stakeholders involved within these processes are:

- Citizens.
- Industry.
- Public sector (federal or local government departments).
- Suppliers.
- Customers.
- Service providers

Stakeholders in Helsinki are involved in co-creation for providing comments on products, within brainstorming processes for selecting and evaluating concepts, for transferring implicit knowledge and generating novel ideas on products and services. Stakeholders are also supporting the city in improving governance processes by identifying new organisational practices and processes in the service/product development phase. Monetary and virtual prizes, as well as community recognition is implemented to reward the stakeholders for their engagement in co-creation activities. The methodologies implemented by Helsinki for co-creation are:

- Living labs.
- Personas.
- Gamification.
- Strategic Roadmaps.
- Hackathons

The tools used for applying co-creation processes by Helsinki are mainly Social media, apps, visual collaboration maps and mind maps, toolkits, crowdmapping, mock-ups, issue cards and character profiles. The success of the co-creation practices put in place by the city is evaluated in terms of increasing the collaboration across cities and the number of people participating in cities co-creation processes, improving user satisfaction and service adoption measures. The contribution of the co-creation activities for improving innovation capabilities and the quality of data collected, as well as increasing the efficiency of the services and products developed is investigated by Helsinki.

From the analysis of the results of the questionnaire, it emerged that Helsinki is implementing some methodologies that usually can support the co-analysis phase, such as Strategic roadmaps, Personas and Living labs, even if they have declared to not organise activities usually addressing this step.

It is clear the effort spent by the city of Helsinki in applying co-creation methodologies within the co-design phase for sharing ideas and creating new products and services. In terms of methodologies to be implemented for co-evaluation and co-implementation phase, Helsinki has already put in place Strategic Roadmaps. However, we suggest that **Appraisal interviews** can also be very useful in establishing performance and evaluation standards by applying social media, visual collaboration maps and toolkits. The final aim is to advance available services, increase the efficiency and effectiveness of already existing service and provide financial and economic sustainability.

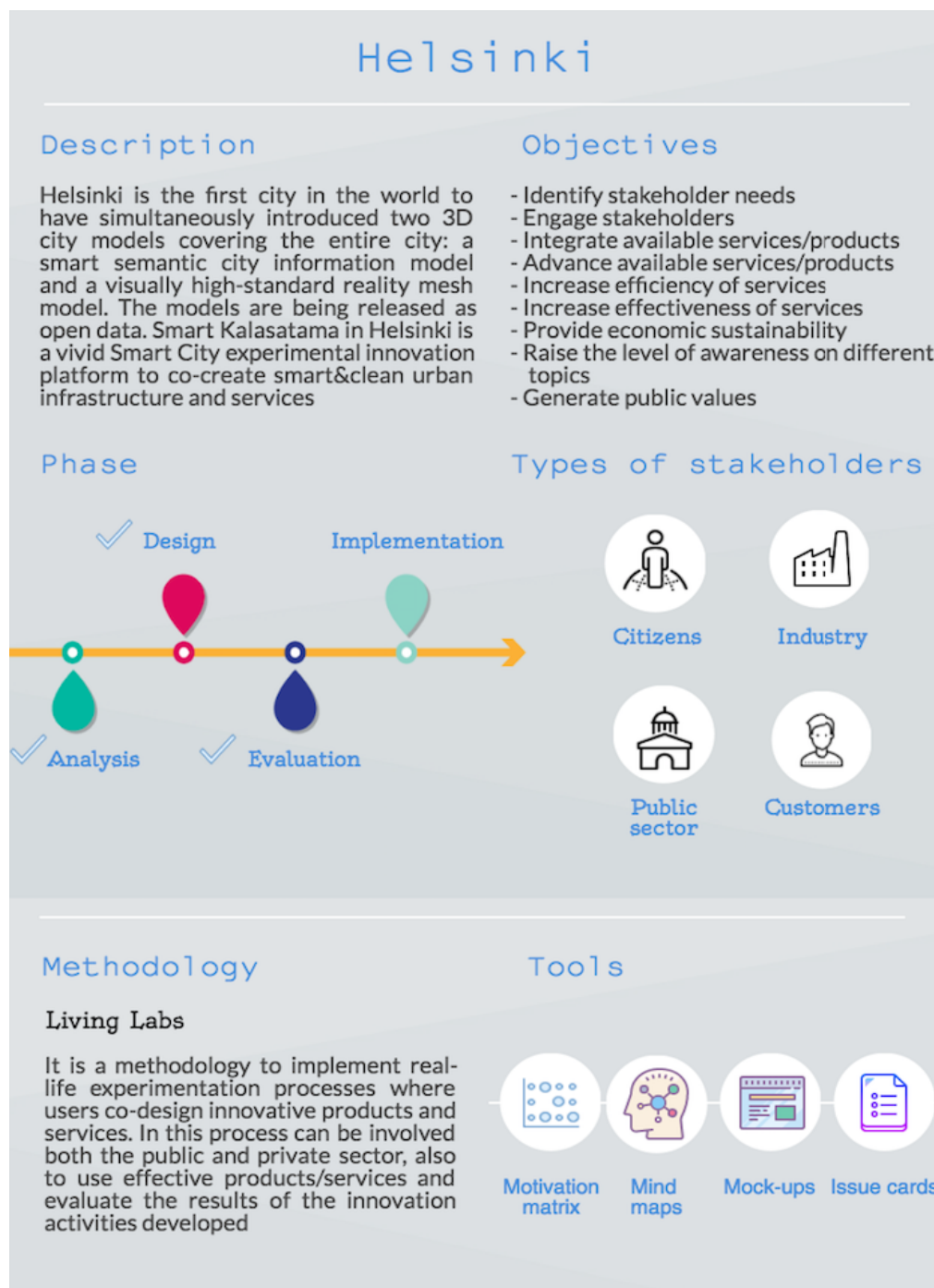


Figure 17 Helsinki co-creation card: Living Labs

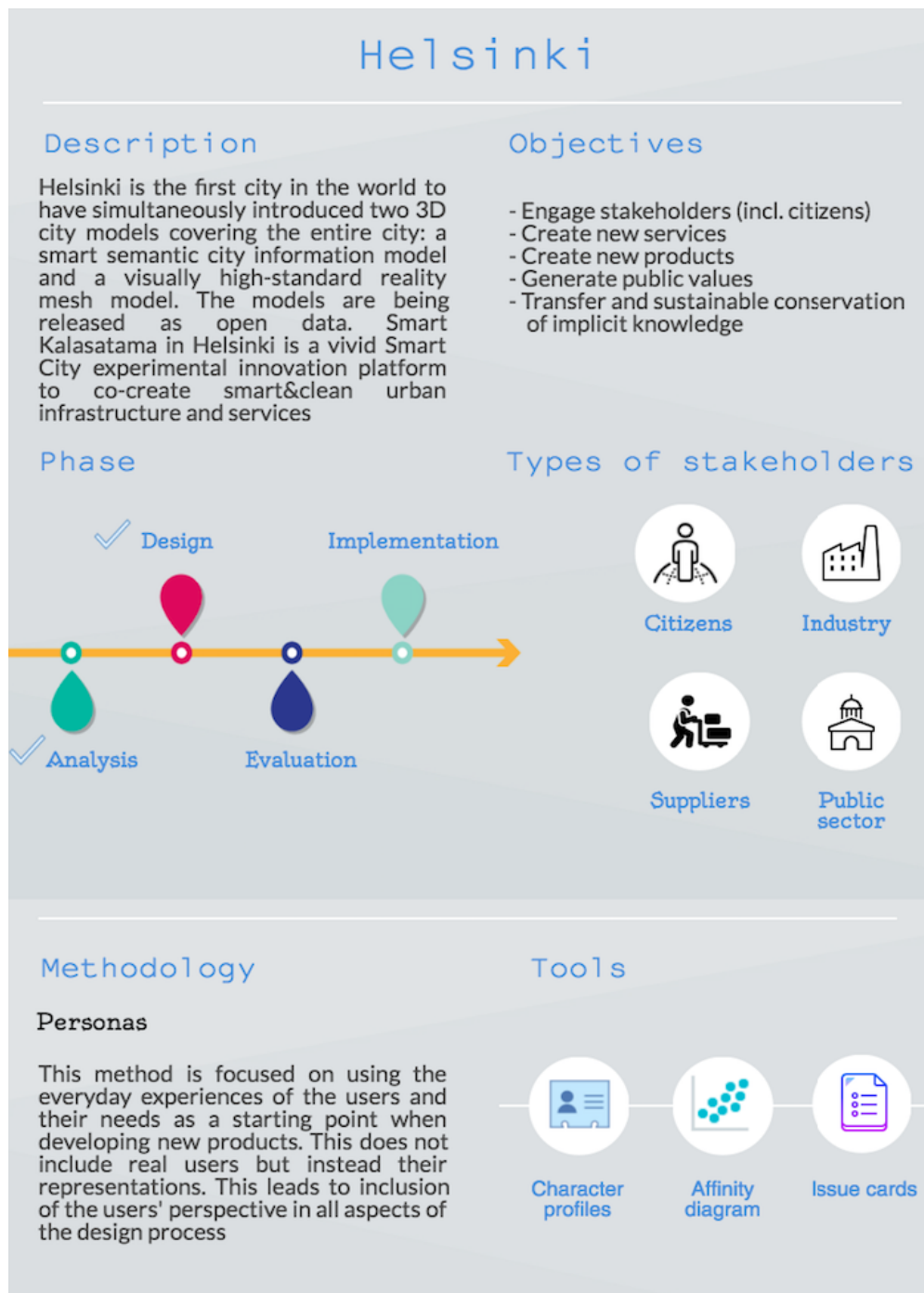


Figure 18 Helsinki co-creation card: Personas

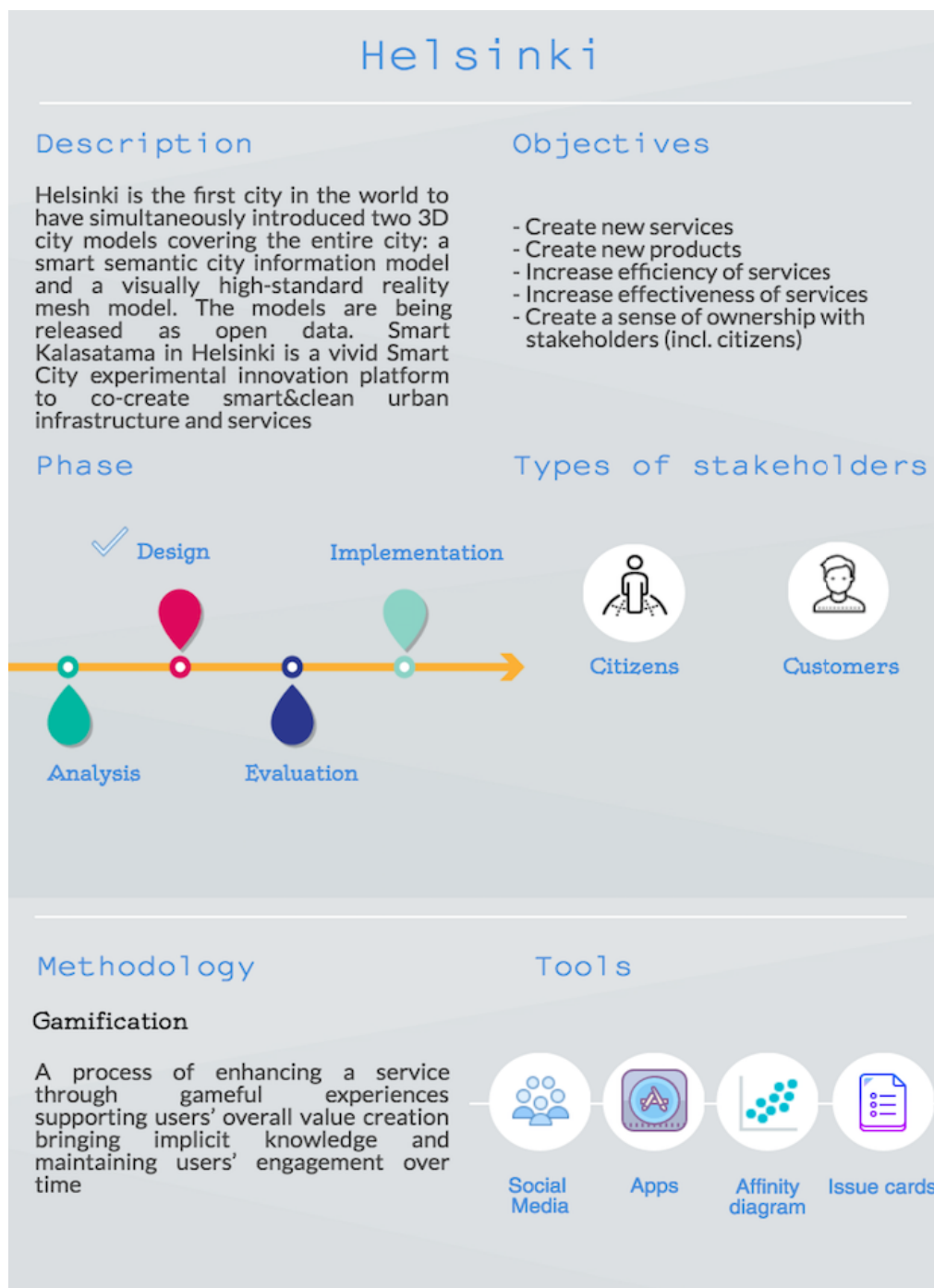


Figure 19 Helsinki co-creation card: Gamification



Figure 20 Helsinki co-creation card: Strategic roadmaps

5.2.5 MANCHESTER

To this day, Manchester has occasionally implemented co-creation processes. However, in Manchester there is a thriving digital and innovation community and co-creation has been key to a wide range of initiatives to involve stakeholders throughout the service design process. Co-creation is important for Manchester as it is a strong approach to unlock civic potential and social capital. Three distinct groups are engaged by the city of Manchester in this process: active citizens (broad vision), service users (come in later for delivery design) and intermediaries (civil servants, public sector stakeholders). Hence, stakeholders are both citizens and professional users. The city applies co-creation processes mainly to achieve the following objectives:

- Identify stakeholder needs
- Engage stakeholders (incl. citizens)
- Create new services
- Create new products
- Support communities of practice
- Increase efficiency of services

The whole co-creation lifecycle is involved in Manchester. The stakeholders engaged are:

- Citizens
- Industry
- Public sector (federal or local government departments)
- Research
- Customers

The stakeholders are mainly involved by the city for brainstorming activities in order to select concept, transfer implicit knowledge and provide their suggestions to improve the governance processes. Stakeholders are rewarded to participate in co-creation processes by having access to new services, or a chance to be an early adopter, as part of active citizenship. Occasionally there will be also incentives, but is mostly around personal fulfilment.

The co-creation methodologies already put in place by Manchester are:

- Living labs
- Gamification
- Appraisal interviews
- Basis SWOT Workshops
- Questionnaires and consultations with community of researchers (e.g. focus groups)

The tools used in co-creation processes by Manchester are visual collaboration maps and mind maps, social media, apps and toolkits. The success of such co-creation approach is evaluated in terms of improving service adoption measures and innovation capabilities, to improve the quality of data collected and to increase the use of co-created services and products. However, Manchester wants to develop also curated hackathon, as this works better with communities that aren't naturally used to develop "innovation". Since Manchester is working with data within SynchroniCity, the main objective of the co-creation approach is to encourage data literacy and implement responsive systems to respond to the emerging questions of the citizens.

By considering that Manchester has not yet using any co-creation methodology aimed to support community of practices, as this is one of the main objective of the City, we suggest to implement the **Lego serious play™** approach. Indeed, this methodology can be really useful for Manchester within the service design process, as it helps to identify stakeholder needs, create new services and products, thus increasing the efficiency of services and improving the innovation capabilities.

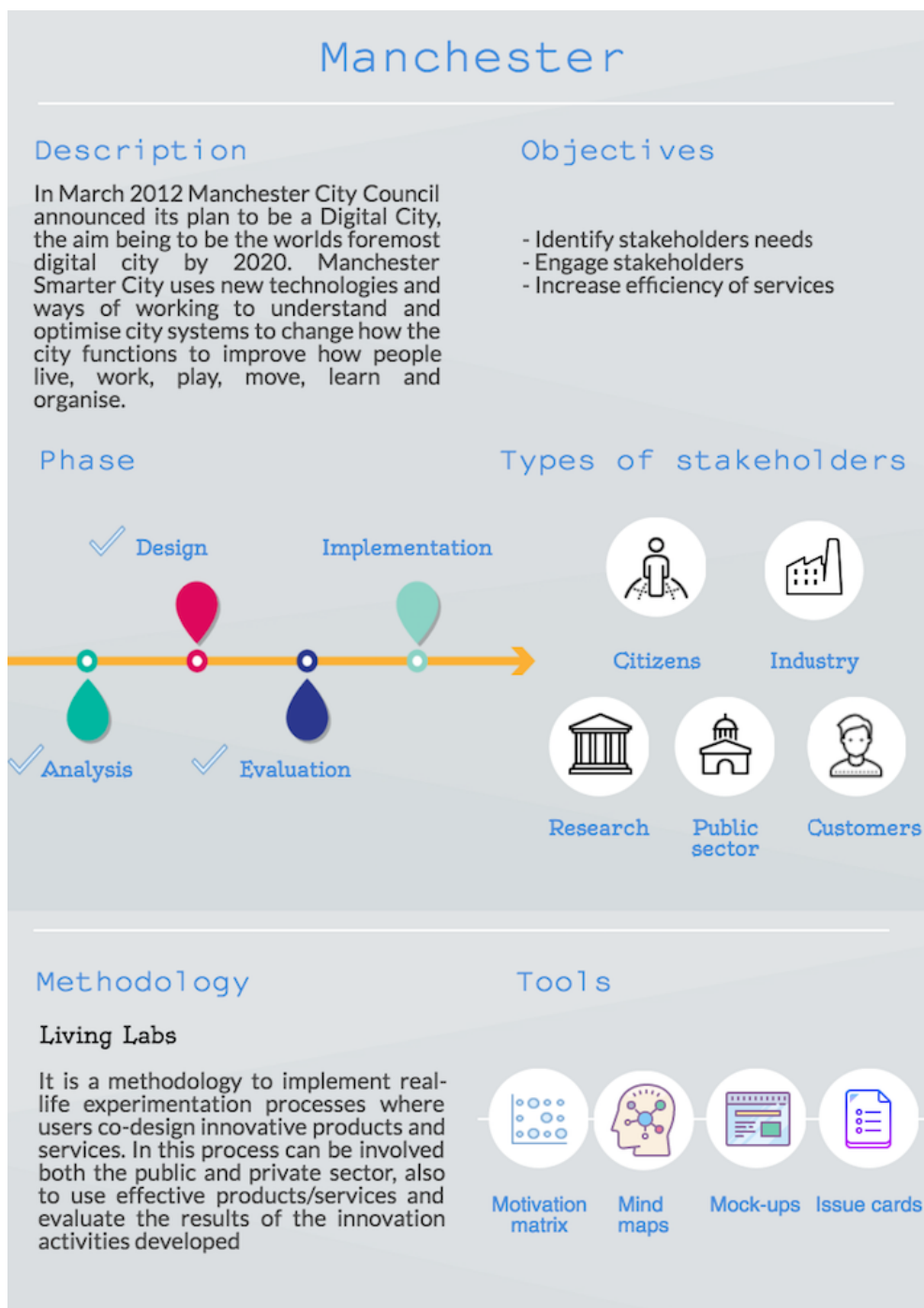


Figure 21 Manchester co-creation card: Living labs

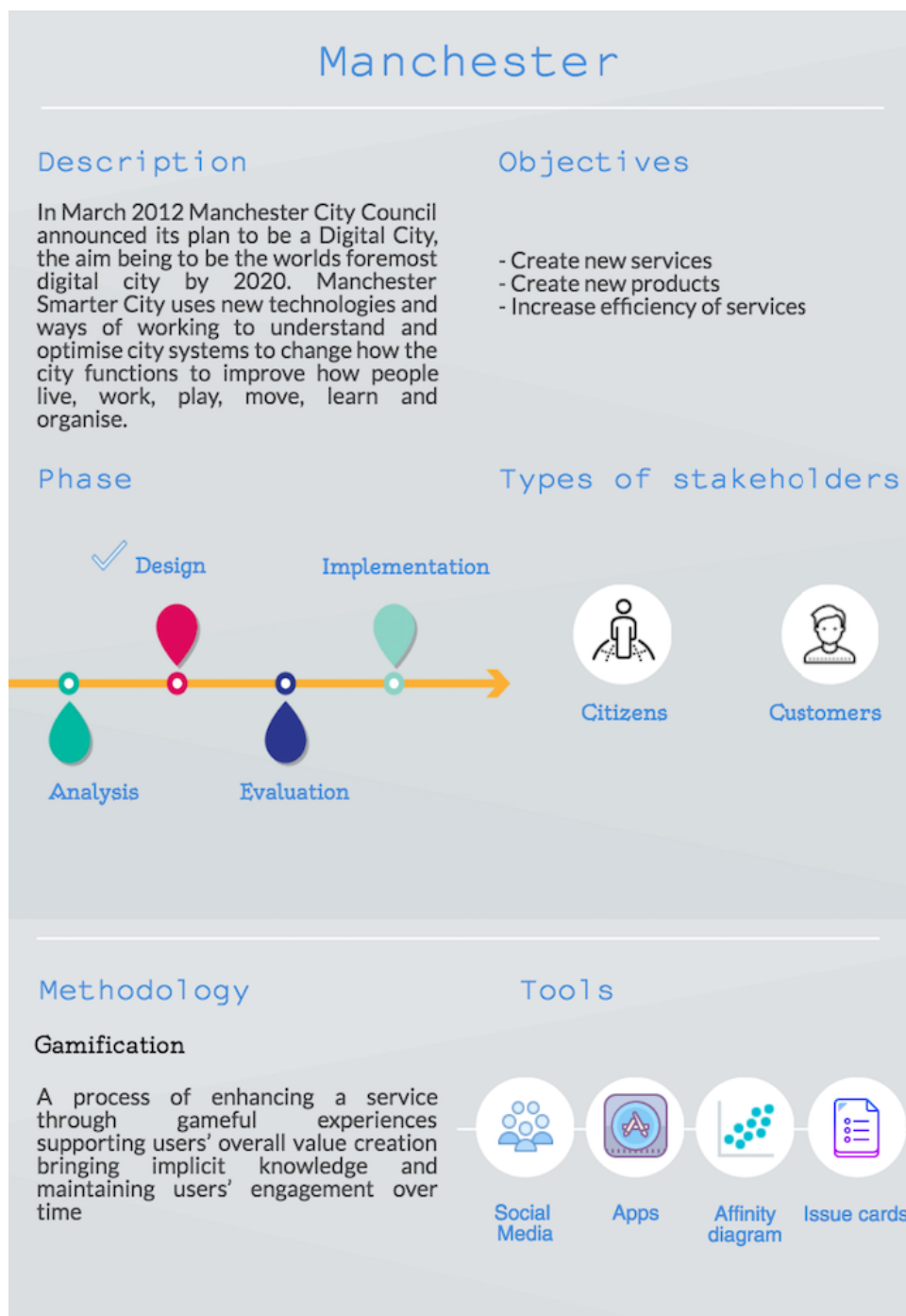


Figure 22 Manchester co-creation card: Gamification

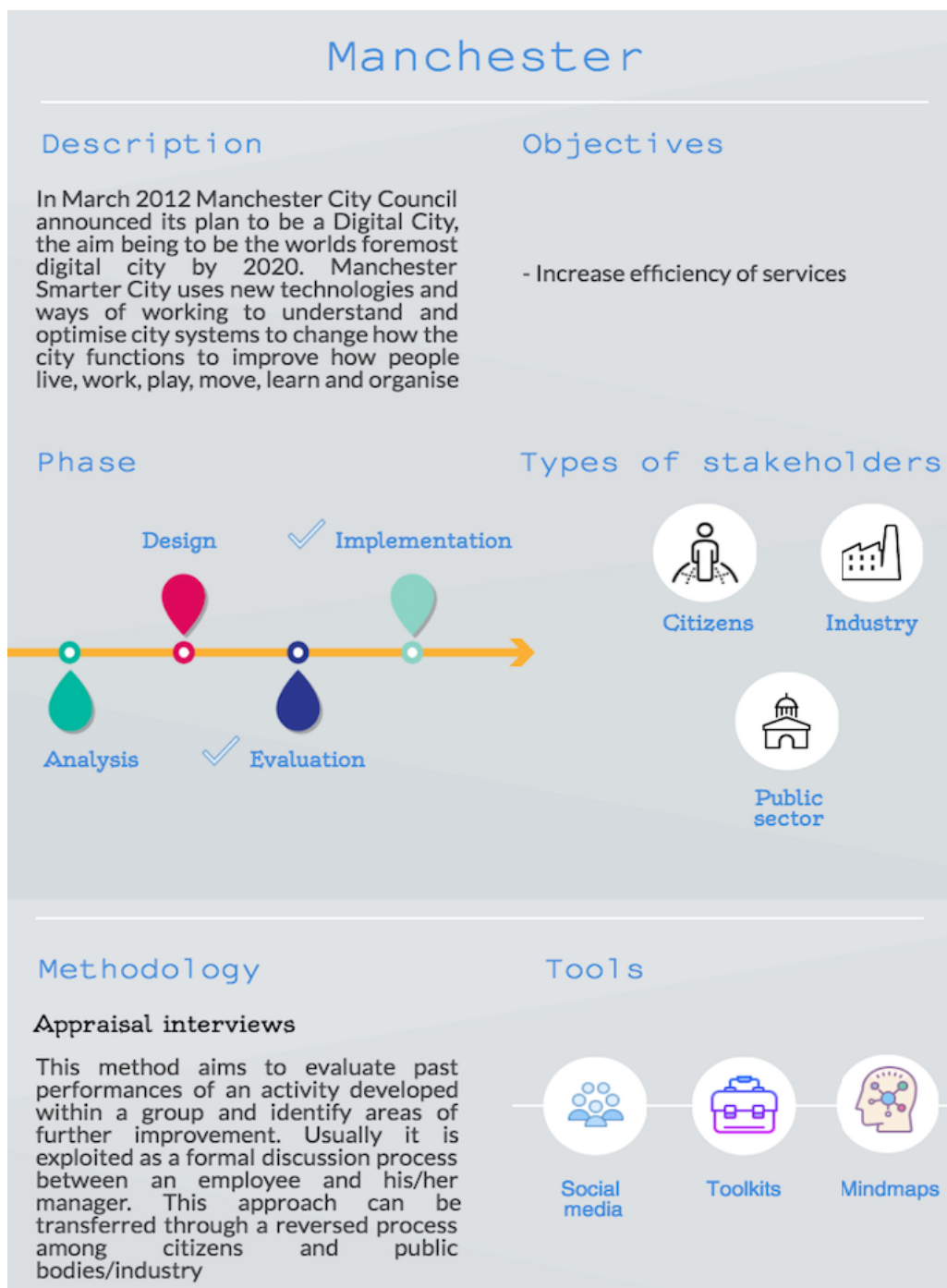


Figure 23 Manchester co-creation card: Appraisal interviews

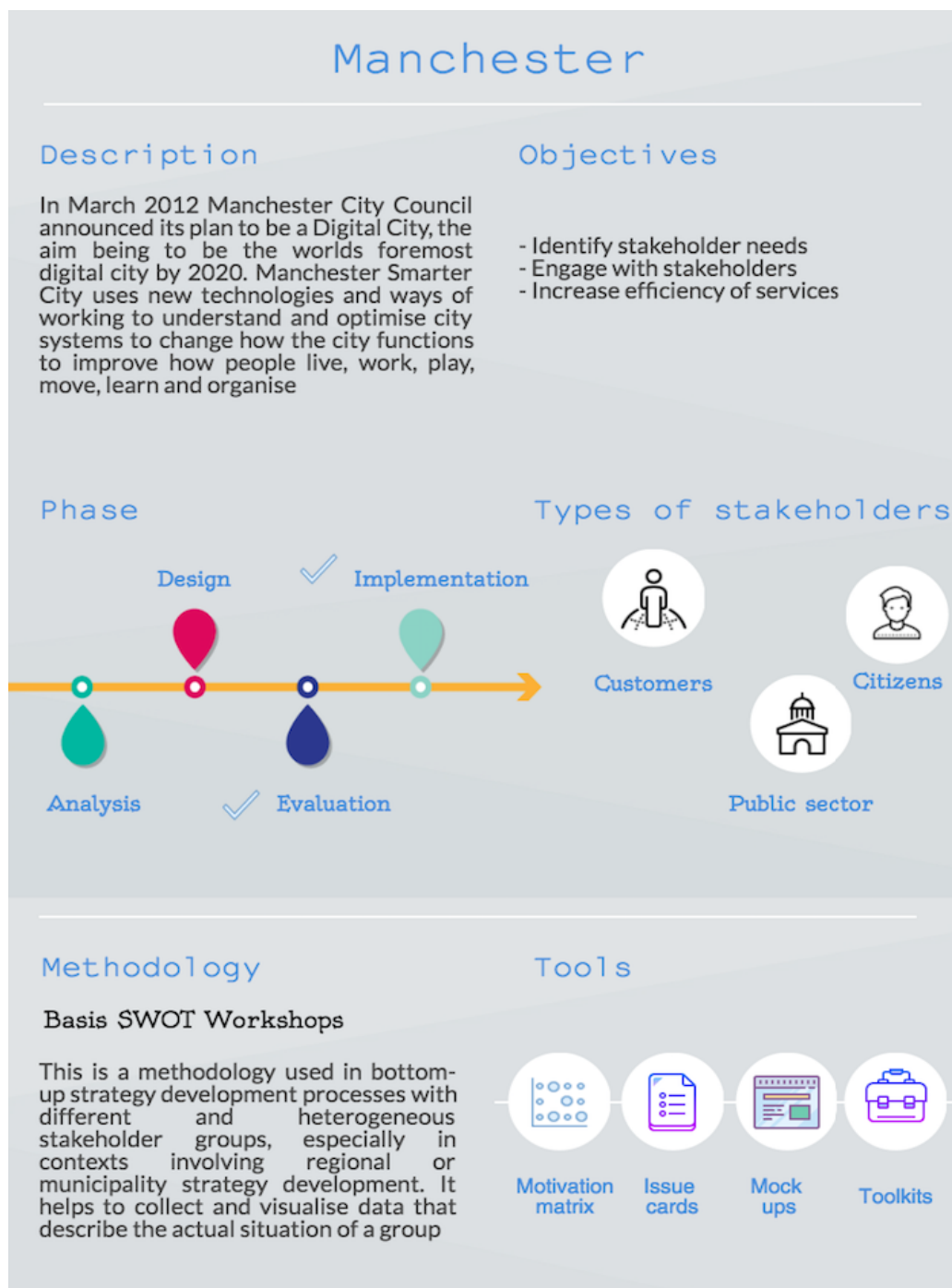


Figure 24 Manchester co-creation card: Basis SWOT workshops

5.2.6 MILAN

A lot of different departments in the city use co-creation (or stakeholder engagement) in their work. They also implement different types of engagement processes on a variety of different projects in the city. For Milan co-creation means involving other stakeholders, to understand their perspectives, but also to draw on their competencies and ideas in finding solutions for some of the challenges the city faces. This process enables to generate more (better) ideas and to qualify solutions. For the municipality, to implement such co-creation approaches, it is relevant to understand the needs of its stakeholders and how to involve more people in the development process.

The city has used co-creation to achieve the following objectives:

- Engage stakeholders (incl. citizens)
- Create new services
- Integrate available services/products
- Advance available services/products
- Generate public values
- Support communities of practice
- Improve communication processes
- Increase effectiveness of services
- Provide financial and economical sustainability of services
- Create a sense of ownership with stakeholders (incl. citizens)

Milan is interested in implementing co-creation strategies mainly during the co-design and co-implementation phases. The main stakeholders involved in these approaches are:

- Citizens
- Industry
- Public sector (federal or local government departments)
- Utilities
- Service providers

The stakeholders are involved by the city of Milan in co-creation processes to identify new processes in the service/product development phase and in brainstorming processes to evaluate concepts and support communities of practice. Moreover, the stakeholders in Milan contribute to improve governance approaches, by participating to co-creation activities to make sure the eco-system is reliable, trustworthy and protects citizens. The city rewards its stakeholders for participating in such processes through virtual prizes, professional and community recognition. The co-creation methods currently used by the city of Milan are:

- Gamification
- Appraisal interviews
- Basis SWOT Workshops
- Strategic roadmaps
- Role Play

The tools used by the city to apply such methodologies are mainly social media, apps, mock-ups, character profiles and storyboards. The success of the co-creation activities exploited is evaluated in terms of increasing the number of people participating in such processes, improving the collaboration among different departments of the city and quality of data collected, improving innovation capabilities, increasing effectiveness, sustainability and adoption measures of the solutions adopted, improving services and products' adoption measures and increasing the use of co-creation activities.

The city of Milan has declared to use co-creation methodologies mainly during co-design and co-implementation phases, however, there are several methodologies they currently

use that can be useful also in the co-evaluation phase, which is a relevant step before the co-implementation one, these are Appraisal interviews, Basis SWOT workshops, Role play and Strategic roadmaps (this one is also important for the co-analysis phase).

Furthermore, there are several tools not yet in use by the city to take advantage of, indeed issue cards can be used in both Gamification, Basis SWOT workshops, Strategic roadmaps and Role Play to visualise the current situation and different viewpoints. Affinity diagram should be applied Gamification and Basis SWOT workshops, such as the Motivation matrix to the Strategic Roadmaps and Basis SWOT workshops for organising facts on clusters and to focus on their different motivations. Mind maps and toolkits are also useful in Appraisal interviews, Strategic roadmaps and Basis SWOT workshops to support the users to visualise information, especially during brainstorming.

According to the information included by the city of Milan within the questionnaire and the discussion emerged from the interview, we suggest to the municipality to implement also the **Living labs** and **Lego Serious Play™** co-creation methodologies, which are both very useful in the co-design phase.

Living labs are relevant for implementing real-life experimentation processes to effectively engage stakeholders, integrate and advance available services and products by consequently increase its efficiency, generate public values and provide economic sustainability. This methodology is effective to improve both services/products' adoption measures, their use and innovation capabilities.

With reference to the second methodology, it can be applied both during co-analysis and co-design phases to support the communities of practice involved in Milan to generate public values and to create new services. Moreover, Lego serious Play™ is really useful to improve communication processes and innovation capabilities, thus enhancing efficiency and sustainability of solutions.

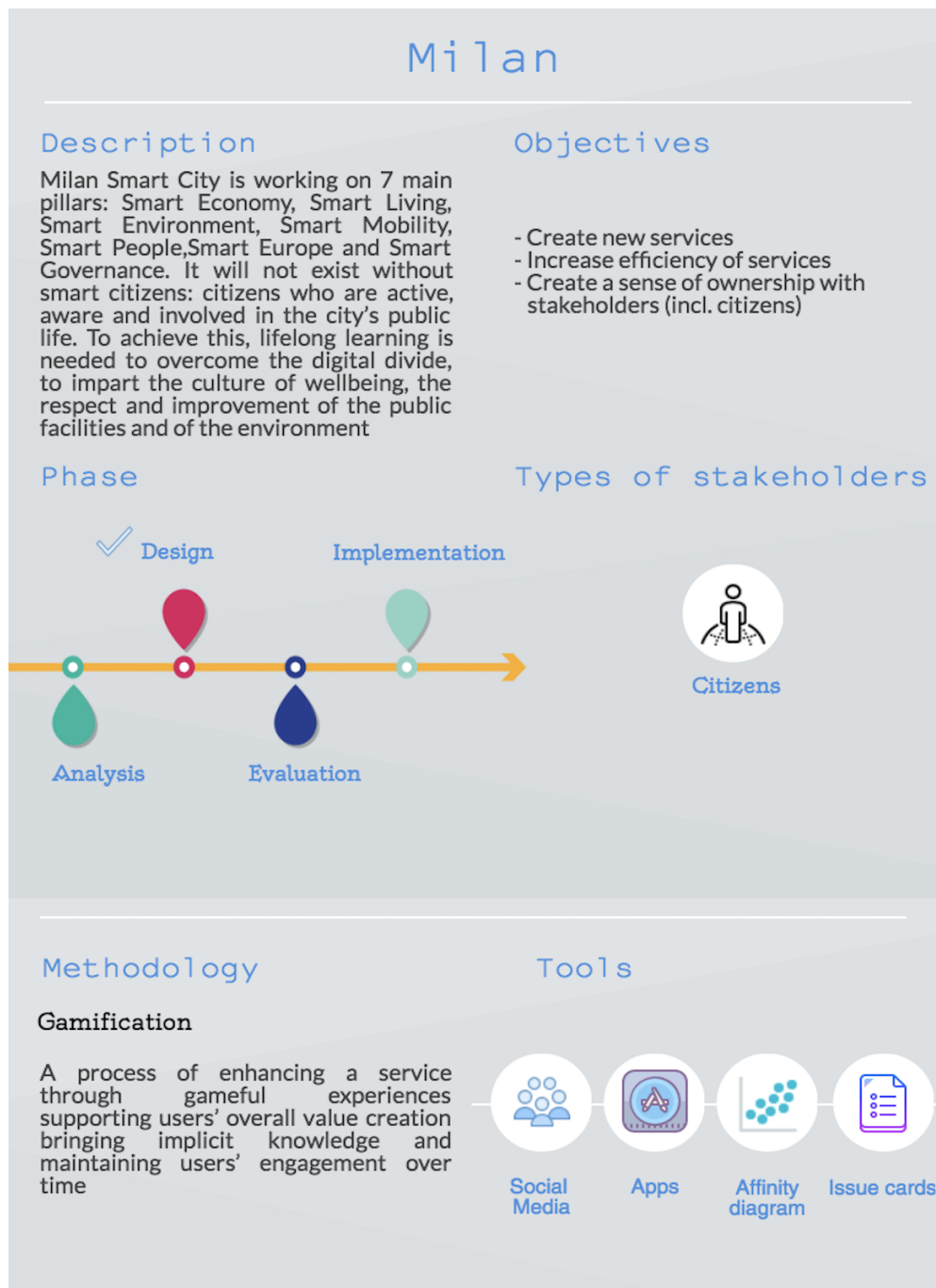


Figure 25 Milan co-creation card: Gamification

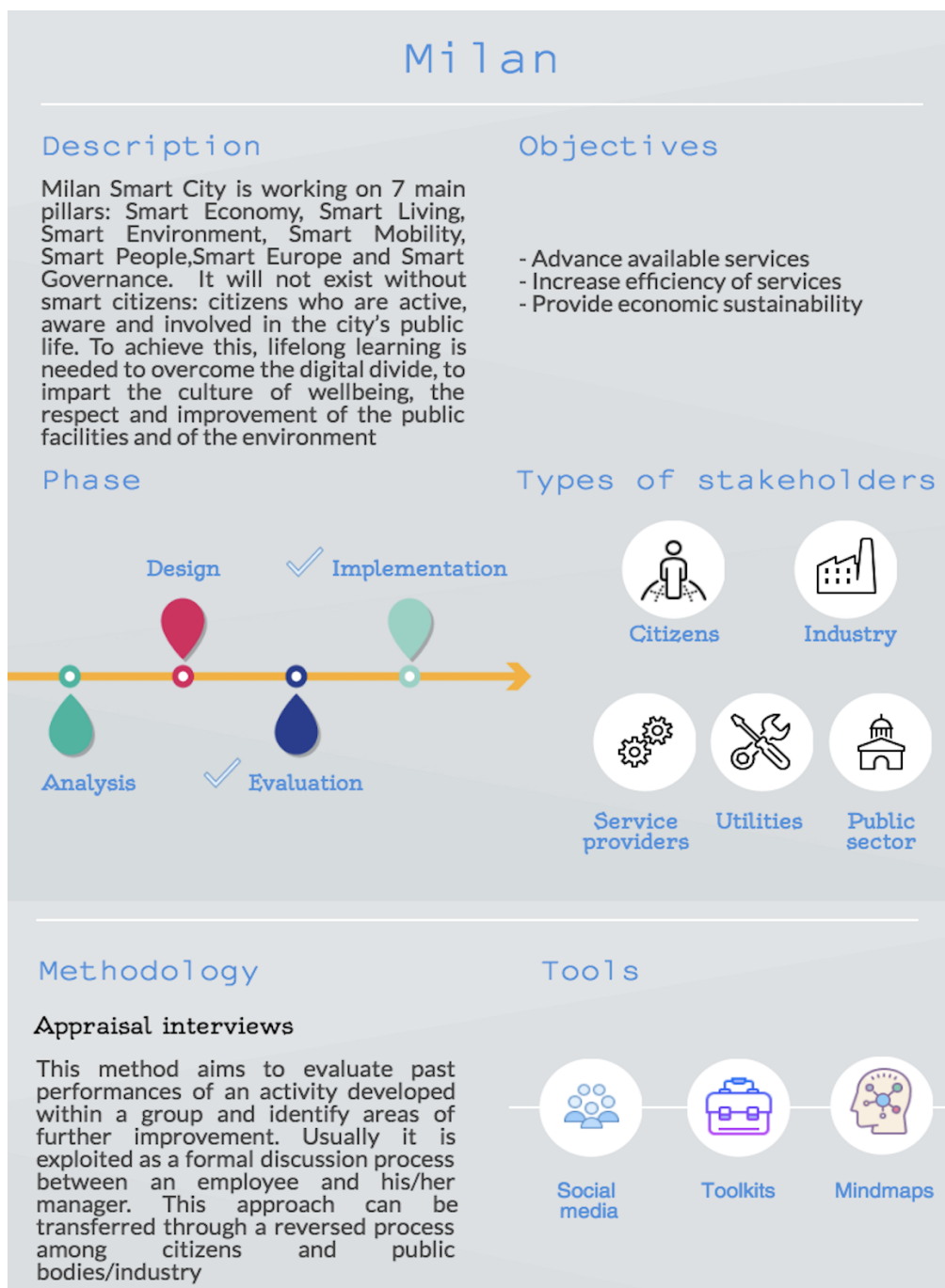


Figure 26 Milan co-creation card: Appraisal interviews

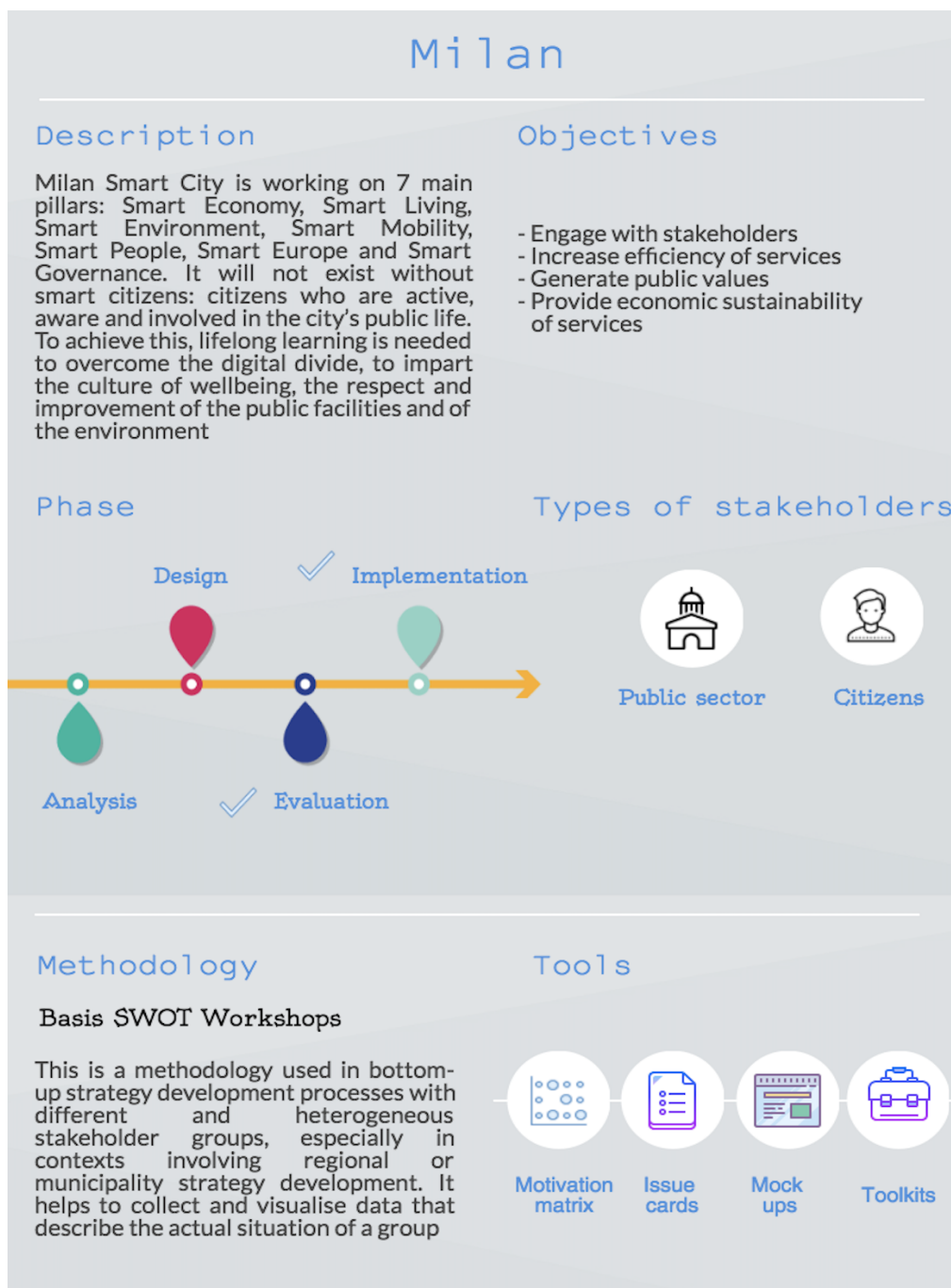


Figure 27 Milan co-creation card: Basis SWOT workshops



Figure 28 Milan co-creation card: Strategic Roadmaps

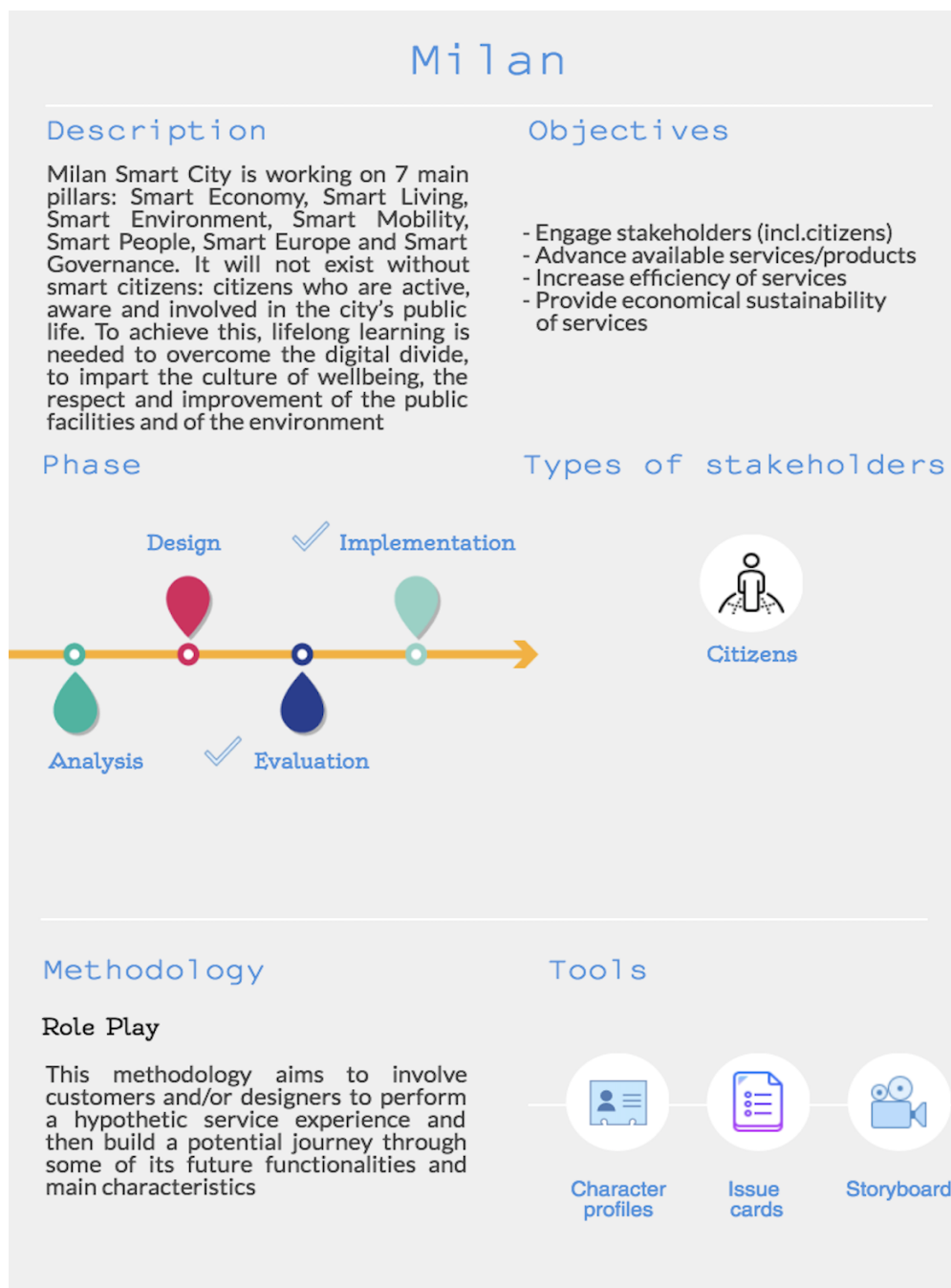


Figure 29 Milan co-creation card: Role play

5.2.7 PORTO

Porto uses co-creation processes to design solutions and strategies with citizens and partners. They practice it regularly as part of the design process with citizens, public and private entities, such as companies, startups and academia. For example, over the past 2 years Porto has been involving people and partners in the strategy of the municipality. The city activates co-creation activities as they believe that the city shouldn't be developing everything, and isn't necessarily best suited to solve every issue.

The city uses co-creation to achieve the following objectives:

- Identify stakeholder needs
- Engage stakeholders (incl. citizens)
- Create new services
- Integrate available services/products
- Raise the level of awareness on different topics
- Increase trust on governmental services
- Transfer and sustainable conservation of implicit knowledge
- Improve communication processes
- Increase efficiency of services
- Increase effectiveness of services

The whole co-creation lifecycle is included in such co-creation process involving the following categories of stakeholders:

- Citizens
- Industry
- Public sector (federal or local government departments)
- Utilities
- Research
- Suppliers
- Customers
- Service providers

Stakeholders in Porto are mainly involved in co-creation in order to provide comments on services/products, generate novel ideas and evaluate concepts during brainstorming

processes, or for improving governance practices. Additionally, co-creation is also used in strategic planning. Porto has a specific project on this - in the Porto innovation hub project they have been developing several activities with city stakeholders. These include workshops, concept development (co-design) and focus groups. Porto is using 25 informal talks (by city councillors, specialists and members of the ecosystem). They then collect all information from the 25 talks and turn this into a report. Local groups will then use the report to define a new strategy for the city.

The city rewards its stakeholders for participating in such co-creation processes through virtual prizes and community recognition.

Challenge Porto is an interesting project that brings these stakeholders together, inviting citizens to tell the city what their needs are, which are then explored and challenge briefs are co-created. With this challenge, the city goes out to local entrepreneurs and creates solutions using an open call, winning solutions then worked up with citizens and deployed within the city. There is a 'deployment' budget not a cash prize because they want to see impact within the Porto.

The co-creation methodologies already in place in the city of Porto are:

- Living labs
- Personas
- Appraisal interviews
- Basis SWOT workshops
- Strategic roadmaps
- Lego serious play™

The tools used to implement these methodologies are mainly apps, visual collaboration maps and mind maps, toolkits, crowdmapping and storyboards. The success of such co-creation activities developed by Porto are evaluated against the capability of the city to increase collaboration across cities and the number of people participating in cities co-creation processes in order to consequently improve collaboration among different departments in a city. All cities work within a political environment, but in Porto co-creation has enabled the Smart Cities Unit to work in an open way and helped to avoid issues with politics (this is helped by the independent candidate that is currently Mayor of Porto).

The main objectives of Porto to apply co-creation methodologies are economic, indeed, by

using co-creation you can support start-ups to grow and allow the city to develop innovative solutions to challenges with concepts designed by citizens. This is also relevant to improve user satisfaction measures, innovation capabilities, the quality of data collected and the sustainability of the solutions proposed, by consequently increasing the efficiency and the provision of cost-efficient services and products provided.

Below a visualisation of the methodologies already in use in the city of Porto and a suggestion for the tools to be applied to such methodologies to better achieve the objectives declared by the city in the questionnaire.

The city of Porto has already implemented several co-creation methodologies that perfectly respond to its need of engaging the stakeholders in the user-centred development process. The whole co-creation lifecycle is included in the approach and the methodologies put in place cover the entire process. Hence, we do not have suggestions to Porto to implement other methodologies.

However, there are several tools involved in the different methodologies that have not been considered to be applied by Porto yet and that can be very beneficial for the city to better improve the results achieved by implementing co-creation approaches. Indeed, within Living Labs, it would be beneficial to use also motivation matrix, issue cards and mock-ups especially within the co-design phase for developing new services, such as in organising the Basis SWOT Workshops for the evaluation and implementation of the services.

With reference to Personas and Lego serious play™, the tools usually applied in these methodologies are the affinity diagram, character profiles and issue cards indeed it is not clear which kind of tools are now being used by the city of Porto for exploiting these methodologies. In terms of implementing Strategic roadmaps also motivation matrix, issue cards and affinity diagram more than mind maps can best support the application of such methodology.

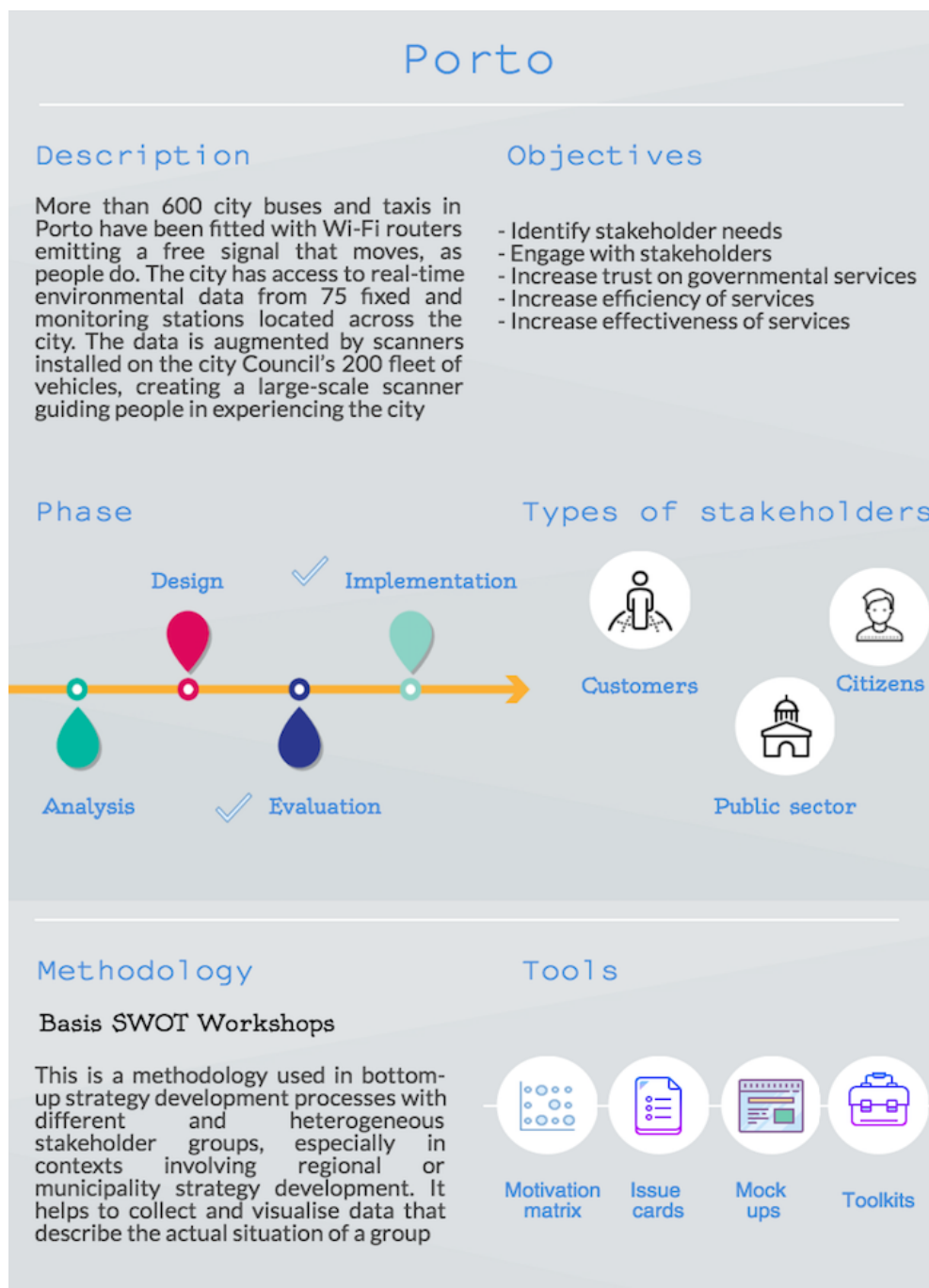


Figure 30 Porto co-creation card: Basis SWOT workshops



Figure 31 Porto co-creation card: Personas

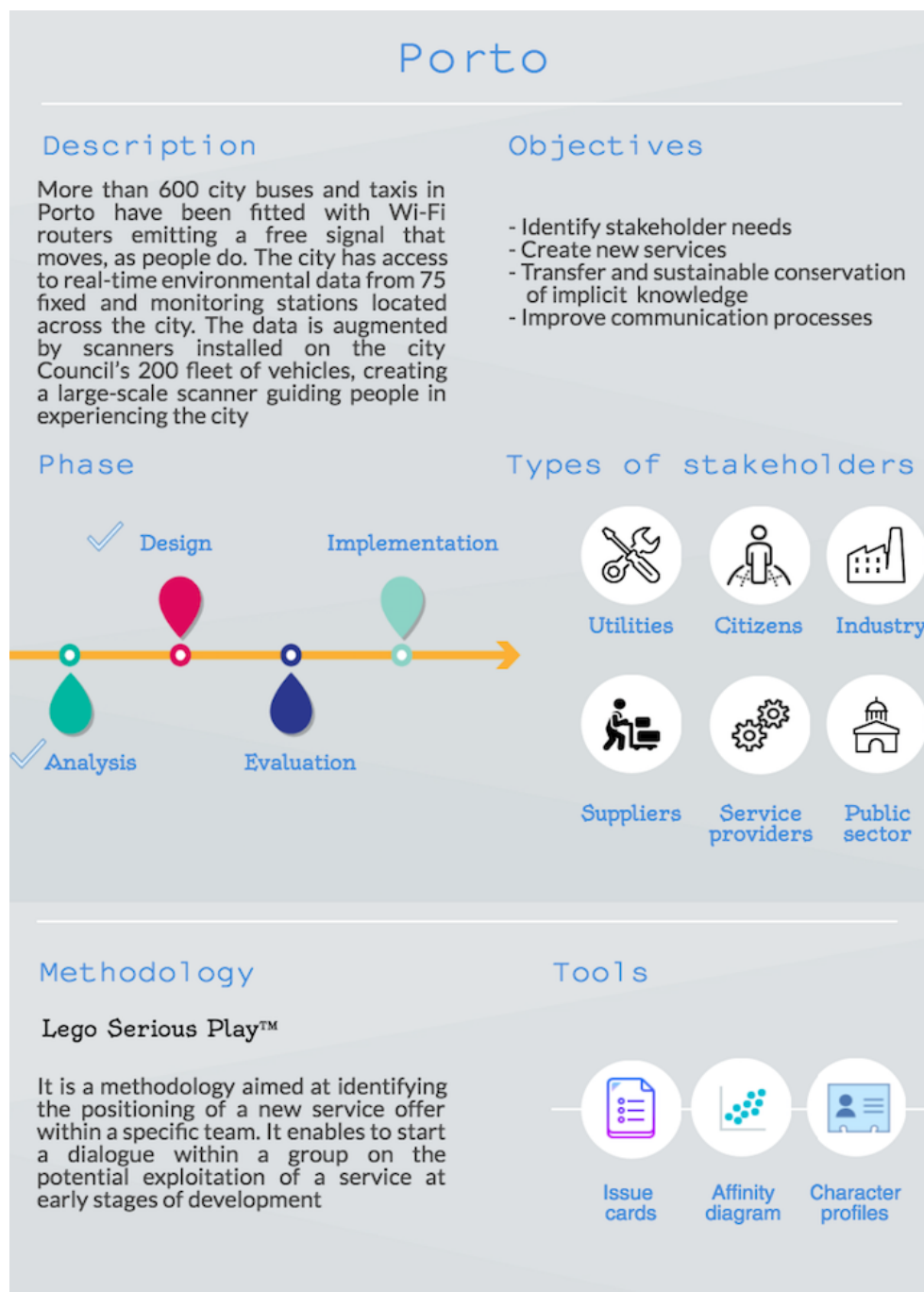


Figure 32 Porto co-creation card: Lego serious play™

5.2.8 SANTANDER

Co-creation is important for Santander as it is the way to guarantee an inclusive approach to this smart city paradigm. One of the main drawbacks in building the smart city, is the fact that at the very the beginning citizens feel really far from what is happening around them. So, the only way to overcome such barrier is fostering activities in which they participate in one or another way. The first step in mobilising the co-creation paradigm is supported by the municipality and the university. The municipality makes an important effort in attracting the attention of people potentially interested, based on the experience they got in the past from similar events. The university and SMEs provide the technical background that the citizens and other third parties may use for co-creating. Third parties, not only citizens, but also SMEs and other activists that might be interested in developing applications are involved in co-creation processes by the city. Santander implements co-creation activities to achieve the following objectives:

- Raise the level of awareness on different topics
- Improve communication processes
- Increase efficiency of services
- Increase effectiveness of services

They use co-creation during the co-analysis and co-design phase. The main stakeholders of Santander are:

- Citizens
- Industry
- Utilities

Citizens are involved in co-creation processes by Santander especially for providing comments on products and services or generating novel ideas and for supporting communities of practice. Citizens participating in co-creation processes are mainly rewarded by the city of Santander through monetary prizes, professional and community recognition. The city organises open calls linked to projects, but also workshops every two months, or they can also be even more spontaneously organised. It depends on the interest of the own Municipality which triggers the actions, supported by the university from the technical point of view. Usually SMEs collaborates in this process. The methodologies applied are:

- Living labs
- Appraisal interviews

The city of Santander has developed a specific platform which contains several tools for

developing co-creation activities together with their stakeholders. The success of such processes is evaluated in terms of increasing the number of people participating in co-creation processes, thus improving innovation capabilities and user satisfaction measures. With the following cards developed for Santander, we aim to support the city to better exploit the potentialities of each methodology. Indeed, with reference to the Living labs methodology, we show a full set of tools that can be implemented. With reference to the Appraisal interviews methodology, usually this is mainly applied during the co-evaluation and co-implementation phase, which the city has stated to not include these steps within its co-creation processes. Indeed, this methodology is best implemented to evaluate past performances of services and there are other methodologies that can best help the city to implement co-creation processes within the co-analysis and co-design phase, especially considering the main objective of the city of Santander is to guide citizens in providing novel ideas on services and products.

Indeed, the co-creation methodologies that can best support the city of Santander to implement co-creation activities for generating novel ideas and communicate with its stakeholders are **Gamification** and **Bodystorming**. The first one is usually applied within the co-design phase to both involving users in brainstorming processes on products and services, and for increasing users' engagement within the whole co-creation lifecycle. This process can enable the city to improve the efficiency and effectiveness of products and services, supporting communities of practice to work together and to improve innovation capabilities. The tools used in gamification processes are mainly social media, issue cards, apps and affinity diagram, which should easily been able to be integrated in every platform already in use by the city of Santander. The bodystorming methodology is used both in the co-analysis and co-design phases to physically setting up an experience and allow the stakeholders to provide feedback. This methodology is very useful for creating new services and products, to transfer implicit knowledge and improve communication processes, which is also one of the main objective of Santander in implementing co-creation practices. Bodystorming enables also to generate novel ideas, select them and identify future strategies. The main tools used within this methodology are character profiles, storyboards and issue cards. As a result, Bodystorming will have a huge impact in increasing the number of people participating in co-creation and improving innovation capabilities.



Figure 33 Santander co-creation card: Living labs

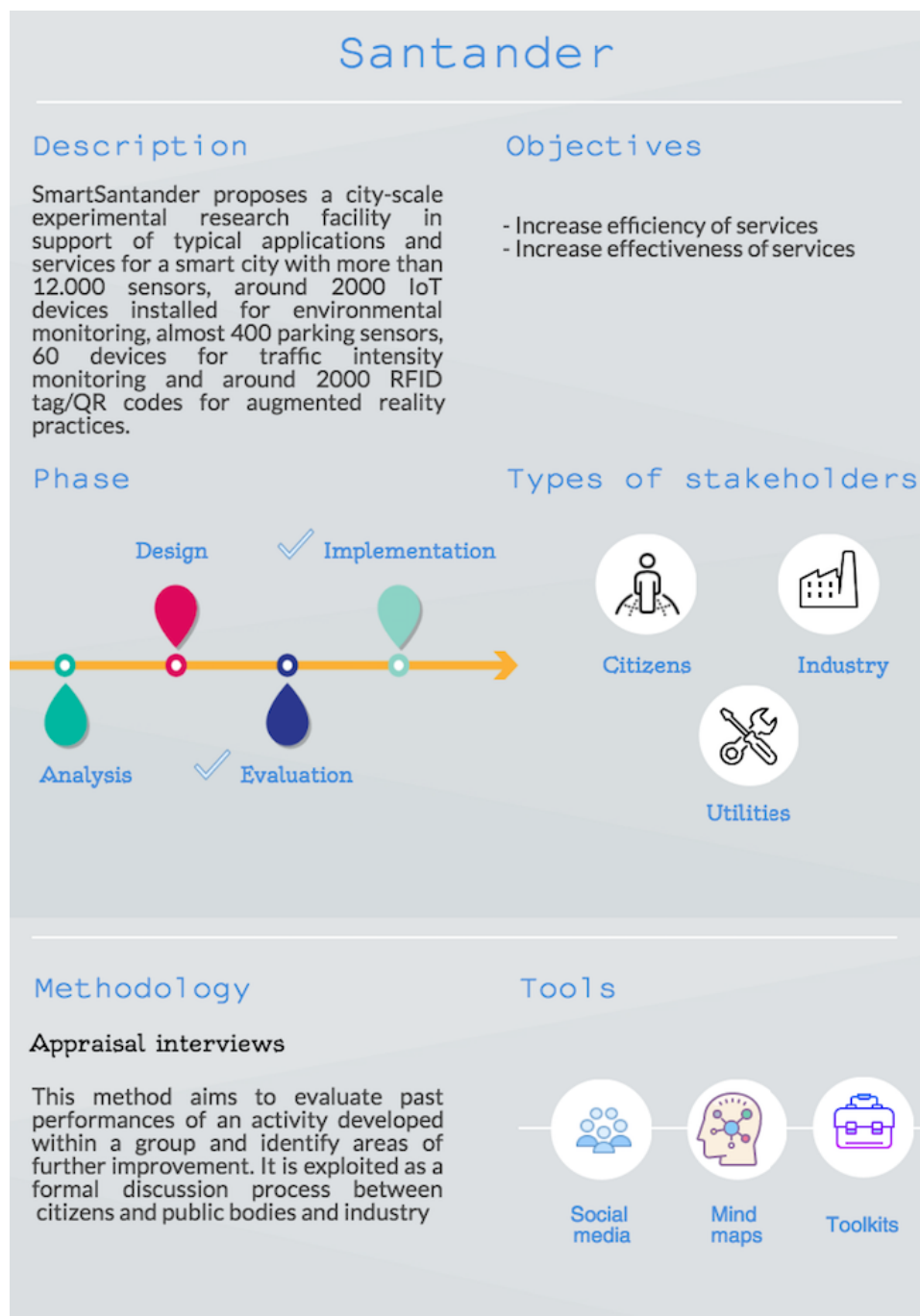


Figure 34 Santander co-creation card: Appraisal interviews

5.3 GUIDELINES TO IMPLEMENT CO-CREATION METHODOLOGIES

5.3.1 PERSONAS

Suggested time

3 to 9 days (one person engaged)

Level of difficulty

Moderate

Number of participants

From 100 to 300 (involved in both questionnaires and personas workshops)

Steps

1. Finding the users: the first phase aims to profile the end-users of the services or products co-created by implementing the personas methodology. Information can be gathered through interviews, observations, questionnaires, reports, companies and markets' data.
2. Building a hypothesis: since the methodology is focused on how the users will act in a specific context, hence is relevant the hypothesis takes into account specific characteristics of the users and their needs. This baseline information can be extracted through interviews with potential users.
3. Verification: this step is focused on finding data to support the initial hypothesis in order to support the personas' description and the scenario portrayed. This analysis requires to investigate also the values and attitudes of the users.
4. Finding patterns: this phase aims to make sense of the data collected to finally depict the profile of the end users often through qualitative analysis.
5. Constructing personas: it is the process of describing personas without stereotypes, but real users that are easy to engage in the co-creation process and can provide

- effective results. The description should include: a photo of the person, description of attitudes, the social background, emotions toward technologies and personal traits.
6. Defining situations: this phase drafts real scenarios starting from the previous personas' descriptions. It includes an analysis of the context in which the user will use the products or service.
 7. Validation and buy-in: this process collects the opinions of the participants about the personas' descriptions.
 8. Dissemination of knowledge: personas' descriptions and all the information about the co-creation process should be shared and promoted as much as possible with people involved in the approach and exchanged with potential newcomers.
 9. Creating scenarios: a scenario it is a main character that should act to achieve a specific objective. Potential issues in achieving the goal identified within the scenario should be also considered in order to have an effective and real scenario.
 10. Ongoing development: the information about personas should be up to date in order to be used within different co-creation lifecycles

Requirements

- *User involvement*: personas are not roles which people play, but for best representing the final real user of the system, it is needed to know well their needs. It is an infrastructure for engagement and a mean for communicating data collected by using other user research methods.
- *Service and infrastructure development*: personas helps to keep the assumptions and decision-making criteria explicit within the service and infrastructure development process. Personas enable to focus the attention to a specific target audience and different categories of users at the same time.
- *Innovation outcomes*: potential usage of real services and products is investigated through personas. Indeed, this methodology is used to inspire and inform service innovation by exploring customers typologies and their needs. Personas' methodology provides a qualitative representation of the market and is focused on an in depth understanding of its customers

5.3.2 LEGO SERIOUS PLAY™

Suggested time

From 3 to 5 hours

Level of difficulty

High

Number of participants

4 to 10, max 12 participants per group (a facilitator for each group is needed)

Steps

1. The challenge/s: the first phase aims to identify the challenge to solve. Potential challenges could be used to build a model for future success and combine models to get support from the team, understand who you are on a team or how you perceive the team and which are its aspirations. Strengths and weaknesses of the model can also be investigated, together with retrospectives.
2. Build the model: to define a metaphor to analyse the applicability of the model/s previously identified within the challenge step.
3. Sharing, give meaning, tell your story: this phase is focused on describing the processes needed to effectively put in place the model and processes required to achieve the expected results. A learning processes is involved, which enables the participants to be more committed in the approach and enjoy the activity.
4. Questions and reflections: the facilitator during this phase will ask for clarifying questions to the team, also required to support people to express themselves and implement an effective participatory approach to co-creation.

Requirements

- *User involvement:* within this methodology, the user involvement is very high, since it is focused on exploring the relationships and connections between people and their world, analyse the dynamics and various hypothetical scenarios. Story making is also implemented to better involve users to work together in drafting several scenarios

and share the same understanding.

- *Service and infrastructure development*: this technique improves problem solving, it enables to explore various hypothetical scenarios and increase the awareness of the service development possibilities. Different infrastructural and service scenarios are exploited to deepen the understanding of the whole development process.
- *Innovation outcomes*: the main innovation goal of this technique is to enhance the business performance by reducing the time needed to create a new service or product and increase its future adoption. It is also an effective communication tool, able to provide innovative insights

5.3.3 GAMIFICATION

Suggested time

From 10 days to months

Level of difficulty

Very high

Number of participants

From 5 to maximum 30

Steps

1. Learning outcomes: identify which are the objectives you aims to achieve through the approach learning by doing. These outcomes should be quantifiable.
2. Choose the idea: define a theme and a challenge to accomplish.
3. Select the process: create a storyboard of the game.
4. Identify the learning activities: choose which are the steps needed to realize the learning outcomes.
5. Define the team: the social part of learning is very relevant, for this reason the group participating in the game has to be formed by taking into account the expertise and

characteristics of each player.

6. Apply dynamics: consider motivation, rewarding systems and challenges, but also leave some space for individual interpretation of the game.

Requirements

- *User involvement*: gamification is essential to facilitate various target audience to be part of the co-creation process and for decision making. Is important to have a clear idea of the user groups that have to be involved since the beginning of the activities to increase the likelihood of adoption of products/services.
- *Service and infrastructure development*: gamification is very useful to identify user requirements which constitute the baseline for service and infrastructure development. Gamification processes implemented should take into account the individual differences and preferences of users to increase their satisfaction.
- *Innovation outcomes*: to develop a game from the scratch is very time consuming and expensive. This is the reason why gamification can only be effective for innovating products and services only if you provide the right environment for increasing collaboration rather than competition. To stimulate different groups to join forces amongst different groups is the perfect way to boost the potentialities of this methodology.

5.3.4 BODYSTORMING

Suggested time

1 to 2 hours

Level of difficulty

Easy

Number of participants

3 to 6 participants

Steps

1. Identify the users who can play the bodystorming process.
2. Assign roles to the participants in the project team, previously defined through a journey map.
3. Ask to the participants to perform their activities as usual.
4. Identify several touch points and analyse how the people achieves their usual goals.
5. Review the whole exercise with the team and document the results/challenges experienced

Requirements

- *User involvement*: the method is useful for generating empathy among users and provides clues about the impact of the environment on the user experience. It can also involve teams or groups working together for achieving the same objectives. In this sense, bodystorming is very useful for gaining more knowledge and understanding of user experiences.
- *Service and infrastructure development*: bodystorming can be implemented within the whole service development process. It is especially useful in gathering information about the use of a potential product and is also a very cheap and fast methodology for infrastructure development.
- *Innovation outcomes*: the methodology should be one of the first steps taken in the problem definition stage within the innovation process, used also for communicating ideas around an envisioned scenario and for defining recommendations

5.3.5 APPRAISAL INTERVIEWS

Suggested time

1 to 2 hours

Level of difficulty

Moderate

Number of participants

One per interview

Steps

1. Establish performance standards and criteria for evaluation. In order to do this process, the activities developed by each actor within the organisation should be described. This approach allows to identify the tasks that are more relevant for achieving the goals expected.
2. Establish performance evaluation policies and the steps necessary for the process, e.g. how, when and how often the activities performed should be evaluated.
3. Prepare interview guidelines and evaluation criteria by identifying the introductory text and the set of questions to be asked to the participants. The main objective is to evaluate the past activities carried out and to set the goals for the through with a specific action plan.
4. Schedule the interviews.
5. Conduct the face to face meeting by first introducing the topic, explaining the process, set the objectives of the discussion together. Share your view about the performance and discuss potential improvements. Find mutual agreements on the results of the performance assessment and delineate together the next steps to improve it.
6. Summarise the results, agree on the action plan and on milestones

Requirements

- *User involvement*: it is a relevant prerequisite of the process, since if the participants do not feel comfortable to share their opinions, no result will be achieved. Moreover, it can be necessary to schedule other meetings with the participants in order to better exploit some topics, so a long term engagement is sometimes required.
- *Service and infrastructure development*: this technique is mostly used in the co-evaluation and co-implementation phases, hence this is not strictly related to the designing step, but can be useful for providing feedback on an actual performance of a service or an infrastructure for further developments.
- *Innovation outcomes*: the result of the appraisal interviews is to define strategic plans for future innovation development approaches and for improving innovation capabilities of stakeholders involved. By analysing performances, the approach

enables the actors directly engaged in service or product development to align it with the KPIs to increase also the efficiency and effectiveness of innovation outcomes

5.3.6 BASIS SWOT WORKSHOPS

Suggested time

2.5 to 3 hours

Level of difficulty

Easy

Number of participants

5 to 10 people

Steps

1. Identify a homogeneous group and select what kind of people are going to participate in the workshop.
2. Prepare several slides showing the different roles concerning knowledge transfer in the innovation system, one per participant.
3. Provide an introduction about the context and describe the characteristic of the participants and their relation to the whole innovation system.
4. Describe the strategy development process and the role of the SWOT analysis inside this process.
5. Present the methodology and the agenda.
6. Collect strengths, weaknesses, opportunities and threats.
7. Select the most important SWOT categories.
8. Set the objectives for the innovation strategy.
9. Select and present actions to be implemented by voting them and effectively put into place within the innovation strategy

Requirements

- *User involvement*: create templates for the documentation of answers can be very useful to convince the users to provide more information during the workshops. However, the discussion should always be guided and not much brainstorming.
- *Service and infrastructure development*: this methodology is not aiming to develop services and infrastructures. It can be applied for identifying and building an innovation strategy, which is a prior phase required for infrastructure development.
- *Innovation outcomes*: the final outcome is an innovation strategy accurately defined with a set of actions to be implemented, directly decided by a group of actors within the city, taking into account regional and national peculiarities, and the needs within the innovation value chain

5.3.7 STRATEGIC ROADMAPS

Suggested time

2 to 3 hours, usually several workshops are held in 1 or two days

Level of difficulty

Moderate

Number of participants

Different groups of 4 to 6 participants at maximum

Steps

1. Set priorities: participants are asked to provide ideas to identify innovation requirements. They should be provided with background information and the facilitator should know well the interest and expertise of the participants. This step aims to analyse the current situation and identify actions to be put in place for achieving future results.
2. Develop roadmaps: actors are split in different groups to discuss the priorities and each group has to draft a roadmap that should consider the current state, and both medium to long term time frame.

3. Identify the implementation actions: after the definition of the roadmaps, a series of actions and/or project ideas will be identified by providing also a description of expected results, an exploitation plan and an analysis of potential impacts

Requirements

- *User involvement*: trust and creativity should be ensured throughout the whole process, it is important that users feel involved within the whole development lifecycle to be able to take care of the implementation actions.
- *Service and infrastructure development*: the actions defined through the strategic roadmap approach are useful for improving the service/infrastructure development process.
- *Innovation outcomes*: the approach is relevant for achieving effective results in terms of innovation, since the strategy drafted guides the participants to identify tangible results to be achieved in terms of applications/tools, methods, etc.

5.3.8 SOCIAL NETWORK ANALYSIS

Suggested time

2 to 3 days

Level of difficulty

Moderate

Number of participants

From small groups of 10 or 20 people to large networks consisting of several thousands actors

Steps

1. Clarify the objectives and define the scope of the analysis (knowledge domain).
2. Develop the methodology.
3. Identify the network members.

4. Collect the data and gather further information from other resources.
5. Analyse the data through formal methods of social network analysis.
6. Interpret the results from the analysis.
7. Design interventions and identify the following actions

Requirements

- *User involvement*: social network analysis aims at interpreting data and relationships among nodes in a network, without any interview or survey process. Hence, this methodology analyses info already available on the web and it not involves directly users in the process.
- *Service and infrastructure development*: this methodology does not aim to engage the users in any development, however it analyses network structures and positions to improve knowledge sharing, which can be indirectly useful for service and infrastructure development.
- *Innovation outcomes*: the social network analysis provides information for influencing actors and their relationships through follow up activities, and as a consequence, also the innovation strategies for new service implementations

5.3.9 ROLE PLAY

Suggested time

1 to 2 days

Level of difficulty

Moderate

Number of participants

1 to 6

Steps

1. Present the problem, by providing examples, to predict what might happen.
2. Select participants and assign the roles.
3. Define a line of action to restate the final roles.
4. Assign tasks to the group for involving it within the whole duration of the activity.
5. Play the roles in a spontaneously “live” situation.
6. Review and discuss the action played.
7. Share new interpretations of roles and investigate potential causes and effects.
8. Discuss and evaluate the actions played.
9. Share the experiences

Requirements

- *User involvement*: it is very important as every participant increases the awareness of results achieved by sharing the activities performed. To achieve this objective, the actors should have the power to discuss directly and freely their opinions.
- *Service and infrastructure development*: Role play is best serving the need of developing strategies and building empathy among people. Service and infrastructure development can be also involved if a journey experience is prepared with the aim to evaluate actual and potential features of a product or service.
- *Innovation outcomes*: by analysing and reviewing the current and potential future performance of a service/product, the participants solve issues relevant for speeding up the innovation process and go to the next phase of the lifecycle. To achieve this goal, it is important the organiser focuses the activities on a real product/service experience

5.3.10 LIVING LABS

Suggested time

2 days minimum

Level of difficulty

High

Number of participants

8 to 10 participants

Steps

1. **Idea:** define a vision and turn it into a concept. This phase includes to analyse needs and gaps of the stakeholders, in order to investigate potential benefits of the solution proposed.
2. **Prototype:** is the step required for developing a product o/service and put it into action by testing it several times.
3. **Evaluation:** it aims to validate the product/service with end-users in a real life environment to detect the real interest of the stakeholders. It also investigates the application of business models and defines the necessary principles for the next step.
4. **Market launch:** to implement the business-driven approach previously identified by defining competitors, willingness to pay of users and value of the network, for the successful introduction of the solution proposed into the market

Requirements

- *User involvement:* end-users are involved within the whole co-creation process, legal requirements are clear and shared with all the stakeholders, open data are automatically collected and available online for all the citizens. Community building methods have been implemented.
- *Service and infrastructure development:* value-added services are implemented and the infrastructure is interoperable.
- *Innovation outcomes:* stakeholders' needs are taken into account, the target market is specified and IPR principles are established. The development of patents is investigated. SMEs potentially relevant for the co-creation process are engaged and business models are identified.

6 CONCLUSIONS AND NEXT STEPS

This document has presented four main tools to the Reference Zones involved in SynchroniCity:

1. A **first set of 10 methodologies** to be used in user-centred co-creation approaches, with specific information on objectives, tools to apply, categories of stakeholders to be involved, tasks to assign, rewarding systems to put in place and success factors to assess.
2. A **picture of the current needs**, implementation and use of co-creation methodologies and tools for each reference zone.
3. A **guideline and a set of requirements** on how to best apply such approaches and tools.
4. A **set of cards**, included in Appendix 3, to be used by the reference zones for sharing and promoting their expertise with other cities and stakeholders involved in their co-creation activities

The exercise implemented in this deliverable has been very useful to identify what are the **main challenges** the reference zones are experiencing in applying co-creation, and **how SynchroniCity can play a role in supporting the cities** to further developing co-creation activities.

In general, all the reference zones have already used co-creation methodologies, especially for engaging their stakeholders in service development processes. The online questionnaire and the in-depth interviews have shown the 10 methodologies listed and presented in this document have been effectively used by them. However, it has been also detected the importance of **hackathons** as a co-creation methodology: already used by Helsinki, to be implemented later on by Manchester. This methodology should be then included in the second version of the deliverable.

The **main challenges** for the reference zones in terms of co-creation are:

- Engage the stakeholders in the first place and organise co-creation activities with new actors in the city.
- Effectively deliver what is designed or agreed with them.
- Have a platform which really incentivises the third parties to be involved in the co-creation activities.
- Select the right tools to be used by the different categories of stakeholders involved every time in a co-creation approach.
- Build a co-creation community and constantly engage the actors in the process.
- Cope with 'big players' proposing a set of co-creation tools that are cheap, or consultancy services in case of SMEs, that are not aligned with the real needs of the cities.
- Get the right methods to reach and keep the different groups of stakeholders interested over time and to address their needs.
- Make clear to the different stakeholders what is in it for them, considering the different level of knowledge.
- Change the culture of municipalities for implementing co-creation approaches by implementing a bottom up approach

SynchroniCity can play a role to support the cities in applying co-creation more by:

- Exploring participatory engagement further.
- Enabling the reference zones to learn from other cities and identifying concrete links amongst them.
- Increasing synergies with existing projects and the potential target audience of each city.
- Supporting the cities to implement a co-creation ecology to test community policy suites.
- Having a wider view on how the co-creation activities should be carried out.
- Finding ways to get clusters working better together.
- Improving the knowledge of the cities on co-creation to help them to apply such approaches by themselves.
- Providing some insights on how new co-creation methodologies can be used, an explanation of tools and what kind of results they can achieve with co-creation.
- Taking engagement and co-creation activities into the IoT domain.
- Connecting possible users and co-creators involved in each reference zones' activities through the Living Labs part of the project

As from the requests of several reference zones, the second version of the deliverable will be focused on better analysing what are the main results and issues faced by the cities in applying the co-creation methodologies here proposed and it will provide a final set of them to be used throughout the whole lifecycle of the SynchroniCity project, by discussing these directly with the cities already in the consortium, and with the new ones that will join us in the upcoming six months.

REFERENCES

1. Adams, E. (2009). Fundamentals of Game Design, Third Edition. Pearson - Allyn and Bacon
2. Arnkil R., Järvensivu A., Koski P., Piirainen T. (2010). Exploring Quadruple Helix. Outlining user-oriented innovation models . European Regional Development Fund and University of Tampere, Institute for Social Research, work Research Centre, Tampere, Finland
3. Arvola M. & Artman H. (2006). Interaction Walkthroughs and Improvised Role Play. DeSForM 2006, Eindhoven, The Netherlands, <https://www.nada.kth.se/~artman/Articles/Conference/arvola-desform06.pdf>
4. Ballon, P. (2015). Co-creation in action: the Impact of Living Labs, p. 5, <http://www.jiip.eu/dweb/sites/default/files/news/5.%20Pieter%20Ballon%20Open%20Innovation%20JIIP.pdf>
5. Ballon, P., Pierson, J. & Delaere, S. (2007). Fostering Innovation in Networked Communications: Test and Experimentation Platforms for Broadband Systems. In S.B. Heilesen & S.S. Jensen (Eds.), Designing for Networked Communications: Strategies and Development (pp. 137-166). London, ISI Global
6. Botan, C., Hazleton, V. (1989). Public Relations Theory. New Jersey: Lawrence Erlbaum Associates
7. Björgvinsson, E., Ehn, P. & Hillgren, PA. (2010), 'Participatory Design and democratizing innovation'. Proceedings of PDC 2010, Sydney, Australia http://drifttest.moodle.aau.dk/pluginfile.php/447681/mod_folder/content/0/%20participatory%20design%20and%20democratizing%20innovation%20-%20bjorgvinson.pdf?forcedownload=1
8. Browne, J., Temkin, B. D., Geller, S. (2008). Design personas best practices from Japan. Examining how four organizations successfully use design personas. Forrester Report
9. Buchenau M. & Fulton Suri J. (2000). Experience prototyping, paper presented at Symposium on designing Interactive systems, New York, Usa, [http://5a5f89b8e10a225a44ac-ccbcd124c38c4f7a3066210c073e7d55.r9.cf1.rackcdn.com/files/pdfs/news/FultonSuriBuchenau-Experience PrototypingACM 8-00.pdf](http://5a5f89b8e10a225a44ac-ccbcd124c38c4f7a3066210c073e7d55.r9.cf1.rackcdn.com/files/pdfs/news/FultonSuriBuchenau-ExperiencePrototypingACM8-00.pdf)
10. CABA (2002) Technology Roadmap for Intelligent Building Technologies, <http://www.caba.org/trm/>

11. Cantoni, L., Marchiori, E., Faré, M., Botturi, L., Bolchini D., A systematic methodology to use LEGO bricks in web communication design. In Proceedings of the 27th ACM international Conference on Design of Communication (Bloomington, Indiana, USA, October 05 - 07, 2009). SIGDOC '09. ACM, New York, NY, 187-192
12. Cantù, D. & Selloni, D. (2013). From engaging to empowering people, a set of co-design experiments with a service design perspective, POLIMI DESIS, Social Frontiers, The next edge of social innovation research, p. 4, Milan, Italy
13. Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology, p.43. Boston: Harvard Business School Press, p. 43
14. Cofini, V., de la Pietra, F., Di Mascio, T., Gennari, R., and Vittorini, P. (2012). Design Smart Games with Context, Generate them with a Click, and Revise them with a GUI. Special Issue of Advances in Distributed Computing and Artificial Intelligence
15. CoreLabs. (2007). Living Labs Roadmap 2007-2010: Recommendations on Networked Systems for Open User-Driven Research, Development and Innovation. In Open Document. Luleå: Luleå University of Technology, Centrum for Distance Spanning Technology
16. Correia, C., Quina, A., Tuffs, R. & Zib, J. (2016). Co-creating smart cities. Citizen city initiative, <https://eu-smartcities.eu/sites/all/files/use%20cases%20analysis-transformcity.pdf>
17. De Jong, J. P. J., Kalvet, T., & Vanhaverbeke, W. (2010). Exploring a theoretic framework to structure the public policy implications of open innovation. Technology Analysis and Strategic Management, 22(8), pp. 887-896
18. De Koning, I.J.C., Crul, R. M. & Wever, R. (2016). Models of co-creation, Paper No. 31, TU Delft, The Netherlands, <http://www.ep.liu.se/ecp/125/022/ecp16125022.pdf>
19. Deterding, S., Sicart, M., Nacke, L., O'Hara, K., and Dixon, D. (2011). Gamification. Using Game-design Elements in Non-gaming Contexts. In CHI '11 Extended Abstracts on Human Factors in Computing Systems, CHI EA '11, ACM. New York, USA, pp. 2425–2428
20. Eden, C. & Ackerman, F. (1998). Making Strategy, the Journey of Strategic Management. London: Sage Publications.
21. Ehn, P. (2008). Participation in Design Things. Proceedings of the 10th Proc PDC 2008, Indiana, USA https://www.researchgate.net/publication/221631329_Participation_in_Design_Things
22. Emilson, A., Seravalli, A., Hillgren, PA, (2011). Dealing with Dilemmas: Participatory Approaches in Design for Social Innovation. Swedish Design Research Journal vol. 1, pp. 23-29, Malmo, Sweden
23. Eriksson, M., Niitamo, V. & Kulkki, S. (2005). State-of-the-art in utilizing Living Labs approach to user-centric ICT innovation-a European approach.

- http://www.vinnova.se/upload/dokument/verksamhet/tita/stateoftheart_livinglabs_eri_ksson2005.pdf
24. European Commission. (2016). Open innovation 2.0 yearbook 2016, DG Communications Networks, Contents and Technology, https://www.researchgate.net/profile/Rianne_Valkenburg/publication/303822705_Open_Innovation_20_Yearbook_2016/links/57566c9c08ae10c72b66f315/Open-Innovation-20-Yearbook-2016.pdf
 25. FIATECH (2004) Capital Projects Technology Roadmap, <http://www.fiatech.org/projects/cptri.htm>
 26. Frey, K., Lüthje, C. & Haag, S. (2011). Whom Should Firms Attract to Open Innovation Platforms? The Role of Knowledge Diversity and Motivation. Long Range Planning, 44(5–6), p.p. 397-420
 27. Frontier Strategy (2009). Co-creation's 5 guiding principles or what is successful co-creation made off? <http://www.thunderfactory.com/pdfs/Co%20creation%20principles%2011-09.pdf>
 28. Grote, D. & Richard C. (1996): How to conduct an Appraisal Discussion, in: The Complete Guide to Performance Appraisal, AMACOM Div American Mgmt Assn, S.147- 170
 29. Grunig, J. (1992). Excellence in Public Relations and Communication Management. New Jersey: Lawrence Erlbaum Associates
 30. Günter H. (2016). From citizens as sensors to co-creation. Examining different forms of citizen participation and their implications in the development of european smart cities, http://www.digitalbydel.dk/wp-content/uploads/2015/01/MA_Guenter_final.pdf
 31. Hemment, D. & Townsend, A. (2013). Smart citizens. Future everything publications, Manchester, UK, <http://futureeverything.org/wp-content/uploads/2014/03/smartcitizens1.pdf>
 32. Hilgers, D. & Ihl, C. (2010). Citizensourcing: Applying the concept of open innovation to the public sector. The International Journal of Public Participation, 4(1), 67-88
 33. Hitt, M., Freeman, R. & Harrison, J. (2001). The Blackwell Handbook of Strategic Management. Hoboken, NJ: Wiley- Blackwell Publishers Ltd., p.1
 34. Huizingh, E. (2011). Open innovation: state of the art and future perspectives. Technovation, 31(1), p.p. 2-9
 35. Huotari K and Hamari J. (2012). Defining gamification: a service marketing perspective. Proceeding of the 16th International Academic MindTrek Conference. ACM, pp. 17-22
 36. IMTI (2000) Integrated Manufacturing Technology Roadmapping Project, <http://www.imti21.org/>

37. Intille, S. S., Larson, K., Beaudin, J. S., Nawyn, J., Tapia, E. M. & Kaushik, P. (2005). A living laboratory for the design and evaluation of ubiquitous computing technologies. In CHI '05 extended abstracts on Human factors in computing systems - CHI '05 (p. 1941). New York, New York, USA: ACM Press
38. Kazi, A.S., Hannus, M., and Zarli, A. (2003) Future RTD in Construction, Proceedings of the 9th International Conference on Concurrent Engineering, 16-18 June 2003, Espoo, Finland, pp. 325-333
39. Klein, G., Moon, B, and Hoffman, RR. (2006). Making Sense of Sensemaking 1: Alternative Perspectives. IEEE Intelligent Systems, 21 (4), pp. 70-73
40. Kresin, F. (2013). A manifesto for smart citizens, Waag Society, Thursday 12 September 2013, <http://waag.org/en/blog/manifesto-smart-citizens>
41. Kumar, J. M., and Herger, M. (2013). Gamification at Work: Designing Engaging Business Software. The Interaction Design Foundation
42. Langley, J. (2016), Participatory design : co-creation | co-production | co-design combining imaging and knowledge. In: Knowledge Utilisation Colloquium, Llandudno, Wales
43. Leavy, B. (2012). Collaborative innovation as the new imperative-design thinking, value creation and the power of “pull” strategy & leadership 40, 2, pp. 25-34
44. Leading Cities. (2012). Co-creating cities. Defining co-creation as a mean of citizen engagement, <https://leadingcities2014.files.wordpress.com/2014/02/co-cr-creation-formatted-draft-6.pdf>
45. Markopoulos, P., and G W M. Rauterberg. (2000). Living Lab: A White Paper. In IPO Annual Progress Report
46. Martelli C. (2017). A point of view on new education for smart citizenship. Future Internet Journal, MDPI, Firenze, Italy
47. Müller-Prothmann, T. (2005) Use and Methods of Social Network Analysis in Knowledge Management, Encyclopedia of Communities of Practice in Information and Knowledge Management, edited by Coakes, E. and Clarke, S., Hershey/PA et al.: Idea Group, ISBN: 1591405564, pp. 565-574
48. Müller-Prothmann, T. (2006): Leveraging Knowledge Communication for Innovation. Framework, Methods and Applications of Social Network Analysis in Research and Development, Frankfurt a. M. et al.: Peter Lang, ISBN: 0820498890
49. Newig, J. (2007). Does public participation in environmental decisions lead to improved environmental quality. CCP (Communication, Cooperation, Participation. Research and Practice for a sustainable Future), 1, p.p. 51-71
50. Nielsen, L. (2011). Personas in co-creation and co-design. Proceedings of the 11th Danish Human-Computer Interaction Research Symposium (DHRS2011). Copenhagen Business School Press

51. Nonaka, I. & Takeuchi, H. (1997): The knowledge creating Company: How Japanese Companies Create the Dynamics of Innovation, New York, Oxford University Press
52. Oulasvirta, A, Kurvinen, E, Kanjaunen, T (2003). Understanding contexts by being there: case studies in bodystorming. In *Personal Ubiquitous Computing*, 7, pp. 125-134
53. Payne, A.F., Storbacka, K. & Frow, P. (2007). Managing the co-creation value. *J. Acad Mark. Sci.* 36, p.p. 83-96, doi:10.1007/s11747-007-0070-0
54. Percy, S. L. (1984). Citizen Participation in the Coproduction of Urban Services. *Urban Affairs Review*, 19(4), p.p. 431-446
55. Preston, E. (2012). Citizensourcing: harnessing the power of the crowds to monitor public services. CEU eTD Collection
56. Probst, G. J. B. / Raub, S. / Romhardt, K. (2000): *Managing Knowledge: Building Blocks for Success*, John Wiley & Sons, Sussex, England
57. Ramaswamy, V. & Gouillart, F. (2010). *The power of co-creation: built it with them, boost growth, productivity and profits*. New York: Free Press
58. Reed, M. S., Dougill, A. J. & Taylor, M. J. (2007). Integrating local and scientific knowledge for adaptation to land degradation: Kalahari rangeland management options. *Land Degradation & Development*, 18(3), p.p. 249-268
59. Richard C., Carter, C. & Sherlock, K. (2004). *Practical approaches to participation*. Macaulay Institute
60. ROADCON (2003) Strategic Roadmap towards Knowledge-Driven Sustainable Construction, <http://cic.vtt.fi/projects/roadcon/>
61. Römer, K. & Mattern, F. (2004). The design space of wireless sensor networks. *IEEE Wireless Communications*. Volume 11, Issue 6
62. Roser, T., Samson, A., Humphreys, P. & Cruz-Valdivieso, E. (2009). *Co-creation: new pathways to value (White Paper)*. Promise/LSE Enterprise, London
63. Savitskaya, I. & Torkkeli, M. (2011). A framework for comparing regional open innovation systems in Russia. *International Journal of Business Innovation and Research*, 5(3), p.p. 332-346
64. Schaffers, H., Komninou, N., Pallot, M., Trousse, B., Nilsson, M. & Oliveira, A. (2011). *Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation*. The Future Internet, Lecture Notes in Computer Science, Book Part, 8, 6656, 431-446. Springer Berlin Heidelberg
65. Schaffers, H., Sällström, A., Pallot, M., Hernández-Muñoz, J. M., Santoro, R. & Trousse, B. (2011). Integrating Living Labs with Future Internet Experimental Platforms for Co-creating Services within Smart Cities. *Concurrent Enterprising (ICE), 2011 17th International Conference on Concurrent Enterprising*. IEEE Explore Conference Proceedings

66. Schrage, M. (1995). Customer relations. *Harvard Business Review*, p.p. 154-156
67. Schuurman, D. & De Marez, L. (2012). Structuring User Involvement in Panel-Based Living Labs. *Technology Innovation Management Review*, (September), p.p. 31–38, <http://timreview.ca/article/606>
68. Schweikert S., Wolf P., Hauser C. (2007). Getting stakeholders involved in regional strategic development: Basis-SWOT-Workshops. In *hands on knowledge co-creation sharing: practical methods and techniques*, Samad Kazi A., Wohlfart L., Wolf P., A book by knowledge board community for the global knowledge community
69. Scott, J. (1991) *Social Network Analysis. A Handbook*, London et al.: Sage, ISBN: 0803984804
70. Selden, L. & MacMillan, I. (2006). Manage customer-centric Innovation systematically. *Harvard Business Review*, Financial Management
71. Simsarian T. K. (2003). Take it to the Next Stage: The Roles of Role Playing in the Design Process. In *Proc. of CHI 2003*, pp. 1012 - 1013
72. Svanaes D. & Seland G. (2004). Putting the users center stage: role playing and low-fi prototyping enable end users to design mobile systems. *CHI '04 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Vienna, Austria
73. The Economist Intelligence Unit. (2016). Empowering cities. The real story of how citizens and businesses are driving smart cities, <http://empoweringcities.eiu.com/>
74. Vargo, S. & Lusch, R. (2004). Evolving to a new dominant logic for marketing, in: *Journal of Marketing* 68(1), p.p. 1-17
75. Voorberg, W. H., Bekkers, V.J.J.M. & Tummers, L. G. (2014). A systematic review of co-creation and co-production: embarking on the social innovation journey
76. Von Hippel, E. (1987). Cooperation between rivals: informal know-how trading. *Research Policy*, 16(6), p.p. 291-302
77. Von Hippel, E. (2005). *Democratizing innovation*. The MIT Press, Cambridge, Massachussets. ISBN: 0-262-00274-4
78. Wasserman, S. and Faust, K. (1994) *Social Network Analysis: Methods and Applications*, Cambridge/MA: Cambridge University Press, ISBN: 0521387078
79. Wellman, B. and Berkowitz, S. D. (1988) *Social Structures*, Cambridge/MA: Cambridge University Press, ISBN: 0521244412
80. Western and Pacific Child Welfare Implementation Center. (2013). *Stakeholder Engagement Tools for action*. Center for the Study of Social Policy, Los Angeles, California

APPENDIX 1 QUESTIONNAIRE TO THE REFERENCE ZONES

Q1) Select the statement that best reflects your city's use of co-creation in designing products and services:

- We have never used co-creation
- We have used co-creation once
- We use co-creation occasionally
- We use co-creation all the time
- We are not interested to use co-creation
- OTHER

Q2) Please describe your city's experience of using co-creation and thoughts for the future

Q3) Please explain why your city does not use co-creation in designing products and or services

Q4) Why does your city use co-creation? [Select all that apply]

- Identify stakeholder needs
- Engage stakeholders (incl. citizens)
- Create new services
- Create new products
- Integrate available services/products
- Advance available services/products
- Raise the level of awareness on different topics
- Increase trust on governmental services
- Generate public values
- Support communities of practice
- Transfer and sustainable conservation of implicit knowledge
- Improve communication processes
- Increase efficiency of services
- Increase effectiveness of services
- Provide financial and economical sustainability of services
- Create a sense of ownership with stakeholders (incl. citizens)
- OTHER

Q5) When do you use co-creation? [Select all that apply]

- Co-analysis

- Co-design
- Co-evaluation
- Co-implementation
- OTHER

Q6) Which stakeholders does your city normally involve in your co-creation? [Select all that apply]

- Citizens
- Industry
- Public sector (federal or local government departments)
- Utilities
- Research
- Suppliers
- Competitors
- Customers
- Service providers
- OTHER

Q7) In your city, in which co-creation activities do **citizens** take part? [Select all that apply]

- Providing comments on services/products
- Governance: making sure the eco-system is reliable, trustworthy, and protects citizens
- Identifying new processes in the service/product development phase
- Identifying new organisational practices
- Generating ideas on novel products/services
- Brainstorming processes
- Evaluation of concepts, implementations etc.
- Selection of concepts, implementations etc.
- Supporting communities of practice
- Establishing performance evaluation standards
- Transferring implicit and/or organisational knowledge
- OTHER

Q8) How does the city reward citizens for participating in co-creation? [Select all that apply]

- Monetary prizes
- Professional recognition
- Virtual prizes
- Community recognition

- Create jobs
- OTHER

Q9) Which of the following methods does your city use when co-creating? (definitions in chapter 3 of D1.4.1 [Select all that apply])

- Living labs
- Personas
- Gamification
- Bodystorming (acting out scenarios as a predefined stakeholder/character)
- Appraisal Interviews
- Basis SWOT Workshops
- Strategic roadmaps
- Social Network Analysis
- Role Play
- Legos serious play™
- OTHER

Q10 Which tools does your city use in co-creation processes? [Select all that apply]

- Social media
- Mobile contribution (apps)
- Visual collaboration maps and mind maps
- Toolkits (sensors, pictures and sharing results, etc.)
- Crowdmapping
- Mock-ups
- Issue cards
- Affinity Diagram
- Character profiles
- Storyboard
- Motivation Matrix
- OTHER

Q11) How does your city measure the success of co-created products and services? [Select all that apply]

- Increased collaboration across cities
- Increased numbers of people participating in cities co-creation processes
- Improved collaboration among different departments in a city

- Improved user satisfaction measures
- Improved services/products adoption measures
- Improved innovation capabilities
- Increased efficiency
- Improved effectiveness
- Increased provision of cost-efficient solutions
- Improved sustainability of solutions
- Repeated use of co-created services and products
- Improved quality of data collected
- OTHER

APPENDIX 2 SET OF QUESTIONS FOR THE INTERVIEWS TO THE REFERENCE ZONES

The main objective of the interviews is to gather specific information from each Reference Zone involved in SynchroniCity to identify the best way to support the cities in applying co-creation methodologies. Indeed, each Reference Zone has different objectives in implementing co-creation activities and is approaching several phases of developing products and services for its stakeholders.

The results from the online questionnaire have been very useful for better understanding the starting points of reflections about co-creation methodologies already in place in each city, their main objectives, the tools and the rewarding systems used, and the current phases of development. However, several cities have declared to use some methodologies that in the literature do not apply to a specific phase (e.g. Appraisal interviews during co-analysis, which indeed should be applied during co-evaluation and co-implementation) or have not considered other ones that can best serve their co-creation needs.

Through these in depth interviews, we aim to discuss to better explore with the Reference Zones the current co-creation activities developed and the future strategies in implementing also other methodologies in the next future (e.g. until the end of the SynchroniCity project). The goal is also to understand how to best support them starting from this first document and providing a second version of the deliverable at the end of the first year of the project. The information gathered through the in depth interviews will be included in specific cards that can be used by each city to present co-creation activities applied so far and future perspectives to the other reference zones. These cards can also be used to present the reference zone co-creation approach during workshops and for facilitations' scopes.

Overall questions to explore cities current co-creation activities

- How do you understand the term co-creation? What does it mean?
- What does co-creation mean for you in your work as a Smart City?
- Who (from the city) is involved in this work?

- How do you use co-creation?
 - what do you do?
 - who is involved
 - in what ways
 - how often?

Refer back to the specific answers they have provided in the questionnaire and explore in more detail how they use the different activities/methods/tools

- Why is co-creation important (objectives)?
- What are the main challenges you experience in your work with co-creation
- What could support you in further developing your co-creation activities?
- How can the SynchroniCity project play a role in that work?

APPENDIX 3 REFERENCE ZONES' CO-CREATION CARDS

City Cards

A set of city cards that outlines the IoT programme of each city has been developed to summarise the information about each city. These will be used by the reference zone coordinator in workshops and engagements with the cities throughout the project. These cards are available to be accessed by all partners at the following shared folder and via the SynchroniCity website to enable the Reference Zones to download them: <https://drive.google.com/open?id=0B1HRLPGKYZ2FUkxIRm5pcmF1eVk>



Method Cards

To share experiences across the cities, a set of 'Method Cards' have been created by using the data collected from the co-creation questionnaire and the interviews. These cards are available to be accessed by all partners using the following shared folder and via the SynchroniCity website:

<https://drive.google.com/open?id=0B1HRLPGKYZ2FeFZyYkh3a250aUU>

