UNIVERSIDAD DE NAVARRA

FUNDACIÓN AON ESPAÑA

A Framework for Public Private People Partnerships in the City Resilience Building process

DISSERTATION

submitted for the Degree of Doctor of Philosophy by

Patricia Maraña Casado

under the supervision of

Dr. Jose Mari Sarriegi and

Dr. Leire Labaka

This thesis has been funded by

Fundación AON España

Donostia-San Sebastián, December 2018

Financing this research, we make our contribution in order to prevent and respond before any catastrophe, thus managing to palliate as far as we can the effects that they produce and to build a better society.

Eduardo Dávila
President of Fundación Aon España

One of the aims of our Catastrophe Observatory is the Research and Prevention in the stated matter. We are proud to have contributed with the funding of Patricia's thesis, directed by Professor Sarriegi and Professor Labaka, framed in the agreement we have with the School of Engineers TECNUN of the University of Navarra. Patricia, in this thesis, exposes a framework to support and guide the development process of public-private-people partnerships (4Ps) in the context of the creation of resilience in cities. Satisfied with the result of the research, we are making progress in the contribution our Catastrophe Chair offers society in order to be more prepared, face the consequences of catastrophic phenomena and live in a safer world.

Pedro Tomey
President of the Catastrophe Observatory
Fundación Aon España

Agradecimientos

Ahora que se divisa el fin de esta etapa de mi carrera académica me gustaría mediante estas líneas agradecer a aquellas personas e instituciones sin cuya ayuda concluir esta tesis no hubiera sido posible.

Me gustaría agradecer a TECNUN, Universidad de Navarra por formarme profesional y personalmente durante los últimos 8 años y medio, dándome además la oportunidad de desarrollar mi tesis doctoral rodeada de un maravilloso equipo de profesionales. También me gustaría dar las gracias a la Fundación AON por confiar en mi financiando mi investigación.

La verdad es que son muchas las personas que me han acompañado en este camino y aún a riesgo de no mencionar explícitamente a alguien me gustaría especialmente dar las gracias a las siguientes personas.

A mi director de tesis Jose Mari Sarriegi, por confiar siempre en mí y por darme el empujoncito que siempre me hace falta para salir adelante en los momentos complicados.

A mi co-directora Leire Labaka, por exigirme el 100% y a la vez estar siempre dispuesta a ayudarme todas las veces que lo he necesitado.

A mis compañeras, Cinta, Josune, Marta y Raquel por hacer tan fácil el día a día, regalarme mil sonrisas y compartir algunos llantos.

A todo el departamento de organización industrial por estar siempre disponibles para ofrecerme su ayuda.

Al Joint Centre for Disaster Research y a Massey University por brindarme la oportunidad de llevar a cabo parte de mi tesis con ellos en la ciudad de Wellington, Nueva Zelanda.

Por último, me gustaría agradecer a Ander, mis padres, mi hermana y mis amigos, por soportarme en los momentos de bajón y nunca dejar de apoyarme en todos los retos que me propongo. Sin vuestro desinteresado apoyo nada de esto hubiera sido posible.

Patricia Maraña Casado

Acknowledgements

Now that this stage of my academic career is about to end, I would like to thank those people and institutions without whose help concluding this thesis would not have been possible.

I would like to thank TECNUN, University of Navarra, for training me professionally and personally for the last 8 and half years, giving me the chance to develop my doctoral thesis surrounded by a wonderful team of professionals. I would also like to thank the AON Foundation for trusting me and funding my research.

The truth is that there are many people who have accompanied me on this path and even at the risk of not explicitly mentioning someone; I would especially like to thank the following people.

To my thesis director Jose Mari Sarriegi, for always trusting in me and for giving me a nudge every time I have needed to overcome complicated moments.

To my co-director Leire Labaka, for always demanding my 100% but at the same time for always being by my side willing to offer her help every time I needed it.

To my colleagues, Cinta, Josune, Marta and Raquel for making the everyday life so easy, and sharing a thousand smiles and some tears with me.

To the entire industrial organization department for always being available to support me.

To the Joint Center for Disaster Research and Massey University for giving me the chance to carry out part of my research with them in the city of Wellington, New Zealand.

Finally, I would like to thank Ander, my parents, my sister and my friends, for supporting me in the moments of decline and never stop encouraging me to achieve all the challenges that I choose. Without your selfless support, none of this would have been possible.

Patricia Maraña Casado

Outline

Figures

Tables

Abstract

Citizens in developed countries are increasingly aware of the fact that the entire responsibility of preventing, responding to and recovering from crises cannot fully fall on public entities and private companies. In fact, the role of the citizenry is increasingly powerful, and citizens are required to prepare for, respond to and recover from crises in the most effective manner. To that end, there is an emerging need to involve not only public entities and private companies but also citizens in the process of building a city's resilience in order to understand the different perspectives on the same reality. Fostering the participation of citizens in the city's resilience building process will also help to increase their awareness and commitment level in resilience related issues, eventually increasing the overall resilience level of the city.

The aim of this research is to develop a framework that supports and guides the development process of public-private-people partnerships (4Ps) in the context of the city resilience-building process.

The presented framework was developed as a result of an iterative process including a literature review, semi-structured interviews with representatives from seven European cities that are currently investing resources to improve their cities' resilience level. Moreover, the final version of the 4P framework was obtained after conducting a Delphi study. Finally, the 4P framework was validated conducting a case study in the city of Wellington, New Zealand, known because of its strong commitment to increase its own resilience level.

The framework is formed by three different components. A set of sixteen characteristics of effective 4Ps that have been classified into three dimensions, namely, stakeholder relationship, information flow and conflict resolution. Moreover, the framework describes three 4P evolution stages that describe the evolution of multi-stakeholder collaborations in order to achieve meaningful and long lasting 4Ps that provide support to any city's resilience building process. Finally, the framework includes an implementation order that considering the 4P evolution stages establishes a priority order in the implementation of the characteristics what enables to ensure that available resources are invested in the most effective manner.

.

1 Introduction

Worldwide population is increasingly urban settled. Moreover, cities are currently at crossroads of challenges like climate change, social dynamics and the increasing dependency on the correct functioning of critical infrastructures that directly affect the welfare of society. Considering the increasing amount of people living in cities and the need to address the emerging challenges, developing effective crisis management procedures and increasing city resilience is an increasingly relevant concern for academics and practitioners.

Increasing the city's resilience level addressing expected and unexpected crises derived from complex challenges affecting complex systems like cities requires enhancing collaboration of city stakeholders. Thus, there is a need to foster collaboration among public entities, private companies and citizens developing mechanisms like Public Private People Partnerships (4) to support the city resilience building process. The aim of this research is to develop a 4P framework in the city resilience building process in order to use available resources to increase the city's resilience level in the most effective manner.

1.1 Overview

Cities are complex systems formed by social, economic and environmental factors that are increasingly interdependent (Bettencourt, 2013). During the last years cities are experiencing a rapid grow as population is getting increasingly urban settled. In fact, in 2018, 55% of the world's population lived in cities and it is expected that the tendency to move to urban areas will increase in the upcoming years (United Nations Department of Economic and Social Affairs, 2018).

Moreover, cities are currently at crossroads of challenges like climate change, social dynamics and the increasing dependency on the correct functioning of critical infrastructures that directly affect to the welfare of society. Therefore, crises affecting systems within the city derived from these challenges will potentially affect the welfare of citizens in the upcoming times.

Considering the increasing amount of people living in urban areas, focusing on protecting cities and the welfare of citizens through effective crisis management procedures and capacities to deal with both expected and unexpected events is an increasingly relevant concern for academics and practitioners.

1.2 City Resilience

It is important to bear in mind that the nature of the striking events derived from emerging challenges affecting cities could be predictable or unpredictable. For instance, a heavy heat wave in a concrete area of a specific country could have predictable effects like water shortages but also unpredictable consequences like migration phenomena. Moreover, predictable crises can also have unpredictable consequences due to potential cascading failures that may occur between complex interconnected systems (Pyrko et al., 2017). For instance, heavy rainfalls derived from climate change could produce expected consequences like floods but also unpredictable effects in other systems like affection in infrastructures producing, for instance, bridge collapse. Therefore, a risk management approach that only consider predictable risks and consequences is not enough to deal with

nowadays crises (Boin and McConnell, 2007). The resilience concept seems promising to address the need to deal with unexpected crises (Suter, 2011). Therefore, efforts are being made in promoting resilience in order to be able to face upcoming unpredictable crises that could potentially affect the welfare of citizens.

The concept of city resilience has gained popularity in the last few years. However, there is still a lack of consensus on its definition and has different approaches (Bäng and Rankin, 2016). Within this research, city resilience is defined as "*the ability of a city or region to resist, absorb, adapt to and recover from acute shocks and chronic stresses to keep critical services functioning, and to monitor and learn from on-going processes through city and cross- regional collaboration, to increase adaptive abilities and strengthen preparedness by anticipating and appropriately responding to future challenges*" (Hernantes et al., 2018).

Increasing city resilience will be a priority to ensure the welfare of society in the upcoming years (Toubin et al., 2015). In fact, conducting the complex task of ensuring the well-being of citizens in times of crisis is not a mission that can only be left in hands of local authorities. Collaboration of all the city stakeholders that are contributing to the city resilience building process is required. Each city stakeholder working on of crisis management or city resilience has their own expertise and resources. Sharing efforts and coordinating available resources of stakeholders like, local authorities, first responders, critical infrastructure operators, volunteers etc. is important to prevent, respond and recover from crises in the most effective manner. For instance, first responders could organize trainings and invite certain volunteer groups in order to coordinate their different expertise finding ways to complement their abilities.

1.3 The need for collaboration

As previously mentioned, considering the wide scope and complexity of the previously mentioned emerging challenges (critical infrastructure dependency, climate change and social dynamics) the whole responsibility to address them cannot be left in hands of just one stakeholder.

The president of 100 Resilient Cities, Michael Berkowitz (Berkowitz, 2016), in his plenary speech at the Habitat III Conference, the United Nations Conference on Housing and Sustainable Urban Development (2016), highlighted the necessity of the stakeholders to act jointly to increase city resilience: *"The story of resilience is really one of collaboration—it takes all levels of government, the private sector, and civil society, working cooperatively toward a common purpose: reducing catastrophic risk and, at the same time, improving the daily lives of residents*". Before him, Kapucu (Kapucu, 2012), similarly said that collaboration and partnerships apart from being identified as two of the most important aspects of managing disasters, they are also the most challenging ones".

It is important to bear in mind that the mission of public entities is to ensure the welfare of society and being so, they need to act as proactive leaders of the city resilience building process. Apart from the insights from public entities, the engagement of private companies is also required, as they are in charge of operating CIs in many cases. The products and services they provide are key for the welfare of society and thus they must contribute with their technical and operational expertise to the city resilience-building process (McKnight and Linnenluecke, 2016). Moreover, there is also an increasing need to empower the whole citizenry, as they are usually the most vulnerable to unexpected crises and the ones who most suffer the effects of any decision taken at the strategic level (Koch et al., 2017). They are usually the ones that respond to crises in the first instance and the ones that could provide additional support when public entities do not have enough resources available to deal with a wide scope crisis (Cohen et al., 2017).

However, sometimes the resources invested by different city stakeholder groups in the city resilience building are made in a fragmented manner. In some cases, each city stakeholder is conducting activities to contribute to the city resilience-building process on their own or in small coalitions without considering what other stakeholders working around the same issues are doing (Bava et al., 2010; O'Sullivan et al., 2015). This fact hampers the identification of potential synergies and the alignment of perspectives what also prevents

investing available resources in the most effective manner, saving costs and time to all the city stakeholders.

Therefore, fostering the collaboration and coordination of all the city stakeholders to prevent silo-thinking should be seen as a priority to improve crisis management procedures and to address the three emerging challenges holistically under the supervisory role of city authorities.

1.4 The role of citizens and communities

The entire society is increasingly conscious of the fact that the effort made by public entities and private companies is not always sufficient to prevent, respond to and recover from crises in the most effective manner. Recent events, such as the tsunami occurring in Indonesia the 30th of September of 2018, show that, apart from the resources of public entities and private companies, the help of citizens has an impact on the effectiveness of crisis prevention, response and recovery. Numerous volunteers were the first to mobilize in order to support the response activities lead by public authorities due to the lack of available resources to respond to an event of such magnitude (British Red Cross, 2018). Consequently, the proactive role of citizens or organisations representing community interests is of utmost importance in crisis management.

Citizens are usually the ones with the most accurate and comprehensive understanding of the requirements regarding the resilience of surrounding communities, which could help in the prevention and response phases of crises (Koch et al., 2017; Whittaker et al., 2015). Moreover, they are usually the first ones able to provide first-hand information and respond when a crisis strikes and the most affected by the impact of the crisis (Grace et al., 2017).

Therefore, there is an emerging need to include not only the perspectives of public entities and private companies but also the perspective of the local community in the city resilience building strategies to improve crisis management within the city. In light of this situation, a need to develop effective mechanisms that involve all relevant agents into the city resilience building process has emerged.

1.5 Research questions and objectives

Considering the need to develop effective mechanisms that support collaboration among different city stakeholders working in the context of city resilience, this research aims to respond to the following research questions.

- **RQ1:** What are the characteristics of successful public-private-people partnerships in the city resilience-building process?
- **RQ2:** How do 4Ps evolve over time in order to become meaningful and successful?

In order to answer these questions, the main objective of this research is to develop a public private people partnership (4P) framework that supports the development of meaningful collaboration among different city stakeholders working in the context of city resilience. Eventually, collaboration will increase the effectiveness of the resources available to improve any city's resilience level reducing duplication of efforts and sharing efforts.

- Objective 1: Provide support to cities willing to develop meaningful and long lasting 4Ps.
- Objective 2: Identify, classify, define and describe the characteristics of successful 4Ps in the city resilience-building process.
- Objective 3: Identify the 4P evolution stages that describe development process of 4Ps.
- Objective 4: Establish an implementation order that considering the 4P evolution stages, establishes a priority order to implement characteristics in the most effective manner.

1.6 The structure of the thesis

The structure of the chapters of this thesis are explained below:

- *Chapter 2* presents the state of the art in the context of crisis management, city resilience and public private people partnerships. It gives an overview on how crisis management has evolved, how the concept of resilience has been implemented on cities and also presents existing 4P frameworks and their limitations as well as the main contribution of this research.
- *Chapter 3* explains the different phases of the research methodology followed in order to develop the 4P framework for building city resilience.
- *Chapter 4* presents the three different components that compose the 4P framework. The set of 16 successful characteristics are defined, the three 4P evolution stages are described and the implementation order is presented.
- *Chapter 5* explains the case studies conducted in two different cities in order to validate the 4P framework.
- *Chapter 6* summarizes the main conclusions and limitations of this research and proposes ideas for future research.

2 State of the Art

This section reviews the literature on multi-stakeholder partnership in the context of city resilience. This research posits that developing mechanisms like public private people partnerships (4Ps) fosters meaningful and long-lasting collaboration among different city stakeholders what eventually support the city resilience building process.

First, an explanation about the reasons behind the evolution of crisis management from a risk management approach to a resilience approach will be presented. Then, the most important aspects that explain how crisis management has evolved from a risk management approach to a resilience approach will be exposed. After that, how the resilience approach has been implemented in practice will be explained. Moreover, the need to develop mechanisms like 4Ps to support the city resilience building process will be justified. Additionally, some of the most important 4P frameworks in the context of crisis management will be explained and their limitations will be discussed. Finally, the main contribution of this research will be stated.

.

2.1 Why has crisis management evolved?

Addressing upcoming challenges affecting citizens such as climate change, critical infrastructure dependency and social issues is an increasingly relevant concern among different city stakeholders (Gonzalez et al., 2017). The broad scope of these challenges will eventually lead to complex trans-boundary and cross-sectorial crises with unpredictable cascading effects that not only affect infrastructure but also the welfare of society (Ansell et al., 2010; Boin et al., 2014).

The emergence of these complex challenges and their unpredictable consequences in society's welfare derived from the globalization phenomenon (reduction of geographical and cross-sectorial boundaries) and the improvements in the communication flow among stakeholders have influenced the way crises are managed.

Therefore, the traditional risk management approach in which the only risks and impacts being considered are the foreseen ones will not be sufficient for effectively managing crises since it is not possible to predict all possible scenarios and how they will evolve (Suter, 2011).

2.1.1 Paradigm shift: from a risk management approach to a resilience approach

Due to the unpredictability of current crises the risk management approach is not sufficient. A more holistic approach that includes not only expected situations and consequences but also the unexpected ones is required. The complementary approach of resilience seems a promising way to increase the ability of cities and their stakeholders to prevent, respond to and recover from crises in the most effective manner (Suter, 2011).

Adopting a resilience approach enables developing prevention, preparedness, response and recovery capacities in order to face both predictable and unpredictable events and consequences (Boin and McConnell, 2007; De Bruijne and van Eeten, 2007). The need to use the

resilience approach to effectively deal with crises has caused a change in how stakeholders interact to increase the resilience level of different systems. Furthermore, the stakeholder groups that participate in the resilience-building process and the way they collaborate with each other has changed.

2.1.2 Resilience definition in the context of crisis management

In the context of crisis management, resilience is understood as "*the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management*" (UNISDR, 2017). It is important to bear in mind that the aim of adopting a resilience approach to crisis management enables to develop the capacity to manage any type of event with both expected and unexpected consequences. Although preparing for the unexpected may seem contradictory, resilience will not exist if it is not planned for (Boin and Lagadec, 2000). What means that in order to be resilient, planning and implementing preparedness, response and recovery procedures are essential to increase the ability to improvise, coordinate and respond in case an unexpected crisis occurs. Therefore, the more resilient a system is, the greater its capacity to effectively deal with any type of crisis both expected and unexpected will be.

2.2 How has crisis management evolved?

Table 2.1 emphasizes the most important aspects that explain how crisis management has evolved from a risk management approach to a resilience approach. In the following sub-sections the evolution of these aspects will be explained in more detail in order to prove the need to adopt a resilience approach in order to effectively deal with nowadays crises effectively.

Table 2.1: Crisis Management Evolution Aspects

CRISIS MANAGEMENT	
Past: Risk Management Approach	Present: Resilience Approach
1a) Risks are addressed in an isolated manner. Silo-thinking predominates.	1b) Risks are considered in a holistic manner. The existing interdependences among risks are also considered.
2a) Crisis management is oriented to address expected events and expected consequences.	2b) Crisis management is oriented to address expected and unexpected events as well as expected and unexpected consequences.
3a) Only the indispensable stakeholders participate to address each crisis.	3b) The participation of all the stakeholders is fostered.

2.2.1 From addressing risks isolated to consider them holistically

Nowadays, the future of cities is uncertain, as they are under the threat of numerous hazards such as severe storms, flooding, tsunamis, tornadoes, heat waves, hail, drought, straight-line winds, hurricanes, severe freeze, tides, wildfires, changing demography, increasing inequalities, CI interdependencies which pose a big impact both economically and socially (Kapucu, 2012). Climate change, social dynamics and critical infrastructure dependencies are complex challenges that need to be addressed by cities and whose consequences are not yet fully known (SMR consortium, 2015).

2.2.1.1 Climate Change

The increasing occurrence of disasters has highlighted cities' exposure to natural disasters and emphasized the need to make cities resilient to them (Malalgoda et al., 2014). In this vein, the links between disasters and climate change are increasingly recognized (O'Brien and Read, 2005). Nowadays, there are growing concerns over the threats posed by climatological hazards, such as the increase of temperatures, drought and wild fires, and the multi-faceted threats associated with sea

level rise, such as floods (Haigh and Amaratunga, 2010) and their consequent effects in the wellbeing of society (Hatvani-Kovacs et al., 2016). In the upcoming decades, cities will have to make significant decisions to address the increased variability and unpredictability derived from climate change. In fact, this challenge is especially daunting at the local level, as city stakeholders have limited experience in understanding and acting in a coordinated way to reduce climate-induced impacts (International Federation of Red Cross and Red Crescent Societies, 2015).

2.2.1.2 Social Dynamics

Nowadays, most of the population is settled in urban areas. This rapid change in patterns has produced some complex consequences. For instance, society needs to address problems related to immigration, poverty, population aging and dependency problems (Gonzalez et al., 2017). In fact, accelerating urbanization has increased inequality (the gap between the rich and poor) among citizens (Sampson, 2017), which endangers social cohesion (Kawachi et al., 1997). Moreover, the change in demography has also increased the concerns about the aging population and its effects on healthcare, education and the provision of other basic services within cities (Aldrich and Kyota, 2017; Aldrich and Meyer, 2015).

2.2.1.3 Critical Infrastructure Dependency

Citizens are increasingly dependent on the services provided by critical infrastructures such as water, telecommunications, health, transport and energy (Eisenman et al., 2014). Critical infrastructures provide basic services and products to society, and the proper functioning of these CIs is essential for maintaining the well-being of society (Almklov and Antonsen, 2010). Actually, concerns about the risks and vulnerabilities that affect CIs is on rise globally (Ainuddin and Routray, 2012). The current challenge is protecting these CIs against

predictable and unpredictable events, thereby increasing their resilience level. However, it is important to bear in mind that people and infrastructures throughout the world are increasingly interconnected, and no geographical, jurisdictional or sectorial boundaries can impede the spread of the impacts affecting a CI (Marana et al., 2017; Pearson and Sommer, 2011). For instance, a power blackout in a specific location could have consequences such as problems in the healthcare system, significant delays in transport or the loss of meaningful information in other areas (Lauge, 2014).

The abovementioned challenges produce shocks and stresses that nowadays hamper and will continue hampering the wellbeing of society in the upcoming future. It is important to note that the risks derived from these complex challenges cannot be considered in an isolated manner. There is a need to consider the existing interdependencies among them what can derive into unexpected cascading events. For instance, the consequences of a heat wave derived from climate change could increase due to the increasing number of elderly people living in cities derived from a demographical change. Taking decisions without considering all the existing challenges and their potential predictable and unpredictable consequences in a holistic manner could decrease the effectiveness level of crisis management and reduce the resilience level of the city.

2.2.2 From addressing expected risks and consequences to face the unexpected

Originally, crisis management was risk oriented, and therefore all the activities related to crisis management were based on the potential risks that could be previously identified. Moreover, all the prevention and preparation activities were designed to address the expected consequences of those previously identified risks, without considering unpredictable events or unpredictable consequences derived from previously identified risks (Labaka, 2013). Consequently, in the past, the activities conducted in the context of crisis

management were specifically planned to address, prevent, respond and recover from expected consequences of previously identified risks.

However, in the urban context, the effects of risks and hazards derived from complex challenges like climate change, social issues and the increasing dependency on the correct functioning of critical infrastructures are increasingly unpredictable. Sometimes some of the risks derived from these challenges could be expected and a risk management approach could be sufficient to deal with them. However, systems within the city are increasingly interdependent (Toubin et al., 2015). This fact could produce that even when the event does not have direct effects on a particular system due to unpredictable cascading effects, this system may end up suffering the consequences of a crisis (Lauge, 2014).

Therefore, a system cannot just focus on improving its own abilities and capabilities without considering others'. In most cases, the resilience level of one system depends on other systems' resilience level (Katina et al., 2014). When the correct functioning of a system is hampered, other systems may suffer unexpected consequences due to the cascading effects given the interdependencies between them (Setola et al., 2009). Cascading effects increase the complexity of crises and make crisis management more difficult (Lorenza et al., 2009). Improving a system's own resilience level must be done without losing the holistic perspective. Considering not only our own resources and capabilities but also other interconnected systems' is highly important to increase our own resilience level. Therefore, existing risks cannot be addressed in an isolated manner anymore, a holistic perspective that considers existing cross-sectorial and transboundary interdependencies and fostering multi-stakeholder collaboration is required (Ansell et al., 2010; Boin et al., 2014).

2.2.3 From involving indispensable stakeholders in crisis management activities to fostering collaboration of all the stakeholders

Due to the complexity of the emerging challenges affecting cities and their unpredictable consequences, the responsibility of ensuring city resilience cannot fall totally on public entities (Scolobig et al., 2015). Although public entities have a supervisory role for ensuring the well-being of citizens, the need to involve

other stakeholders in the resilience building process is increasingly acknowledged (Goldstein et al., 2015; McKnight and Linnenluecke, 2016). A multi-stakeholder dialogue addressing the relevant challenges will improve the resilience building process within the city (Oxley, 2013). Therefore, cross-sectoral cooperation among public entities, private companies and citizens is essential in order to improve their ability to prepare for, respond to and recover from unexpected events in the most effective manner (Eisenman et al., 2014). Moreover, bearing in mind that crisis management needs now to address expected and unexpected crises with expected and unexpected consequences in a holistic way, finding effective ways to foster multi-stakeholder collaboration seems necessary.

Actually, one of the most important challenges for increasing any city's resilience level is the development of a multidisciplinary theory that integrates and coordinates a variety of city sectors such as critical infrastructures, community, private businesses and environment and stakeholders working in different areas (Bulkeley, 2013; Jabareen, 2013; O'Brien, 2012; Pelling, 2011; Satterthwaite, 2011; Vedeld et al., 2016). This challenge has to be addressed at both the theoretical and practical levels by developing theories and implementation tools.

Moreover, the effectiveness of a city resilience building process is determined by the extent to which all the relevant city stakeholders are involved (Kapucu, 2012). City stakeholders are any individual, group or organisation within a city who can affect or can be affected by the city resilience building process (Gimenez, 2017). Academics and practitioners have identified the relevant city stakeholders that should be involved in the resilience building process (FEMA, 2011; Gimenez, Labaka, et al., 2017; SMR consortium, 2015; United Nations, 2015). Considering the similarities in their main mission, these stakeholders have been classified into three groups: public entities, private companies and citizens (Table 2.2).

- Public Entities: Entities whose main aim is to ensure the well-being of society. This group includes city councils, first responders and civil protection units.

- Private Companies: Entities whose main aim is to be profitable by providing services. This group includes critical infrastructure owners and operators, businesses, insurance companies, consultancies and media companies.
- People: Individuals or organisations whose main aim is to defend the interests of people. This group includes NGOs, volunteers and citizens (young people's associations, neighborhood representatives, elderly people's representatives, vulnerable groups).

Some of the stakeholder groups cannot be only classified into one of these three groups. For instance, a media company can be either public or private depending on its legal status.

Table 2.2: Classification of relevant city stakeholders depending on their type

	PUBLIC ENTITIES	PRIVATE COMPANIES	PEOPLE
Multi-level Governance	X		
Emergency Services	X		
Critical Infrastructures	X	X	
Media	X	X	
Academic, Educational, Scientific Entities	X	X	X
Business, consultancies, insurance companies		X	
Citizens			X
NGO			X
International Organisations	X	X	X

However, the contribution of each stakeholder and how this could complement other stakeholders' contribution is not completely clear (Andrews and Entwistle, 2010). Each city stakeholder usually defends its own perspective and interests without being aware that working collaboratively is essential to create the relevant knowledge that is required for facing problems that affect the well-being of society (Frantzeskaki and Kabisch, 2015). Moreover, working together prevents duplication of efforts and reduces the amount of resources needed in the resilience building process (Evers et al., 2016; Quick and Feldman, 2014).

In fact, each city sector has its own mechanisms for involving relevant stakeholders in their own resilience-building process and fostering collaboration (Gagnon et al., 2016). For instance, public-private partnerships (PPPs) are an effective tool for increasing critical infrastructure resilience (Dunn-Cavelty and Suter, 2009). Other mechanisms, such as participatory governance, increase community resilience (Chandra et al., 2015; Doyle et al., 2015). Moreover, private companies also understand that they have to assume an important role in ensuring the wellbeing of society, so they have designed corporate social responsibility strategies that also contribute to increasing city resilience (McKnight and Linnenluecke, 2016)(see Figure 2.1).

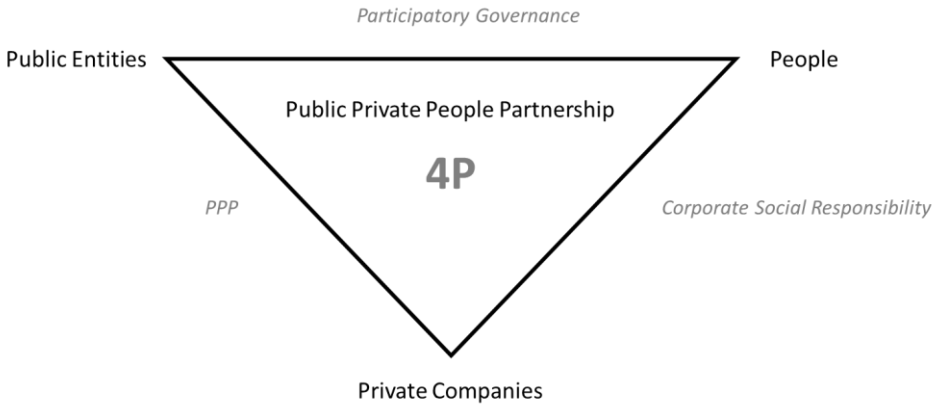


Figure 2.1: Existing mechanisms to relate public entities, private companies and citizens

2.2.3.1 Public-private partnerships (PPPs)

The concept of partnerships and more particularly of Public-Private Partnerships (PPP) is a widespread idea of the 21st century. Although there have been several attempts to define the concept, there is still not a formal definition. Some define PPP as "a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance" (World Bank, 2014). Others see PPPs as a new governance mechanism that could replace the traditional method of contracting for public services through competitive tendering. They emphasize that PPPs are worthwhile because both the public and the private sector can benefit by combining their specific qualities (Rosenau, 1999). Therefore, some define PPPs as "an organized relationship between public and private organizations, which establishes common scope and objectives and uses defined roles and work methodology to achieve shared goals" (ENISA, 2011).

CIs are responsible for providing basic services to society, which makes society dependent on the correct functioning of CIs. Without the provision of those basic services, vital societal functions could be in danger. Public entities are the ones in charge of ensuring the well-being of society and in considering the problems that may cause a disruption in one or more CIs. In this context, critical infrastructure protection (CIP) becomes one of the most significant activities that governments must pay attention to.

However, CIs are usually managed by private entities (Boin and McConnell, 2007; Dunn-Cavelty and Suter, 2009) and consequently both public and private companies are responsible for providing resources and sharing responsibilities in terms of CIP. This requires a significant effort to promote cooperation between parties through PPPs to ensure CIP (Busch and Givens, 2012).

For instance, PPPs are very common in the energy sector, where private companies are usually in charge of these infrastructures (Yusta et al., 2011). In fact, it is responsibility of the public and private participants to coordinate their efforts to improve the robustness of the CI, meaning that cooperation between public entities and private companies in improving CIP is not only sensible but essential (Dunn-Cavelty and Suter, 2009).

2.2.3.2 Participatory governance

Governance entails processes and institutions that contribute to public decision-making. Participatory governance is one of many institutional strategies for developing governance, where the desired outcome and logical end of participatory governance is citizen engagement (United Nations Economic and Social Council, 2008). Participatory processes within the city have also emerged over the last decade. Involving citizens in the city's decision-making and planning processes has already become a common practice in major cities of developed countries. Public participation is thought to increase the legitimacy, quality, acceptance, and efficacy of decisions and to empower citizens. These approaches rely on the hypothesis that stakeholders will arrive at a shared solution by aligning their different perspectives if they can deliberate freely and there is no predefined hierarchy (Habermas, 1984).

Due to the wide scope of emerging challenges and the high amount of city stakeholders affected by them, the decision making process to address them cannot be conducted by just public entities (Scolobig et al., 2015). Moreover, all the decisions taken regarding city resilience, regardless of the sector directly affected, end up having an indirect effect on citizens as the main aim of resilience building activities is to ensure the wellbeing of citizens (Koch et al., 2017). Actually, a change is occurring in the way public entities relate the community. Community representatives are redefining their respective roles and responsibilities

in the resilience building process. In fact, public institutions are increasingly involved in the crisis management policy development process with the community sector. Therefore, participatory processes within the city are seen as key elements in the community resilience-building process (Schauppenlehner-Kloyber and Penker, 2016).

The purpose of participation needs to be clearly determined in order to allow community representatives to share their perspectives to better understand their needs and concerns and to empower them; otherwise motives will be inferred and distrust could occur (Edwards, 2001). Moreover, the participation of the community sector maybe more appropriate at certain stages in the policy process than at others and this needs to be thought. Obviously, the more politically sensitive the issue is, the more participation by affected players across the policy process will be required (Pelling, 2004). In fact, their participation throughout the policy development process will increase its acceptability when the policy is finally implemented (Scolobig and Lilliestam, 2016).

Despite the changing role of local governments and the increased involvement of the community sector in service delivery, it would be assumed that, ultimately the local government is responsible for final policy decisions (Gimenez, Labaka, et al., 2017).

2.2.3.3 Corporate Social Responsibility

Private companies are usually the ones with more resources to handle with crisis management disaster activities. In fact, private companies should not only focus on protecting themselves against hazards. They should also assume their relevant role increasing the resilience level of surrounding communities participating in holistic crisis management and resilience building activities (Twigg, 2001).

Although the mission of private companies is profit oriented, most private companies have recently come to the conclusion that it is also their responsibility to contribute to the growth and development of

society (Devinney, 2009). Therefore, companies are implementing corporate social responsibility (CSR) policies, with the aim of creating shared value for themselves and for society addressing their needs, concerns and challenges.

Corporate social responsibility (CSR) could be defined as the attitude and activities a company conducts bearing in mind its perceived obligations towards society (Brown and Dacin, 1997; Janssen et al., 2015). Companies' CSR strategies can be oriented to a variety of issues (e.g., diversity, education, economic development, the environment, human rights) through different type of initiatives like the development of socially responsible business practices (Janssen et al., 2015).

However, CSR is not the same as altruism (Forino et al., 2015). Although, indirectly CSR strategies can generate many benefits for society, their final aim is to help companies to increase their revenue in different ways. In the context of crisis management, for instance, implementing CSR is highly important to increase the resilience level of communities in which they work or to which they sell their goods and services (Twigg, 2001). In fact, just focusing on protecting a particular business, without considering the community to which it belongs to is not enough to ensure business continuity in times of crises. If the infrastructure, utility services, employees or customers are affected by a disaster, the profitability of a business will be affected both in the short and long term (Twigg, 2001). Moreover, due to the increasingly demanding customers regarding companies' social, environmental and economic impacts, business models need to adapt quickly to maintain their competitiveness (Piñeiro and Romero, 2011). An additional reason for implementing CSR policies is that private companies have understood that ensuring the welfare of society benefits them as well, as it increases their reputation and consequently their profitability over the long term (Husted and De Jesus Salazar, 2006). These arguments have helped to incentivize private sector involvement in the community resilience building processes

Actually, although the interests that underlie public and private entities differ, the rise of CSR means they both share the important goal of ensuring the wellbeing of society. Bearing this in mind, studying the benefits of developing and implementing CSR strategies to improve the relationship among private companies and citizens seems interesting in the context of city resilience.

2.3 How has the implementation of the resilience approach in crisis management been in practice?

Due to the paradigm shift in crisis management the adoption of a resilience approach started to be important for academics and practitioners. The adoption of the resilience approach in crisis management has been a gradual process. First, the resilience approach was implemented into narrow scope systems involving a limited number of stakeholders in crisis management activities. Gradually, the scope of the systems that needed to be protected started to be wider and more complex. Therefore, the number of stakeholders involved started to be higher. Figure 2.2, illustrates how the scope of the systems in which a resilience approach was being implemented has gradually increased and how the wider the scope of the system the more stakeholders need to collaborate.

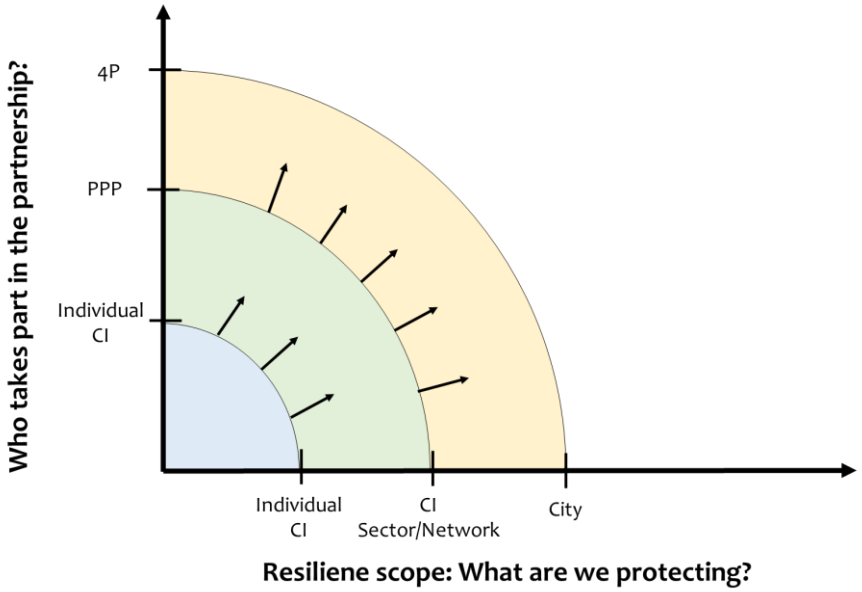


Figure 2.2: Implementation of the resilience approach in crisis management in practice

2.3.1 First step: Protecting individual CIs

Initially, crisis management was focused on protecting the most critical systems for the wellbeing of society. This is why all the efforts were focused on improving the resilience level of critical infrastructures (CIs) (Boin et al., 2003; De Bruijne, 2006). Moreover, CI resilience-building activities were focused only on technical measures, creating robust systems with high security levels and the ability to withstand significant threats (Moteff, 2012; United States. President's Commission on Critical Infrastructure Protection, 1997). They also understood that focusing only on technical issues was not sufficient for increasing the resilience level of a CI. It was also important to consider the organizational dimension of resilience because some of the disruptions derive from human errors (Madni and Jackson, 2009).

2.3.2 Second step: Protecting CI networks

Today, CIs are increasingly interconnected, and therefore considering them as isolated entities and focusing only on improving their own resilience level (internal resilience level) without considering other CIs' resilience level is not enough (O'Rourke, 2007). In fact, nowadays, crises are increasingly complex due to the high interdependencies among CIs and the potential cascading effects (Setola, 2010). Therefore, CIs need to be considered as networks in which the resilience level of a particular CI depends not only on its own resilience level (internal resilience) but also on the resilience level of other interrelated CIs and first responders (external resilience) (Labaka, 2013). When improving external resilience, public entities are of utmost importance for their role of providing resources if a crisis strikes. In this context, fostering collaboration through mechanisms like Public Private Partnerships (PPPs) began to be developed with the aim of providing support for the external resilience-building process of interdependent CI networks (Dunn-Cavelty and Suter, 2009).

2.3.3 Third step: Protecting cities

When the aim is to protect the overall welfare of society, broader scope systems, like cities, need to be considered. Protecting systems like cities requires an additional dimension of resilience, namely the social dimension (Dobson, 2017). In order to improve this dimension, citizens also need to be considered as relevant stakeholders that contribute to the resilience-building process. Therefore, in this context, it is not enough to develop PPPs; citizens are also needed. The need to consider the social dimension of resilience to increase the overall city resilience level requires the development of a new mechanism that is capable of engaging all the relevant stakeholders. Therefore, developing public private people partnerships (4Ps) seems a promising approach to supporting the city resilience-building process.

2.4 The need for new collaboration mechanisms: Developing 4Ps to increase city resilience

Academic and practitioners are increasingly aware of the fact that in addition to considering the supervisory role of public entities and the technical expertise of private companies, it is also important to consider the tacit and explicit knowledge of NGOs, community representatives and citizens to be able to address its societal aspect. This is why, city resilience building processes are emphasizing the benefits of engaging all relevant city stakeholders like community-based organizations (NGOs, schools, volunteering groups…), private companies (businesses, insurance companies, critical infrastructure owner or operators…) and public entities (multi-level government agencies, first responders…) to better address the complex challenge of building resilience from a holistic perspective.

In fact, some experts observe a need for a governance model shift towards a public private people partnership (4P) in crisis management to embrace both technical and societal aspects of city resilience (Majamaa et al., 2008; Marana et al., 2018; Zhang, 2012). 4Ps could help to identify and focus on the society's needs in the context of city resilience (Kumaraswamy et al., 2015). Actually, promoting the participation of community representatives in partnerships could change their role from a reactive to a proactive stakeholder that is able to contribute in the development and implementation of city resilience strategies (Patel and Gleason, 2018; Puerari et al., 2014). Civil society has an increasingly important role in crisis management within the city. In practice, during crises, local people are frequently the first ones responding to and the ones that suffer most their effects (Aldrich and Kyota, 2017).

2.5 Existing 4P frameworks

Some of the most relevant frameworks in the context of disaster resilience support the need to foster mechanisms like 4Ps to support city resilience-building processes. These frameworks highlight the importance of city

stakeholder engagement and 4Ps to integrate the perspectives of different organizations within the city (Bromley et al., 2017).

- The Sendai Framework for disaster risk reduction 2015-2030 is a voluntary non-binding agreement that recognizes public authorities in charge of disaster risk reduction activities but that should share this responsibility with other stakeholders including private companies and society. The framework include seven global targets and four priorities for action. The seven global targets are the following:
    1. Reducing global disaster morality
    2. Reducing number of affected people
    3. Reducing the economic loss derived from disasters
    4. Reducing the disaster damage to critical infrastructures
    5. Increasing the number with local disaster risk reduction strategies
    6. Enhancing international cooperation
    7. Increasing the availability of early warning systems

  The four priorities for action are the following:

    - Priority 1: Understanding disaster risk
    - Priority 2: Strengthening disaster risk governance to manage disaster risk
    - Priority 3: Investing in disaster risk reduction resilience
    - Priority 4: Enhancing disaster preparedness for effective response

  According to this framework, in order to achieve the four priorities, the engagement representatives of all the different city stakeholder groups is required. Focusing on improving the coordination between different entities within the city and highlighting the importance of engaging representatives of society is important (United Nations, 2015).

Therefore, developing mechanisms like 4Ps is seen as highly relevant in order to achieve the four priorities for action.

- The strategies developed under the scope of the 100 Resilient Cities initiative funded by the Rockefeller foundation highlight the need to consider the well-being of citizens as the most important asset to be protected against upcoming challenges (acute shocks or long term stresses) (Rockefeller Foundation, 2017). Four categories (inner ring) and twelve indicators (outer ring) compose the City Resilience Framework developed within the scope of this initiative (see Figure 2.3). The indicators are critical attributes that need to be considered in order to increase the city's resilience level. The indicators included in the leadership and strategy category (promote leadership & effective management, empower a broad range of stakeholder and fosters long term & integrated planning) are all closely related to the idea that fostering partnerships among relevant stakeholders (public entities, private companies and citizens) is key to increase city resilience. Therefore, 4Ps appear to be a required mechanism to improve the indicators in the Leadership & Strategy category but also the rest of them (Health & Wellbeing, Economy & Society and Infrastructure & Environment).

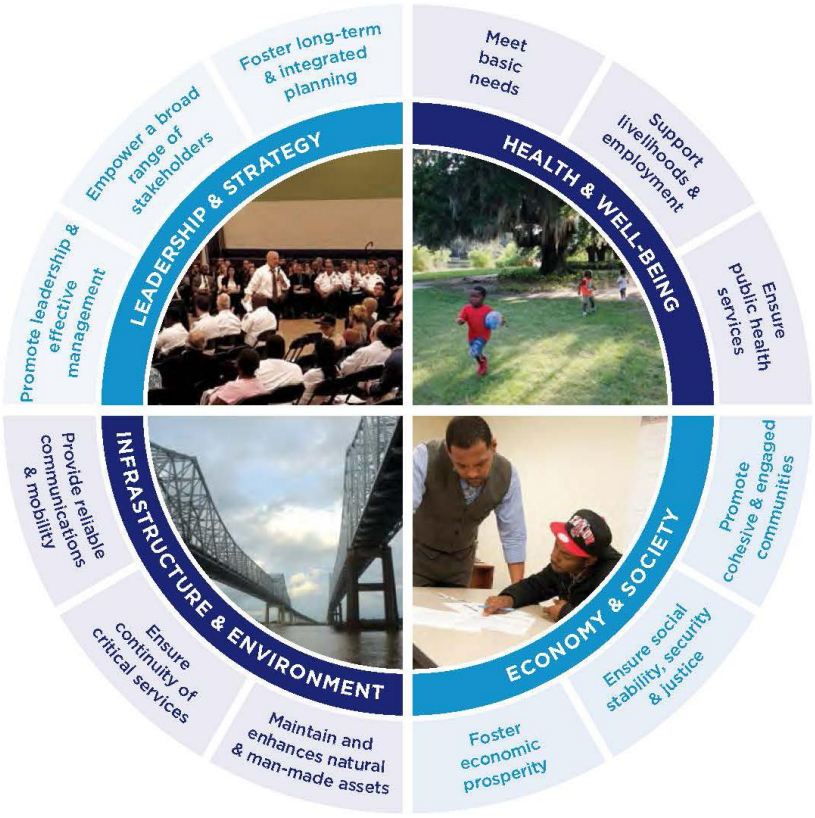


Figure 2.3: 100 Resilient Cities Framework

- The Global Facility for Disaster Reduction and Recovery (GFDRR) supported by the World Bank Group's (WBG) provides analytical work, technical assistance, and capacity building to help vulnerable nations improve resilience and reduce risk. GFDRR has several areas of engagement. One of the area is related to city resilience and there is another one related to community resilience. Recently the "City Resilience Program" (CRP) which is an effort to assist developing countries to build greater resilience to climate change and disaster risks has been launched (Global Facility for Disaster Reduction and Recovery, 2018). GFDRR is a grant-funding mechanism that supports disaster risk

management projects worldwide. This program highlights the importance of fostering PPPs to increase city resilience. The community resilience engagement area focuses on engaging communities and promoting social cohesion in city resilience-building processes. Therefore, GFDRR's work is oriented to create partnerships with key city stakeholders as well as other international organizations and cities.

- There are also academic frameworks like the one presented in the paper called "Developing public private people partnership (4P) for disaster infrastructure procurement" (Zhang et al., 2015) whose aim is to illustrate how the involvement of relevant "people" into already established PPPs could increase the effectiveness of post-disaster infrastructure projects (Figure 2.4). The paper also provides a practical guide for practitioners who may wish to implement the 4P framework presented in the paper.

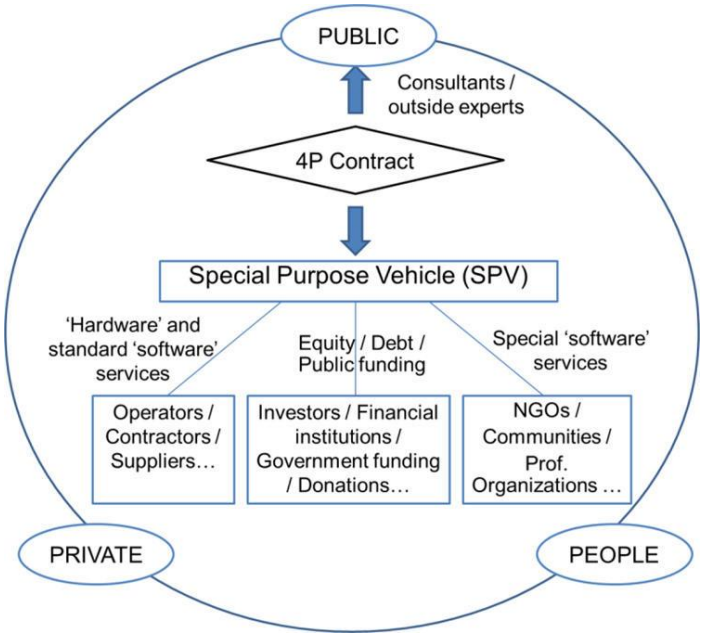


Figure 2.4: Framework for 4P for disaster infrastructure procurement (Zhang et al., 2015)

- The following academic framework presents a relationship stakeholder model for disaster and humanitarian operations (Fontainha et al., 2017). The framework identify 10 main stakeholders organized in three groups (public, private and people group) including a last stakeholder, the Beneficiary, detached from the others (Figure 2.5). The beneficiary is the central target of all the previous stakeholders' actions and is regularly defined as the receiver of aid from other stakeholders or those affected by a disaster. Beneficiaries must not be considered solely as passive stakeholders but rather as active partners in all the crisis phases. The framework explains different relationship structures of stakeholder management in stakeholder models for Disaster and Humanitarian Operations. It proposes that a multi-focal structure is the most suitable to represent the stakeholder relationship in disaster and humanitarian operations. The multi-focal structure is seen as a representation of stakeholders interacting with all other stakeholders considering the existence of a central stakeholder that in this case will be the beneficiary. This model could be used to illustrate how stakeholders collaborate in different countries and to identify which stakeholders need to be further involved.

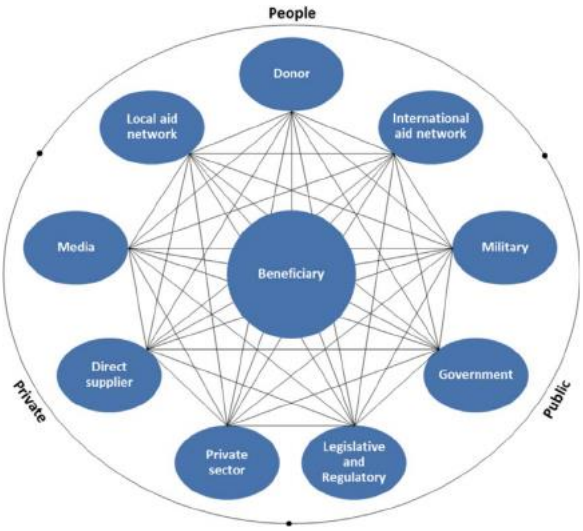


Figure 2.5: The relationship stakeholder model for disaster and humanitarian operations (Fontainha, 2017)

2.5.1 Limitations of existing frameworks

All the presented frameworks agree on the fact that 4Ps enable meaningful and long-lasting formal and informal collaboration in the context of crisis management and resilience. However, representing the diversity of city stakeholders' perspectives and dealing constructively with value-based intangible issues in strategic decision making in the context of resilience is far from simple (Scolobig and Lilliestam, 2016).

Although all these frameworks highlight the benefit that developing 4Ps could bring to the crisis management and to the resilience building process, some of the frameworks presented focus only on explaining how 4Ps could contribute in a specific phase of a crisis (prevention, preparation, response or recovery). 4Ps are useful mechanisms that could support in activities related to any crisis management phase. Therefore, there is a need to develop frameworks that help on understanding how 4Ps could support in the whole resilience building process rather than focusing in a specific phase of the crisis without considering the process holistically (Hernantes et al., 2018).

Other frameworks explain how 4Ps could contribute in increasing the resilience level of a city but in the context of a specific area like disaster and humanitarian operations. Bearing in mind the increasing need to protect cities in order to ensure the welfare of society, apart from developing specific 4P frameworks to address specific problems there is a need to consider the city resilience dimensions (social, economic, cultural, environmental, spatial and physical infrastructure) and city resilience building process holistically (Godschalk, 2003; Jabareen, 2013). Frameworks like the 100 Resilient Cities framework (Rockefeller Foundation, 2017), one of the most significant city resilience framework, is a good example to show that in order to increase the overall resilience level of a city different areas need to be covered. Therefore, developing 4P frameworks that contribute in the development of 4Ps that cope with the complex nature of urban resilience is important.

Moreover, most of the frameworks are rather descriptive and do not give tips on how these 4Ps could be useful in practice. Although frameworks highlight the importance of developing this type of mechanisms, generally, they do not provide strategies and procedures to embrace different city stakeholder's expectations and foster collaboration among different city stakeholders working in the context of resilience (Jabareen, 2013). Identifying potential best practices to enhance stakeholder engagement to the resilience building process overcoming potential barriers that may arise due to existing self-interests is required (Whittaker et al., 2015). In fact, these frameworks do not provide a guideline that could help city stakeholders identifying which factors need to be taken into consideration to enhance collaboration when developing effective and long-lasting 4Ps in cities.

Therefore, the existing framework limitations found after analysing the available 4P frameworks in the context of city resilience building process are the following:

1. Some frameworks only explore the contribution of 4Ps in a specific phase of the crisis.

2. Some frameworks only focus on the benefits 4Ps bring to a particular resilience building activity in the context of a particular challenge.
3. Most frameworks are descriptive and do not give practical guidance on how these mechanisms should be developed.

2.6 Research contribution: a 4P framework to support the city resilience building process

Developing city resilience is a complex and dynamic process that involves the engagement of multiple city stakeholder groups (Gimenez, Labaka, et al., 2017). The development of 4Ps is based on three main ideas: The first one is the willingness to offer ones' resources, the second one is the ability to coordinate the available resources in the most effective manner and the third one is the ability to align existing different perspectives (Jung, 2017). The contribution of this research is a framework for public private people partnerships (4Ps) in the city resilience-building process. The aim of our contribution is to provide a framework that complements the limitations of existing frameworks, previously commented.

Therefore, this framework overcomes the previously mentioned limitations developing a new 4P framework with the following peculiarities:

1. A framework that guides the development of 4Ps that could provide support in any phase of crisis management.
2. A framework that contributes to implement any resilience building activity in order to face crises derived from all the emerging challenges affecting cities.
3. A framework that gives practical and detailed guidance on how these mechanisms could be developed and implemented in cities

Therefore, this framework provides support and guides local authorities developing 4Ps to support the city resilience-building process. The framework includes a set of sixteen characteristics that successful 4Ps in the city resilience

building process should consider. Moreover, the framework presents three 4P evolution stages that describe the continuous transformation of the multi-stakeholder collaborations at the city level to eventually achieve a successful 4P that supports the city resilience building process. Finally, the framework presents an implementation order whose aim is to establish the most effective implementation order for the characteristics taking into consideration the 4P evolution stages.

3 Research Methodology

This section presents the methodology used to develop this research. The methodology is composed of three main phases: (1) conceptualization, (2) development of the 4P framework, and (3) validation of the 4P framework. In each phase different research methods were applied to gather the required information and knowledge.

First, a literature review was carried out within the conceptualization phase to analyze the current state of the art in order to identify existing gaps and define our research questions. Second, semi-structured interviews, review of resilience strategies and a Delphi study were conducted with multidisciplinary experts. Finally, two case studies were carried out in two different cities in order to gather relevant information to validate the 4P framework developed in the development phase.

Therefore, this chapter explains the overall research methodology that consists of the three different phases. Afterwards, the research methods used in each research phase and their specific application in the context of this research are described.

3.1 Overall research methodology

The research methodology used needs to be adequate to the research topic, objectives and the desired results. The aim of this research is to develop a 4P framework that provides support to city stakeholders involved in the city resilience-building process. Being city resilience a wide scope concept, a co-creation approach has been followed involving multi-disciplinary experts working in the field of crisis management and resilience in cities. Therefore, the validation of this framework was carried out based on evidence and examples gathered through case studies in two different cities.

This research methodology consists of three main phases; first, the conceptualization phase, second the development phase and third the validation phase. To achieve the expected results in each phase, different research methods where applied. In the conceptualization phase, a systematic literature review was conducted to obtain the research questions, the layers and dimensions of the framework, the characteristics of successful 4Ps in the city resilience-building process and the 4P evolution stages. In the development phase, semi-structured interviews with experts, review of resilience strategies and a Delphi process were conducted to obtain the final version of the 4P framework. Finally, in the validation phase two case studies were conducted to find practical evidences on how 4Ps have been developed. The first case study was carried out in the city of Wellington, New Zealand and the second one in the city of Donostia, Spain.

Figure 3.1, illustrates the overall research methodology used in this research. Squares in green represent work already finished, squares in blue represent papers already finished and submitted but not accepted and squares in yellow represent on going tasks. In this chapter, the three phases carried out in this research and the research methods applied in each phase will be explained in more detail.

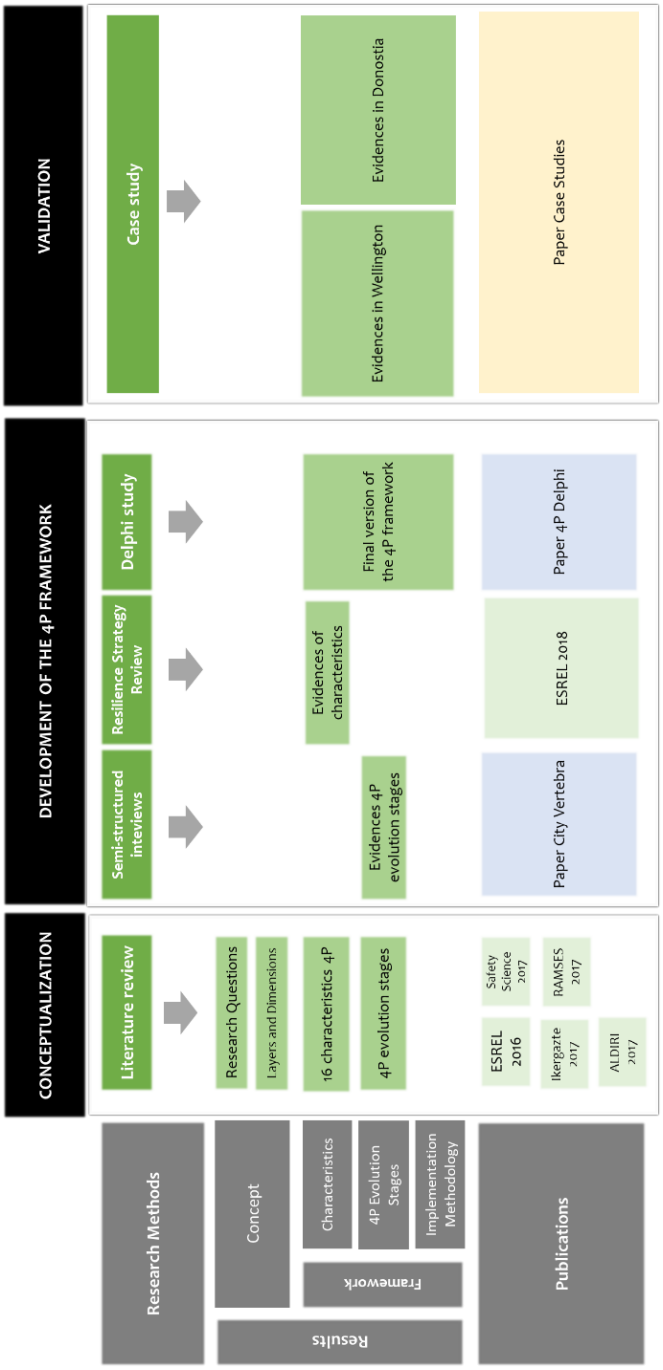


Figure 3.1: Research Methodology

3.2 Conceptualization phase: Literature review

Before defining the research objectives, it is necessary to analyze the existing literature in order to identify existing research gaps and to establish the research contribution. In this phase, the literature review was chosen as the most adequate research method to analyze the existing literature in the field of multi-stakeholder partnerships in the context of city resilience.

During the conceptualization phase, the research questions, the layers and dimensions of the 4P framework, the characteristics of successful 4Ps and the 4P evolution stages were obtained. Furthermore, it enabled us to identify general trends in the evolution of partnerships supporting the city resilience building process.

The first objective of the literature review was to identify research studies, frameworks and reports explaining multi-stakeholder collaboration in the context of city resilience in order to find the research gaps and define the research contribution.

In the first step, we chose a set of keywords and conduct different searches. The set of keywords used were the following: “city resilience”, “community resilience”, “urban resilience”, “partnership”, “collaboration”, “public-private partnership”, “public-private collaboration”, “public private people partnership”, “community”.

Analyzing the literature obtained from those keywords, we were able to find the research gap, define the research questions, and design more specific queries to answer each of those research questions. Our main research question are the following:

- RQ1: What are the characteristics of successful public-private-people partnerships in the city resilience-building process?
- RQ2: How do 4Ps evolve over time in order to become meaningful and successful?

In order to be able to answer RQ1, it is necessary to understand that different types of partnerships have been used to address large-scale cross-sectoral challenges in a wide range of contexts, such as environmental sustainability

(Bäckstrand, 2006) or industry (Majamaa et al., 2008). Accordingly, it is valuable to analyse the literature on 4Ps in the city resilience-building process as well as the literature on partnerships in other contexts. This is why in order to respond main RSQ1 research question three concrete research sub-questions were defined:

- RQ1.1: What are the characteristics that successful partnerships have in common, regardless of its type?
- RQ1.2: What are the specific characteristics of successful city resilience-building partnerships (without considering the type of partners involved)?
- RQ1.3: What are the specific characteristics of successful public-private-people partnerships (4Ps) (without considering the context of city resilience)?

RQ1.1 was answered based on the characteristics of successful partnerships that Mohr & Spekman identified in their widely-cited article "Characteristics of partnership success: partnership attributes, communication behaviour, and conflict resolution techniques" (Mohr and Spekman, 1994). The Mohr and Spekman article has subsequently been referenced by other recent researchers whose aim was similar to ours; to find successful factors for meaningful collaboration between and among stakeholders (Browning et al., 2018; Doyle and Paton, 2017).

To answer RQ1.2 and RQ1.3, a systematic literature review was conducted using the Scopus electronic database, which was launched in 2004 by Elsevier. We chose this database because it indexes a larger number of journals than the other databases and it is the largest searchable citation and abstract source for different scientific fields (Falagas et al., 2008; Guz and Rushchitsky, 2009).

The keywords and queries used to find papers that were relevant to the second and third research sub-questions are detailed in Table 3.1.

Table 3.1: Queries used to answer RQ1.2 and RQ1.3

RESEARCH QUESTION	EXECUTED QUERY
RQ1.2:	"city resilience" OR "community resilience" OR "urban resilience" AND partnership OR collaboration
RQ1.3:	(("public-private partnership" OR "public-private collaboration" AND communit*) OR "public-private people partnership") AND ("characteristics" OR "properties" OR "dimensions")

Figure 3.2 illustrates the iterative process used to remove irrelevant papers as well as to identify the characteristics of successful 4Ps in the city resilience-building process. After the initial search, different phases were carried out to decide which papers were relevant and therefore included in the sample to be analysed in further detail. After executing each query, the title, the abstract and the keywords of the identified articles were analysed to identify the relevant ones. Afterwards, the duplicate entries were removed.

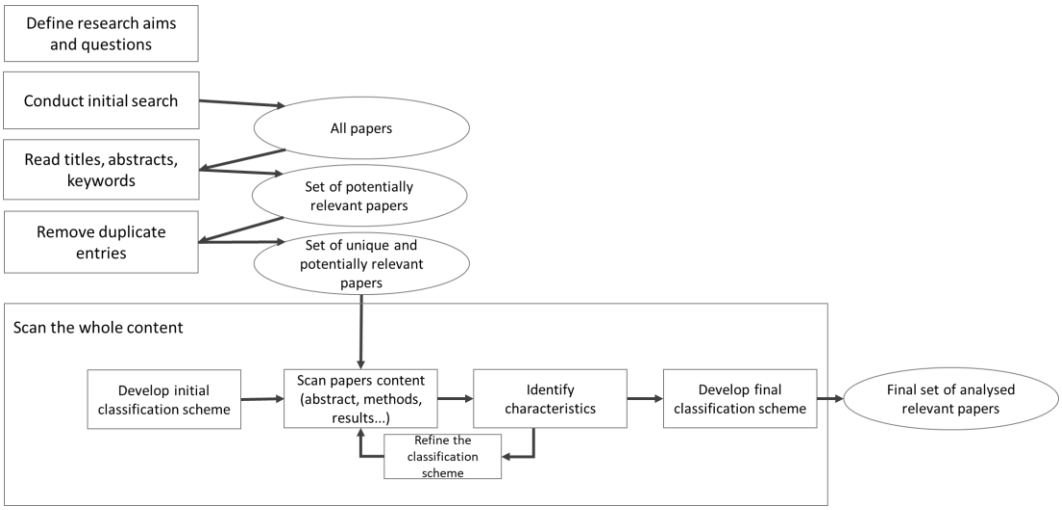


Figure 3.2: Process followed in the analysis of the literature review

Once unique and potentially relevant papers were identified, a five-step process was conducted to identify characteristics that answered RQ1.2 and RQ1.3:

1. Develop an initial classification scheme: a preliminary version of the possible characteristics for successful resilience-building partnerships and 4Ps was developed. The initial scheme was based on the characteristics identified by the Mohr & Spekman article.
2. Scan the papers' content (abstract, methods, results and conclusions): potentially relevant articles were read in full and analysed in greater detail.
3. Identify any characteristic of successful partnership mentioned in the articles according to the classification scheme: Articles were analysed in detail to find statements that justified the characteristics included in the classification scheme as well as to find new characteristics.
4. Refine the classification scheme if necessary: Preliminary characteristics were modified, removed or replaced.
5. Develop final classification: A final version of the characteristics for successful resilience-building partnerships and 4Ps was developed.

Figure 3.3 and Figure 3.4 presents the quantitative results gathered from executing RQ1.2 and RQ1.3 queries.

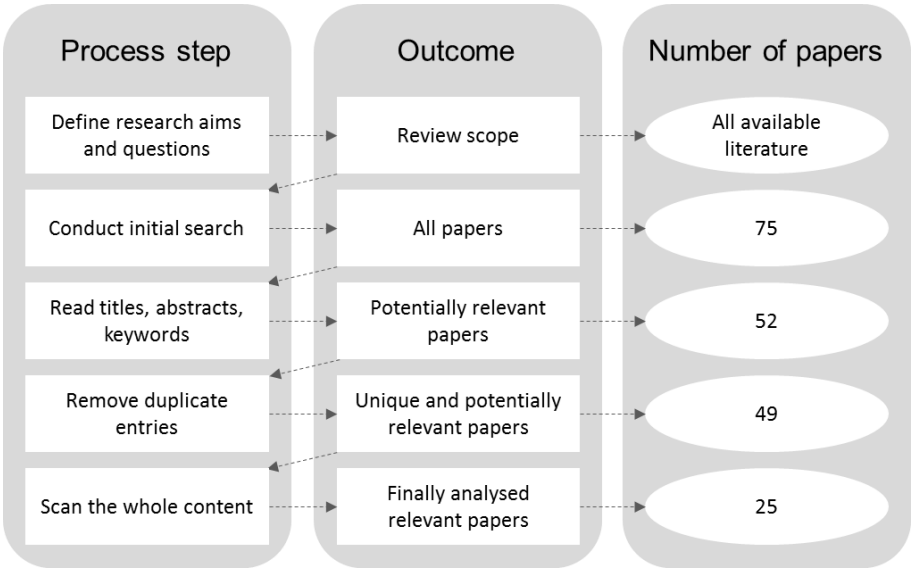


Figure 3.3: Quantitative results obtained after executing Q1.2 query

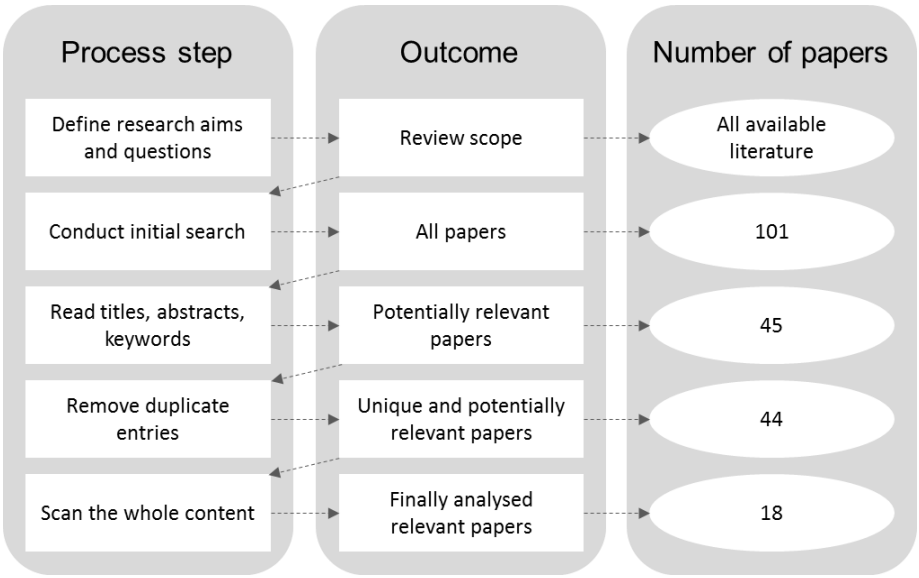


Figure 3.4: Quantitative results obtained after executing Q1.3 query

Appendix A presents the list of relevant papers selected to answer RQ1.2 and RQ1.3.

In order to answer RQ2 the papers obtained from after executing RQ1.2 query were analysed since the papers obtained after executing this query were talking about partnerships in the context of city resilience context. Through executing RQ1.2, papers presenting research work in multi-stakeholder partnerships in the context of resilience were obtained. Analysing these papers enabled us to better understand the evolution of resilience-building partnerships over time.

Therefore, as a result of the systematic literature review, the sixteen characteristics of successful 4Ps, the classification scheme for the 16 characteristics (dimensions and layers) and the three 4P evolution stages were obtained. The dimensions were obtained taking the work of Mohr & Spekman as a basis. The three layers were obtained grouping the characteristics obtained to answer each of the three research sub-questions. Finally, the three evolution

stages were obtained after analysing the available literature about multi-stakeholder partnerships in the context of city resilience.

3.3 Development phase of the 4P framework

Once the conceptualization phase was finished, the development phase of the 4P framework started. The 4P is composed by three elements; a set of 16 characteristics of successful partnerships, three 4P evolution stages that explain the development process of 4Ps in cities and a implementation order that established in which stage should each characteristic be implemented. In this phase, the following research methods were applied; semi-structured interviews with experts, resilience strategy review and a Delphi process. The triangulation of the information gathered applying those research methods enabled to develop the final version of the 4P framework.

3.3.1 Semi-structured interviews

The main aim of the interviews was to gather relevant information on a particular topic or area to obtain valuable information from the experiences of individuals (DiCicco-Bloom and Crabtree, 2006). For this research, qualitative semi-structured interviews were performed. Kvale (2007, p.174) defines the qualitative research interview as "an interview, whose purpose is to gather descriptions of the life- world of the interviewee with respect to interpretation of the meaning of the described phenomena". Being semi-structured allowed asking open-ended questions to respondents.

The semi-structured interviews with experienced practitioners in city resilience helped us to translate their experience into evidences to illustrate the 4P evolution stages. We conducted a total of six semi-structured interviews with city representatives (Table 3.2). These representatives were chosen because they were familiar with the concept of city resilience and have been involved in the strategic planning of their city's resilience building process. In fact, four out of the six cities (Bristol, Glasgow, Rome and Vejle) are enrolled in the 100

Resilience Cities program, which gives funding to cities to develop and implement their own resilience strategy (Rockefeller Foundation, 2017).

Table 3.2: Participants in the semi-structured interviews

PROFILE OF THE PARTICIPANTS	REPRESENTING CITY
Sustainability Manager	Bristol (UK)
Project Management (Sustainability and Resilience)	Glasgow (UK)
Adviser in Societal Safety	Kristiansand (Norway)
Urban Resilience and Natural Hazard expert	Rome (Italy)
Technical Assistant for Strategic Planning	Donostia/San Sebastian (Spain)
Manager of Resource Centre	Vejle (Denmark)

These semi-structured interviews consisted of two parts. First, we presented and explained the preliminary results gathered from the conceptualization phase (characteristics, layers, dimensions and evolution stages) using two videos available on the internet (Appendix B). After that, a set of general open questions about the proposed framework were asked in order to receive valuable feedback to improve the elements of the 4P framework obtained in the conceptualization phase. More specifically, experts were asked about aspects that should be considered when developing effective 4Ps and about how the roles and interactions of each city stakeholder evolve through the city resilience building process. The semi-structured interviews were helpful to obtain the final version of the description of the three 4P evolution stages that explain the 4P development process.

3.3.2 Review of city resilience strategies

The review of city resilience strategies already implemented by leading cities enabled us to gather real evidence on which initiatives could be implemented in

order to develop and manage 4Ps effectively and to identify lessons learnt and best practices replicable in other cities. For this research, twelve resilience strategies have been analyzed (Table 3.3). We identified cities in different continents with different demographical, environmental and social realities in order to be able to encompass the different realities of the whole world. Actually, these leading cities are in the last stages of the evolution of 4P in the city resilience building process. We decided to analyze the resilience strategies of leading cities as we assumed that the experience gained during the development and implementation of the strategy could be of huge support for other cities in the development of effective 4Ps in the city resilience-building process.

Table 3.3: Resilience Strategies Reviewed

YEAR	TITLE OF THE REPORT	SOURCE	LINK
2017	Wellington Resilience Strategy	Wellington City Council and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/wellington/
2017	Resilient Bangkok	Bangkok Metropolitan Administration and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/bangkok/
2016	Rotterdam Resilience Strategy	Gemeente Rotterdam and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/rotterdam/
2017	Dakar Resilience Strategy	Ville de Dakar and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/dakar/

2016	Resilient San Francisco	Seal of the city and county of San Francisco and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/san-francisco/
2016	Our Resilient Glasgow	Glasgow City Council and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/glasgow/
2016	Bristol Resilience Strategy	Bristol City Council and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/bristol/
2016	Resilient Greater Christchurch	Greater Christchurch Partnership and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/greater-christchurch/
2016	Resilient Melbourne	The City of Melbourne and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/melbourne/
2016	CDMX Resilience Strategy	Ciudad de Mexico and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/mexico-city/
2015	Resilient New Orleans	City of New Orleans and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/new-orleans/
2017	Human & Resilient Santiago	Santiago Metropolitan Region and the Rockefeller Foundation	https://www.100resilientcities.org/strategies/santiago-de-chile/

3.3.3 Delphi Study

Finally, the Delphi method was chosen to improve the preliminary version of the 4P framework to obtain its final version. The final version of the 4P framework includes the sixteen characteristics of successful 4Ps, the three 4P evolution stages results obtained and the implementation order. The Delphi process is a survey method used to facilitate an efficient group dynamic discussion intended to reach a reliable group opinion about a complex problem by the use of a series of questionnaires combined with a controlled feedback (Linstone, Harold A. Turoff, 1975). It has been proven as a valid technique to aid decision-making based on opinions of experts. Moreover, this method has been proved to be valuable in the field of resilience in crisis management and resilience (Adini et al., 2017; Gimenez, Hernantes, et al., 2017; Labaka et al., 2016).

The Delphi method consists of multiple rounds of questionnaires (Figure 3.5). In the first round, a questionnaire is sent to all the experts. After receiving their answers and analyzing their feedback, a new questionnaire is sent to start the second round as well as a report with the analysis of previous answers and the group's ranking. The expectation is that each expert may reflect on their earlier answer and, over time a convergence may be obtained (Skulmoski and Hartman, 2007). The process is repeated until the stopping criterion is reached. For example, a fixed number of rounds have been completed or a consensus has been achieved. The main characteristics to be considered while designing a Delphi process are anonymity, iteration and controlled feedback (Linstone, Harold A. Turoff, 1975):

- Anonymity: In order to reduce the confrontation, participants only interact with the moderator. This generates trust and helps participants to respond in a sincerer manner allowing more valuable outputs (Landeta, 2006).
- Interaction: The Delphi process consists on various rounds of questions and feedback, two or three are typically sufficient for most studies (Linstone, Harold A. Turoff, 1975). The answers gathered from the questions in each round are summarized by the moderator and provided as feedback to be considered in the next round.

- Controlled feedback: The moderator adequate the feedback given to the experts trying to eliminate all irrelevant information or noise from the discussion (Landeta, 2006).

Moreover, the Delphi method is a group decision mechanism that requires qualified experts with deep understanding of the issues being analysed (Okoli and Pawlowski, 2004). Selecting the participants is a critical step of the Delphi process since the quality of the opinions received will condition the output of the Delphi process (Bolger and Wright, 1994). A total number of 15-30 heterogeneous and carefully selected experts are required to ensure about the quality of the feedback received from the Delphi process (Martino, 1972). Moreover, for this particular research experts selected should fulfil the following conditions:

- Representatives from all the city stakeholder groups (public entities, private companies and citizens) that take part in the city resilience-building process should contribute with their opinion to the process.
- Considering that the way of implementing city resilience may differ depending on the country, we assumed that it was important to have a variety of experts from different places in order to be able to generalize the results obtained from this research.
- Representatives with different backgrounds should contribute with their opinion to the process. Although they are working on the same challenge, they may have different perspectives of the same reality.

After identifying an initial group of experts that are currently involved in city resilience building international initiatives, a total amount of 37 experts participated in the first round of the Delphi questionnaire and a total amount of 22 experts conducted the whole process (1st, 2nd and 3rd questionnaires). Table 3.4 lists the experts that participate in the whole process.

Table 3.4: List of experts that participate in the whole Delphi process

PROFILES OF THE PARTICIPANTS (Nº OF PARTICIPANTS)	ORGANIZATION	YEARS OF EXPERIENCE
Natural Hazard Assessment Expert	Risorse per Roma (Italy)	>15 years
Assistant Manager	Sustainability Department from Glasgow City Council (UK)	10-15 years
Project Manager	DIN (Germany)	< 5 years
Councilor	Bristol City Council (UK)	5-10 years
Emergency Planning Expert	Avon Fire & Rescue (UK)	> 15 years
Manager of Resource Centre	Vejle City Council (Denmark)	> 15 years
Climate Change and Hydraulics Expert	Sewage plant Vejle (Denmark)	10-15 years
Project Manager	Risorse per Roma (Italy)	10-15 years
Researcher	Department of Epidemiology Lazio Regional Health Service (Italy)	10-15 years
Civil Contingencies Expert	Fire Scotland (UK)	10-15 years
Consultant and Developer	Vejle City Council (Denmark)	< 5 years
Researcher	Massey University (New Zealand)	> 15 years
Civil Protection Officer	Rome City Council (Italy)	< 5 years
Project Manager	Bristol City Council (UK)	> 15 years
Researcher	ENEA (Italy)	10-15 years
Researcher and Project Manager	Università degli Studi di Torino (Italy)	5-10 years
Civil Protection Manager	Bristol City Council (UK)	10-15 years

Project Manager	Red Cross Spain (Spain)	10-15 years
Senior Technician	City Council of San Sebastian, Strategy Office (Spain)	10-15 years
Senior Technician	City Council of San Sebastian, Cultural Diversity (Spain)	5-10 years
Manager Technician	ALBOAN (Spain)	5-10 years
Manager	Youth association (Spain)	< 5 years

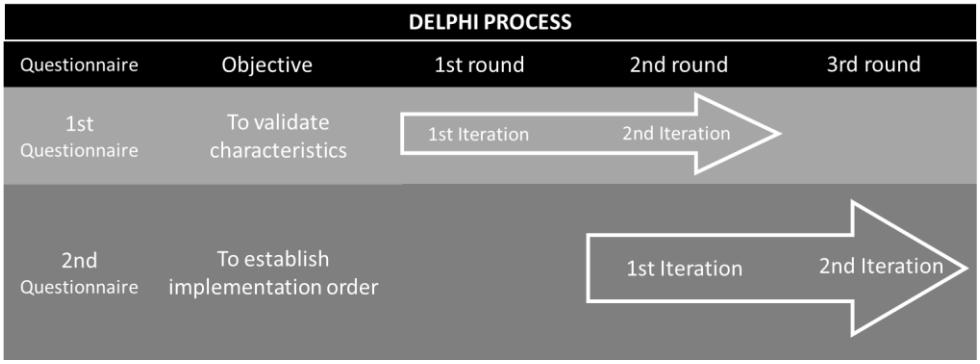


Figure 3.5: Summary of the Delphi process

Figure 3.5 shows the design of the Delphi process. The process consisted of three rounds. In the first round, the first questionnaire was sent to the experts (Appendix C). The target of the first questionnaire was to validate the set of successful characteristics of 4Ps using the feedback gathered from the experts. They were asked to evaluate from 0 to 5 (with 0 meaning strongly disagree and 5 meaning strongly agree) to what extent they agreed with the definitions of the characteristics provided and to what extent they agreed on the relevancy of the characteristic for improving the 4P. Moreover, three open questions were also included in the questionnaire to give comments on how the definition could be improved and to suggest new terms to refer to the concept explained. After concluding the first round a report was sent to experts summarizing the information gathered (Appendix E).

In the second round of the process, the first questionnaire was sent again to the experts to reevaluate the improved version of the 4P framework based on the feedback gathered in the first iteration. Moreover, the first iteration of the second questionnaire was sent to experts (Appendix D). The target of the second questionnaire was to set the implementation order of the 16 successful characteristics of 4Ps considering the final version of the 4P evolution stages obtained after conducting the semi-structured interviews. In order to do that, experts were asked to define in which evolution stage should each characteristic start being implemented. After concluding the second round a report was sent to experts summarizing the information gathered (Appendix E).

Finally, in the last round of the process an open question was sent to experts to gather feedback on the proposed implementation order developed with the information gathered from the previous round. The analysis of all the information gathered during the Delphi process is available in Appendix F.

3.3.4 Triangulation of the information gathered through different research methods

Researchers are recommended not to only rely upon a single method to examine a problem but to consider using a triangulation of methods (Loo, 2002). Therefore, this research has been conducted following a triangulation approach. Triangulation could be defined as "the combination of methodologies in the study of the same phenomenon"(Denzin, 1978, p.291). The effectiveness of triangulation rests on the assumption that the strengths of one specific method will counter-balance the weaknesses of another (Jick, 1979). There are two types of methodological triangulation: 'across-method' and 'within-method'. Across-method studies combine qualitative and quantitative methodologies while "within-method" combine more than one methodology, quantitative or qualitative, but not both (Bekhet and Zauszniewski, 2012). This is why our research takes the 'across method' triangulation approach, as we use quantitative (Delphi study) and qualitative methodologies (semi-structured interviews with a panel of experts and review of city resilience strategies).

Using this methodological approach enabled us to develop the final version of the 4P framework (successful characteristics, evolution process and implementation order).

Table 3.5 summarises how each research method used in the development phase contributes to the final version of the 4P framework. First, through semi structured interviews with local authorities of six leading cities, we obtained information about the important aspects that need to be considered when developing 4Ps in cities. Moreover, we better understood how the roles and interactions among different stakeholders evolve during the city resilience building process. This enabled us to better describe each 4P evolution stage to better illustrate their whole transformation process. Second, through the review of city resilience strategies, we gathered real evidence about initiatives that are currently being carried out in cities. Through this analysis, we identified best practices replicable in other cities that enable to improve each 4P characteristic. Moreover, we also improved the preliminary description of the set of sixteen characteristics obtained after conducting the conceptualization phase. Finally, the first Delphi questionnaire enabled to validate the definition and the description of the 16 characteristics through the feedback received from experts. Moreover, the second Delphi questionnaire taking the final version of the 4P evolution stages enabled us to establish a priority order of the characteristics considering the 4P stages.

Table 3.5: Contribution of each methodology to the 4P framework

METHOD	SET OF 16 CHARACT.	4P EVOL. STAGES	IMPLEMENTATION ORDER
Semi-structured interviews	—	Final version of the description of the three 4P evolution stages	—
Review of City Resilience Strategies	Description of each of the sixteen 4P characteristics Lessons learnt and best practices to improve those characteristics	—	—
1st Delphi Questionnaire	Validation of the definition and description of the 4P characteristics	—	—
2nd Delphi Questionnaire	—	—	Considering the final version of the description of the three 4P evolution stages, development of the implementation order

3.4 Validation phase of the 4P framework

The main goal of the 4P framework is to provide support in the development process of 4Ps in the context of city resilience. The aim of the validation phase of this research was to confirm that the 4P framework serve for the purpose for which it was developed. In order to make sure that the framework reach this objective the following characteristics were checked: completeness, usefulness and relevancy. The aim of checking completeness was to assess whether the 4P framework includes all the factor that need to be considered when developing effective 4Ps within the city resilience building process. The aim of checking usefulness was to make sure that the 4P framework allows the assess the current status in the 4P development process. Finally, the aim of checking relevancy was to ensure that the 4P framework provides relevant support to local authorities willing to develop 4Ps within the city.

Once the 4P framework for city resilience was developed, the case study was chosen as the most appropriate research method to validate the framework. Although there is not a standard definition, within the scope of this research a case study is defined as a study that "examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations) and in which the boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used" (Benbasat et al., 1987). This research method enables to identify complexities of reality through real-life experiences. A case study enables us to understand why decisions are taken, how they are implemented and which their consequences are (Yin, 2009).

The case study method is often accused of lack of rigour because the researches can manipulate information to support their own perspective and interests (Zainal, 2007). To ensure the reliability of the conclusions obtained through the case study, a triangulation of the information gathered from different information sources can be made to obtain relevant information on 4P development within the city (Tickle et al., 2011). Those information sources include interviews, official documentation (internal reports and plans) and webpages. Contrasting different information sources would ensure the

reliability of the data gathered and the increase in the confidence of the obtained results (Tickle et al., 2011).

The goal of the case studies conducted within the scope of this research was to understand the way in which the cities develop successful 4Ps in the city resilience-building process. The evidences gathered helped to prove the validity of the 4P framework.

The most relevant information source for this research was obtained through semi-structured interviews with experts representing public entities, private companies and community and working in different areas related to resilience (social, infrastructure and environment). All the suggested experts were key partners of the city's 4P in the context of city resilience and were actively involved in its resilience-building process. The semi-structured interviews consisted on open questions in which experts were encouraged to tell us the ways in which multi-stakeholder collaboration is fostered among public entities, private companies and citizens in the context of crisis management and resilience. In order to do that, experts were asked to comment how each of the 4P characteristics is being improved as well as to give feedback on evidences to asses at which 4P evolution stage the city is.

All the interviews lasted about 1 hour and were recorded and transcribed manually. Moreover, in order to ensure about the reliability and rigor of this case study, the insights gathered from the interviews were triangulated with data gathered from public documents, plans, reports, research papers and webpages of relevant stakeholders. In order to determine the number of interviews needed the concept of saturation was considered. Saturation happens when the collection of new data does not shed any further light on the issue under investigation (Mason, 2010).

Two case studies were conducted, one in the city of Wellington (New Zealand) and the second one in the city of Donostia (Spain). In the case of Wellington, a total amount of 20 multi-disciplinary experts were interviewed (Table 3.6) while in the case of Donostia a total amount of 15 experts were interviewed (Table 3.7).

Table 3.6: Participants in the case study of Wellington

PROFILES OF THE PARTICIPANTS (Nº OF PARTICIPANTS)	ORGANIZATION
Manager Building Resilience (1)	Wellington City Council (Earthquake Response Unit)
Communication Specialist (1)	Wellington City Council (Earthquake Response Unit)
Manager Community Services (1)	Wellington City Council (Community Services)
Chief Advisor (1)	Wellington City Council (City Planning)
Project Director (1)	Wellington Water
Principal Advisor Infrastructure Resilience (1)	Wellington City Council (Infrastructure Resilience)
Manager Seismic Assessments (1)	Wellington City Council (Earthquake Resilience)
Innovation Officer (1)	Wellington City Council (Smart Cities)
Senior Lecturer (1)	Victoria University of Wellington
Community Resilience Manager & Deputy Chief Resilience Officer (1)	Wellington Region Emergency Management Office (WREMO)
Project Manager (1)	Wellington Lifelines Group
Chief Resilience Officer (1)	Wellington City Council
Independent Consultant (1)	Pattillo (Engagement Consultancy)
Technician from Community Services (6)	Wellington City Council (Community Services)
Independent Consultant (1)	Ministry of Civil Defence & Emergency Management

Table 3.7: Participants in the case study of Donostia

PROFILES OF THE PARTICIPANTS (Nº OF PARTICIPANTS)	ORGANIZATION
Head of the Communication and Volunteering Department (1)	Caritas Gipuzkoa
Provincial Head of International Cooperation and Environment (1)	Red Cross Gipuzkoa
Manager (1)	DYA Gipuzkoa
Independent Consultant (1)	Daiteke
Independent Consultant (1)	Farapi
Independent Consultant (1)	Heatlh and Social Sector
Councillor (1)	Donostia/San Sebastian City Council (Social Welfare Department)
Councillor (1)	Donostia/San Sebastian City Council (Civil Protection Department)
Technical Assistant (1)	Donostia/San Sebastian City Council (Strategic Planning Department)
Head of the Environmental Quality and Sustainability Service (1)	Donostia/San Sebastian City Council (Environmental Department)
Managing Director (1)	APTES
Technician (1)	Donostia/San Sebastian City Council (Citizen Participation Department)
Head of the Citizen Participation Department (1)	Donostia/San Sebastian City Council (Citizen Participation Department)
Coordinator (1)	Neighbourhood Association
Technician (1)	Donostia/San Sebastian City Council (Municipal Information Unit)

3.5 Conclusions

The research methodology followed in this research consists of three main phases; first, the conceptualization phase, second the development phase and third the validation phase. The conceptualization phase consisted on a literature review to determine the research questions and to establish the research contribution. In the development phase, the following research methods were applied; semi-structured interviews with experts, resilience strategy review and a Delphi process. All the knowledge gathered through the different methods was triangulated to develop the final version of the 4P framework. Finally, the validation phase consisted on conducting two case studies at two different cities with different experience level in the field of city resilience. Through these case studies, first, evidences of how characteristics are being implemented in practice in both have been identified. Moreover, the case studies also enabled to find relevant milestones that enable to assess in which 4P evolution stage the city is. The information gathered served to prove the completeness, usefulness and relevancy of the 4P framework.

4 Results: 4P Framework for Building City Resilience

This section presents the 4P framework in the city resilience building process developed within this research. The 4P framework aims to be a supporting tool for cities willing to create strong and long lasting relationships among city stakeholder working in the context of city resilience.

The 4P framework is composed of three different elements. The 4P framework has been developed to provide support to the local authorities fostering multi-stakeholder collaboration creating 4Ps in the context of crisis management and city resilience. First, it includes a set of 16 characteristics that should be developed in order to create successful 4Ps. Second, it includes a 4P development roadmap formed by three evolution stages that describes the evolution of partnerships among city stakeholders through the city resilience building process. Finally, it presents an implementation order that establishes in which stage each characteristic should start being considered in order to invest available resources in the most effective manner.

4.1 Composition of the 4P framework

The 4P framework consists of the following elements:

1. Sixteen successful characteristics that need to be developed when creating successful, meaningful and long lasting 4Ps at the city level. The framework classifies the set of sixteen characteristics into three different dimensions (stakeholder relationship, information flow and conflict resolution) and three different layers. Moreover, a description of each characteristic is provided.
2. Three 4P evolution stages that describe the continuous development process of 4Ps at the city level. Each stage describes the way in which city stakeholder collaboration should be oriented in order to eventually create a strong 4P to address the complex challenge of building city resilience.
3. An implementation order that considering the 4P evolution stages sets a priority order in the implementation of characteristics. Bearing in mind that the amount of resources available to develop 4Ps at the city level is limited, this order allows to use the resources in the most effective manner prioritizing the implementation of the characteristics based on the 4P stages.

4.1.1 First component: The sixteen characteristics of successful 4Ps

The 4P framework includes a set of sixteen characteristics that need to be developed in order to create effective 4Ps in the city resilience building process. Identifying and classifying which are the most important characteristics of successful 4Ps is important to invest the available resources on the most significant aspects when developing 4Ps in the city resilience building process. First, this section presents a classification schema, composed by three dimensions and three layers for the sixteen characteristics of successful 4Ps in

the city resilience building process. After that, the sixteen characteristics are defined and described in detail.

4.1.1.1 Classification of the sixteen characteristics

The characteristics of successful 4Ps have been classified based on two different criteria. The first one takes into account the three dimensions that need to be considered in any successful partnerships. The second criterion classifies successful partnerships in accordance to the purpose of the partnership and the type of partners any partnership should have.

4.1.1.1.1 First criterion: dimensions of the partnership

This criterion classifies the characteristics of successful 4Ps into the three dimensions that define any partnership proposed by Mohr and Spekman (Mohr and Spekman, 1994) (See Figure 4.1).

1. Stakeholder relationship: The seven characteristics in this dimension are related to the attributes and attitudes stakeholders must possess to work together successfully: commitment, coordination, interdependence, trust, integration, flexibility and inclusiveness.
2. Information flow: The six characteristics in this dimension are related to the communication channels and protocols that stakeholders must use to invest resources in the most effective manner: information quality, information sharing, participation, information accessibility, information transparency and user friendliness.
3. Conflict resolution: The three characteristics in this dimension are related to the techniques used to solve problems related to

the correct functioning of the partnership: constructive resolution, reflectiveness and perspective alignment.

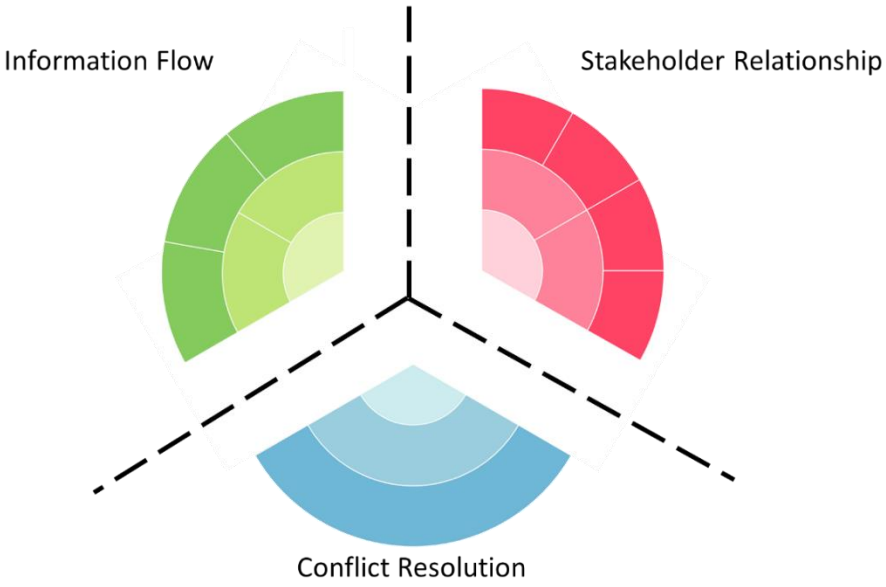


Figure 4.1: Dimension-based classification criterion

4.1.1.1.2 Second criterion: attributes of the partnership

The partnerships are classified based on two types of attributes: the purpose of the partnership and the type of stakeholders involved. Some of the characteristics need to be considered in any type of partnership regardless its purpose or the type of stakeholders involved. Other attributes should only be considered by partnership with a specific purpose regardless of the stakeholders involved. Finally, others are characteristics of successful partnerships including certain type of stakeholders involved regardless the purpose. In fact, the research sub-questions presented in the methodology (RQ1.1, RQ1.2 and RQ1.3) section were designed considering the two different attributes of any type of partnership. The sixteen characteristics have been classified into three different layers (see Figure 4.2) according to this second criterion

and, therefore, considering the research sub-questions presented in the methodology section:

- The 1st layer of the framework includes general characteristics applicable to any type of partnership regardless of its specific aim or the type of stakeholders involved.
- The 2nd layer of the framework includes the particular characteristics of partnerships filtered by the purpose. In this study, this layer includes partnership characteristics in the context of the city resilience-building process. In this layer, the type of stakeholders involved has been not considered.
- The 3rd layer of the framework includes the specific characteristics of partnerships filtered by the type of stakeholders involved. In this study, this layer includes partnerships formed by public entities, private companies and people living in the cities. In this layer the aim of the partnership has not been considered.

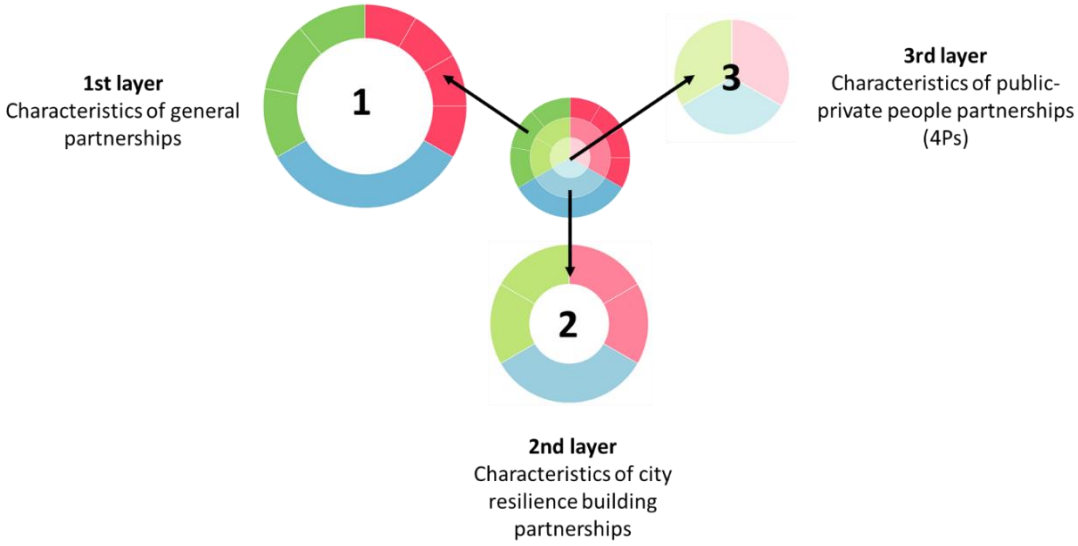


Figure 4.2: Layer-based classification criterion

4.1.1.2 Characteristics of 4Ps in the city resilience building process

This section presents the sixteen characteristics of successful 4Ps in the city resilience building process. First, Figure 4.3, presents the characteristics of successful 4Ps in the city resilience building process classified based on the classification schema previously explained. After that, each characteristic of successful 4P is defined and described in further detail. Moreover, some best practices that could help to improve each of the characteristics are also presented.

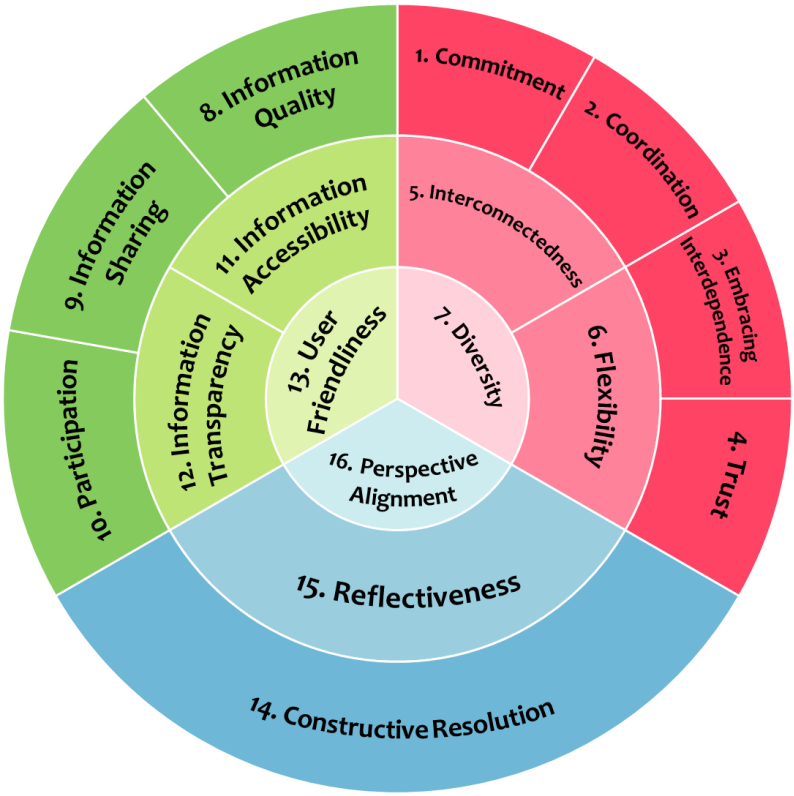


Figure 4.3: Framework showing the characteristics of successful 4Ps in the city resilience-building process

4.1.1.2.1 Stakeholder Relationship

1. Commitment:

   Commitment refers to the willingness of stakeholders to exert effort on behalf of the partnership, understanding existing self-interests and renouncing a part of their own interests in order to obtain a more general shared goal. Committed stakeholders have the capacity to focus on long-term goals while overcoming short-term problems and discussions (Adams, 2016; Doyle et al., 2015).

   Therefore, city resilience depends in part on the ability to involve representatives from public entities, private companies and the community

(Adams, 2016). All stakeholders should feel valuable, as members who do not see any real benefit will be reluctant to take part (Doyle et al., 2015).

Proposed best practices:

- Awareness increasing campaigns
- Meetings to engage decision makers
- Identifying hot-topics for citizens and addressing them

2. Coordination:

Coordination refers to the need of stakeholders to define the boundaries of each partner's responsibilities, to be aware of other partners' interests and to specify the tasks each partner is expected to perform within the partnership. stakeholders also need to specify the mechanisms and protocols that will allow them to create a shared understanding of each partner's individual responsibility and work together in an effective manner (Doyle et al., 2015).

Defining boundaries, developing networks and connections for collaboration, performing coordination activities across public and private entities and citizens, and facilitating access to useful resources (skills, funding, infrastructure or knowledge) are some of the activities that increase coordination among stakeholders (Doyle et al., 2015).

Proposed best practices:

- Creation of a multi-stakeholder steering group involving senior managers of key stakeholder that have the holistic view of what are their entities doing

3. Embracing Interdependence

Embracing interdependence refers to the capacity of stakeholders to assume that in order to achieve mutually beneficial goals they will depend on each other. Stakeholders need to have the capacity to understand the existing interdependencies among them and be aware that they rely on one each other to fulfill the goals that they cannot otherwise obtain on their own (Chandra et al., 2015; O'Sullivan et al., 2015).

Finding individual benefit opportunities for stakeholders and assuming that one's benefits usually depends on the performance of others' is key for a successful city resilience-building 4P (Chandra et al., 2013; O'Sullivan et al., 2015). Developing a common vision of the challenges ahead, planning the activities that fall under that vision and the time frame for undertaking those activities, and identifying the most appropriate people to be involved are all key elements (Doyle et al., 2015). This helps prevent misunderstandings and potential conflicts in the future.

Proposed best practices:

- Workshops to align ideas and initiatives
- Work around values discussing different paths to achieve the same objective

4. Trust

Trust refers to the belief that a partner is capable, credible and reliable, and that therefore it will fulfil its obligations. This belief is what makes it possible to work for shared objectives (Rogers et al., 2016; Stewart et al., 2009).

The quality of the way in which stakeholders interact is more influenced by non-legally binding aspects such as trust (Stewart et al., 2009) than by legally binding aspects. Trust among stakeholders is a vital component in city resilience-building; if they trust each other, they are far more likely to collaborate beyond existing cross-sectoral boundaries and the hierarchical restrictions of organisations (Rogers et al., 2016). Trust increases open communication between partners, which eventually creates the belief that they are being represented fairly (Fitzpatrick and Molloy, 2014). Moreover, integrating the stakeholders and organisations in a tighter way can build trust and improve city resilience- such as crisis preparedness activities or recovery plans (Chi et al., 2015). However, developing trust among different city stakeholders is also a very challenging issue (Doyle and Paton, 2017).

Proposed best practices:

- Create informal connections among city stakeholders (funding initiatives, projects, activities…)

5. Interconnectedness

Interconnectedness refers to the extent the partnership is interconnected to systems, institutions or other partnerships that have similar or complementary purposes to achieve greater results (Chi et al., 2015; Shoaf et al., 2014).

Interconnecting the efforts of city stakeholders with other agencies or organizations outside the city-boundaries but also involved in resilience-building is required to align efforts and improve the efficacy of the city resilience-building partnerships. This could be done, for instance, by aligning the efforts that at the city level with what is being done at regional, national and even international levels. Moreover, greater integration can also contribute to aligning crisis prevention, response and recovery plans and activities in a collaborative way, preventing the duplication of effort by various agencies or organizations (Chi et al., 2015; Shoaf et al., 2014). The need to work on interconnecting efforts in the context of city resilience has been highlighted by numerous academics and practitioners; however, the focus should be now in developing new methods that support these processes (Kapucu, 2012).

Proposed best practices:

- Join international city networks (100 Resilient Cities) to share best practices
- Establish connection with relevant institutions outside the city boundaries (research institutions at the national level)

6. Flexibility

Flexibility refers to the adaptability of each partner in the partnership in the face of changing circumstances, new challenges or sudden crises (Doyle et al., 2015; Stewart et al., 2009).

Although the partnership's structure, roles and responsibilities can benefit prevention and the decisive and timely response to a crisis, these structural elements must permit flexibility so that existing relationships can adapt to respond to and recover from a crisis in the most effective manner (Doyle et al., 2015; Stewart et al., 2009). Moreover, partnerships must be flexible to be able to evolve and adapt to face emerging new challenges and risks. Although rigid agreements have proven to be suitable to address certain types of crises, solely trusting on them do not always result effective (Stewart et al., 2009). Conducting training activities with stakeholders to improve the capacity to improvise could help in developing flexible partnerships (Scolobig et al., 2015).

Proposed best practices:

- Conduct training with different city stakeholders
- Create crisis response and recover protocols involving all the city stakeholders

7. Diversity

Diversity refers to the involvement of representatives from different city stakeholder groups (including minority groups) in the partnership in order to create a sense of shared ownership and joint vision (Akamani et al., 2015; Atela et al., 2015).

Successful 4Ps in the city resilience-building process should promote equal access to information and opportunities for participation without excluding the opinions of certain stakeholder groups (Akamani et al., 2015). In fact, excluding the opinions of the representatives of key stakeholder groups reduces the legitimacy of the decisions and actions taken and may cause the disapproval of certain stakeholders, thereby hampering the correct functioning of the partnerships (Atela et al., 2015). Fostering the participation of diverse stakeholder groups builds a sense of belonging that is key for successful partnerships (Coffin and Barbero, 2009).

Proposed best practices:

- Identify and integrate vulnerable groups in society and represent their interests

4.1.1.2.2 Information flow

8. Information Quality

Information quality refers to the accuracy, relevancy and timeliness of exchanged information. This enables fluent communication among partners, thus improving the ability to make better decisions (Allen et al., 2014; Brogt et al., 2015).

High information quality facilitates communication between different partners, which enables the partnership to identify the requirements and resources needed to increase city resilience (Brogt et al., 2015). Higher quality information leads to a better decision-making process and more effective prevention of, response to and recovery from any crisis. However, implementing effective ways to exchange high quality information is in no way an easy task to undertake (Allen et al., 2014).

Proposed best practices:

- Work together with scientific and academic institutions to make sure that the information shared has enough quality and it is not too vague

9. Information Sharing

Information sharing refers to the extent to which information is communicated to other partners, allowing tasks to be completed more effectively (Fitzpatrick and Molloy, 2014; Kapucu, 2012).

Information sharing at best improves joint actions, which adds to city resilience by enhancing partners' capabilities to prevent, respond and recover more effectively in times of crisis (Kapucu, 2012). In fact, information sharing is believed to be one of the keys for an effective collaboration (Fitzpatrick and Molloy, 2014). Moreover, information sharing prevents the duplication of effort and resources, which also

increases the efficacy of partnerships. However, fostering meaningful information exchange is not easy (Busch and Givens, 2012). Sometimes there are problems due to information overload (too much information to share) and also because of cognitive undercomprenhension (e.g., Allen et al., 2014).

Proposed best practices:

- Sharing early information even when it is not 100% accurate (reduce uncertainty)
- Improve collaboration agreements among multi-level agencies (local, regional, national)

10. Participation

Participation refers to the extent to which stakeholders engage jointly in planning, goal setting and responsibility distribution, as well as in the execution of different tasks providing meaningful insights for all the stakeholders involved (Bava et al., 2010; Chandra et al., 2015).

A collective response to resilience-related issues can help promote self-sufficiency, which is relevant because citizens are often familiar with the issues that affect city resilience and they are able to provide useful knowledge that increases it (Bava et al., 2010; Chandra et al., 2013). Although participation is essential, the challenge is how to sustain motivation and active participation in resilience-oriented activities (O'Sullivan et al., 2015).

Proposed best practices:

- Establish trustworthy channels to connect with citizens
- Publicly recognize the usefulness of the feedback gathered from city stakeholders and informing them about the outcomes obtained due to their participation

11. Information Accessibility

Information accessibility refers to how easily stakeholders can access relevant information when it is needed (Adams, 2016; Brogt et al., 2015).

Clear communication protocols as well as timely notification of new or updated information are valuable to ensure all stakeholders are up to date and have the same information (Adams, 2016). This makes it possible to identify needs and resources that the city and its citizens require in terms of resilience (Brogt et al., 2015) and to help to improve the decision-making process, in order to reduce the impacts caused by cascading effects (Toubin et al., 2015). For instance, at the peak of a crisis, information should be instantaneously available for any partner so they can respond in the most effective manner. However, effective mechanisms that deal with this challenge are still under development (Roche et al., 2013). Moreover, each type of stakeholder is usually interested in having access to different information to further enhance their knowledge about certain topics (Addison et al., 2015). Therefore, classifying information considering the characteristics of the users is also important.

Proposed best practices:

- Convert information related to the city resilience building process into relevant digital content
- Adapt the structure of the website depending on the situation (pro-post crisis)
- Establish alternative channels to contact groups in society that are not familiarized with using digital channels

12. Information Transparency

Information transparency refers to the extent to which shareable, appropriate, critical and sensitive information and data are made available to relevant partners, allowing tasks to be completed more effectively (Busch and Givens, 2012; Gagnon et al., 2016).

Being transparent fosters engagement and helps developing a common vision of how city resilience can evolve in order to respond to local concerns (Gagnon et al., 2016). However, due to the diverging interests of all the stakeholders, ensuring the transparency of the information provided by

private companies and citizens is not easy (Busch and Givens, 2012). Confidentiality issues and the fear of being criticized sometimes hamper information sharing. The information that should be shared in order to increase the city's resilience level is usually sensitive, which makes this characteristic more relevant.

Proposed best practices:

- Inform stakeholders when there is not information available (prevent uncertainty)
- Development of apps and platforms to triangulate information provided by different stakeholders

13. User Friendliness

User friendliness refers to the ease with which all stakeholders understand and can use the information. It means that there is a need to adapt how information is expressed so that the highest number of stakeholders will find it understandable, giving all stakeholders equal access to the content (Addison et al., 2015).

Not using an appropriate language that is precise and easily understandable by all the stakeholders involved in 4Ps keeps the partnership from functioning correctly.

Proposed best practices:

- Adaptation of the language of messages shared with different audiences (use of plain languages and visual content for citizens instead of technical language)
- Translating information to different languages as well as to braille and sign languages

4.1.1.2.3 Conflict Resolution

14. Constructive Resolution

Constructive resolution refers to the way conflicts between different stakeholders are solved in an effective manner, thereby promoting solutions in which every partner feels their interests are being represented. Stakeholders must show compromise to achieve success and to resolve issues amicably (Bava et al., 2010; O'Sullivan et al., 2015).

Conflicts might appear due to the different nature of the stakeholders who cooperate in increasing city resilience. Therefore, constructive resolution of conflicts is necessary to align the self-interests and perspectives of different stakeholders. City resilience-building 4Ps must include on-going dialogue to encourage stakeholders to engage in collaborative problem-solving and address potential conflicts (Bava et al., 2010; O'Sullivan et al., 2015).

Proposed best practices:

- Foster constructive conversation among city stakeholders through workshops and meetings

15. Reflectiveness

Reflectiveness refers to the ability of the partnership to use past experiences to support future decisions, for instance, by modifying procedures and behaviors accordingly (Pfefferbaum et al., 2013).

Identifying and framing collective experiences, analysing successes and failures and assessing performance is critical to ensure long-term collaboration among stakeholders (Pfefferbaum et al., 2013). By definition, to be resilient is to be adaptable. Therefore, it is necessary to consider not only our own experiences but also to learn from others. Lessons learnt in the past should not be ignored; instead, they should be considered and integrated into future city resilience-building strategies (Fitzpatrick and Molloy, 2014). Additionally, it is not enough to work on identifying lessons learnt; it is also necessary to apply them in real contexts to be better prepared.

Proposed best practices:

- Review of crisis management activities after a crisis
- Monitorization of the resilience building policy implementation

16. Perspective Alignment

Perspective alignment refers to the capacity of each partner to analyze all the existing self-interests from different stakeholders and discuss their commonalities and how to align the different existing perspectives and meet a mutually beneficial goal (Atela et al., 2015).

The positive outcomes of successful partnerships can be limited by misalignments in stakeholders' self-interests and individual goals (Atela et al., 2015). The process of developing a common strategy involves representatives from public entities, private companies and communities, thus promoting a type of collective decision-making that identifies the community's needs in order to align all the decisions and future activities (Addison et al., 2015; Coffin and Barbero, 2009).

Proposed best practices:

- Conduct exercises to understand all the existing perspectives

4.1.2 Second component: The three 4P evolution stages

The second component of the 4P framework consists of three 4P evolution stages that describe the development process of multi-stakeholder collaboration in the city resilience building process. These stages explain how all relevant city stakeholders should interact in order to create meaningful and long-lasting 4Ps.

4.1.2.1 1st 4P evolution stage

At this stage, the awareness level of city stakeholders concerning the challenges related to city resilience (climate change, social dynamics and critical infrastructure dependency) starts to rise. Therefore, city

stakeholders develop incipient activities, either individually or in small coalitions, to increase resilience. For instance, citizens start recycling or using public transport to reduce the effects of climate change, private companies start to invest money in corporate social responsibility initiatives to ensure the well-being of society, and public entities and private companies start to jointly develop measures that increase critical infrastructure protection. However, all these efforts are implemented by each individual or small coalition, without explicitly knowing what efforts are being made by the rest of the stakeholders. Most of the initiatives, even the ones related to the same city resilience challenge, are not yet coordinated in any manner, which hampers the effective investment of resources.

Figure 4.4 presents how city stakeholders interact in this first stage. The grey ovals represent some of the specific problems city stakeholders are aware of and trying to address, namely Climate Change, Social Dynamics and Critical Infrastructure Dependencies. The green circles represent public entities, the blue circles represent private companies and the yellow circles represent citizens. At this stage, each city stakeholder is conducting different activities to address the particular problems that are part of one of the three main challenges. Public entities, private companies and citizens are all making efforts to address challenges by conducting narrow scope initiatives but without taking into account what others are doing simultaneously.

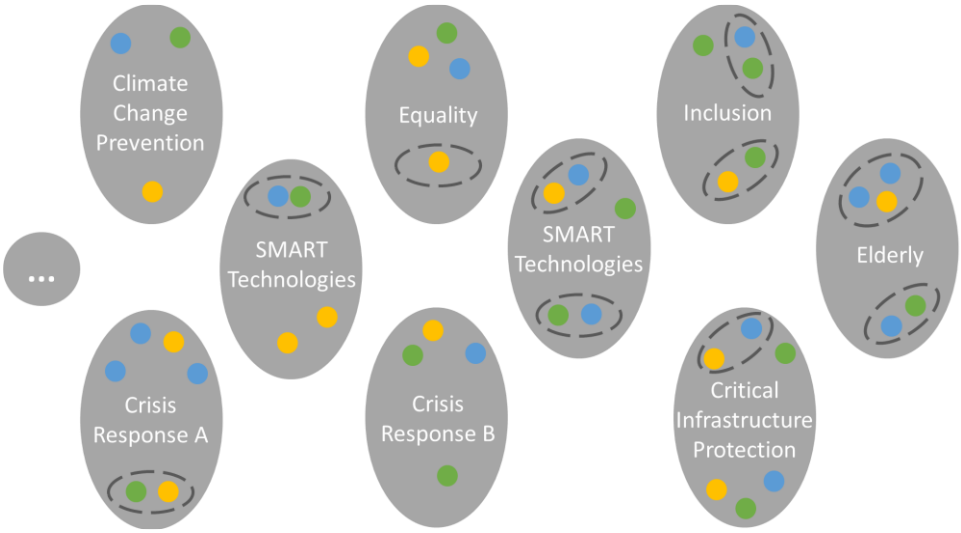


Figure 4.4: Stage 1

4.1.2.2 2nd 4P evolution stage

At this stage, the relevance of resilience increases. Stakeholders are aware of the importance of working in a coordinated manner to invest the resources in the most effective manner. Therefore, relevant city stakeholders cooperate by sharing efforts and aligning their different perspectives to address each challenge independently. However, these partnerships are still focused on developing solutions to each specific challenge without a holistic perspective on city resilience. At this point, partnerships for addressing resilience as a whole have not been developed yet. Moreover, potential synergies among the different city stakeholders focused on the different challenges have not been explored yet.

Figure 4.5 and Figure 4.6 show how city stakeholders interact in this second stage. At this stage, different city stakeholders working on specific initiatives within the context of each of the three main challenges start to work together. They coordinate their individual efforts to embrace the perspectives of all the city stakeholders that can contribute to each of the challenges.

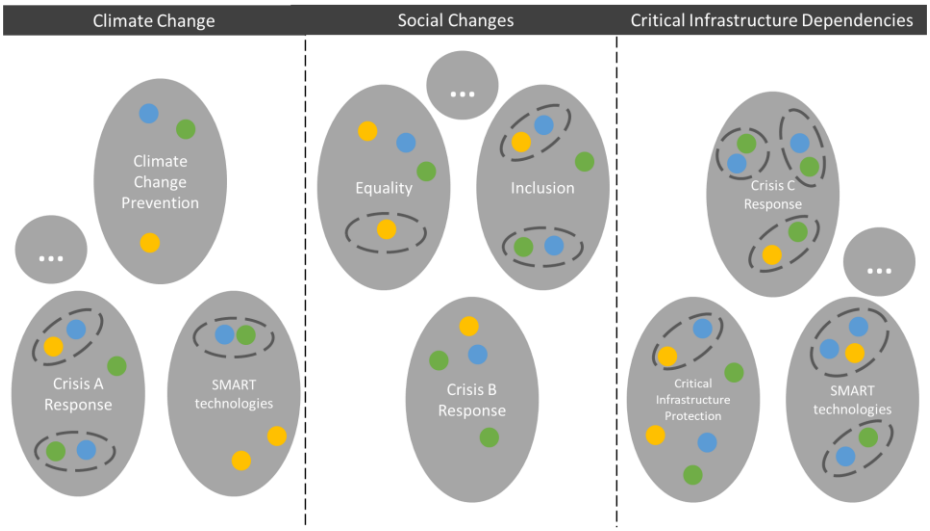


Figure 4.5: Stage 1 to Stage 2

For instance, with the aim of developing a common climate change adaptation strategy, some stakeholder groups could be working on new technologies to reduce gas emissions, while other entities like academic institutions and NGOs conduct dissemination activities to increase the awareness and the commitment level of citizens. This process happens in parallel with the other two main challenges (social dynamics and critical infrastructure dependencies).

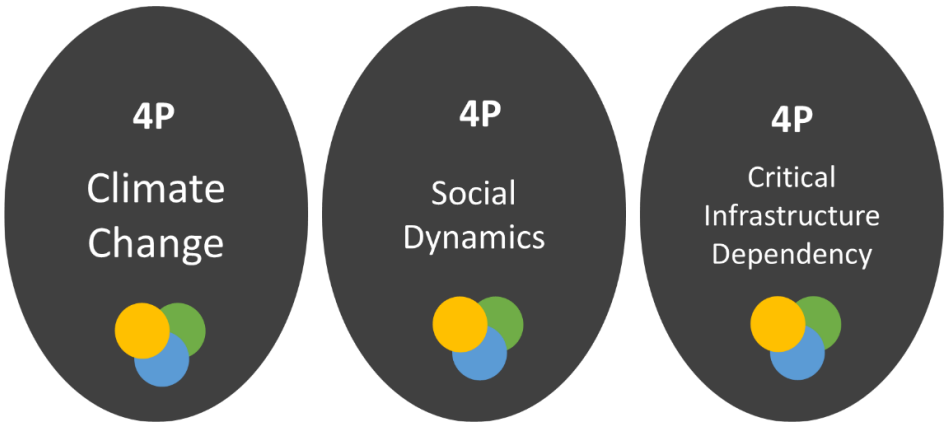


Figure 4.6: Stage 2

4.1.2.3 3rd 4P evolution stage

At this stage, the relevant city stakeholders are aware that to better address city resilience they need to align their perspectives. They realise that every stakeholder could be affected by more than one challenge in the future. This 4P including all the relevant city stakeholders is a 'city vertebra'. Creating a tight city vertebra is the first relevant milestone in the development of 4Ps. At this stage, the city resilience building process is seen as an efficient path to address emerging city challenges in a coordinated manner.

Figure 4.7 shows the tight city vertebra created in the third stage. The grey ovals still represent the three main challenges. However, at this stage, stakeholders realise that clear boundaries do not exist between the different challenges. In fact, they realize that efforts being made to address one particular challenge support addressing another challenge. For instance, a study on transport (CI) within the city could serve to gather information about current gas emissions (climate change) in the city to implement policies to provide incentives for using more sustainable means of transport. At the same time, this study on transport (CI) could also serve as input to a study of inequalities, which could be useful addressing the social dynamics challenge. Therefore, at this stage, considering that all the challenges share the same objective of ensuring the well-being of society, the need to develop holistic solutions is explicit.

Figure 4.7: Stage 3

4.1.3 Third component: The 4P framework implementation order

Finally, the 4P framework establishes an implementation order that establishes a priority order for the implementation of the characteristics considering the 4P stages. This implementation order was designed as a way to invest the available limited resources that city stakeholders have to develop this type of partnerships in the most effective manner.

Once the final version of the sixteen characteristics and three 4P evolution stages were obtained, the establishment of an implementation order was seen as a good way to combine both contributions complementing the 4P framework.

Figure 4.8, presents the implementation order of the 4P framework.

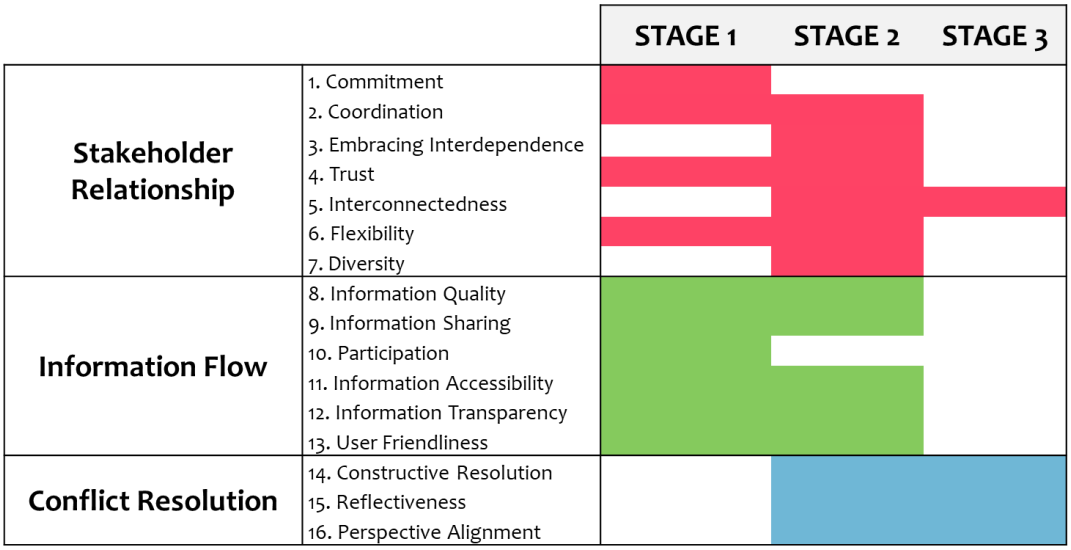


Figure 4.8: Implementation Order

The colorful rectangles in Figure 4.8 shows that some characteristics should start being be implemented in one specific stage while in other cases the suggested implementation stage is not restricted to one particular stage but to two stages. This means that while for some experts the implementation of one characteristic in the first stage has worked successfully for others the implementation of the same characteristic in the second stage has also worked effectively and both opinions are equally valuable. Actually, their experience showed us that in some cases a characteristic could start to be implemented in different stages and could in both cases be equally successful. The starting implementation stage of some characteristics is bounded to one specific stage while in other cases, this boundary is less strict and the implementation could start at different stages being the final result equally successful.

It is important to bear in mind that Figure 4.8 summarizes the starting implementation stage/stages per characteristic. Actually, it is also important to bear in mind that the implementation process of the characteristics is a continuous improvement process, what means that once their implementation begins they should be continuously improving. Although Figure 4.8 highlights the stages in which each characteristic should start being implemented, the

characteristic should be considered throughout the whole 4P development process, thus, in all the posterior 4P evolution stages once it is started being implemented.

Below the analysis of why according the outcomes gathered in the research each characteristic should be implemented in this priority order is presented.

- **Commitment:** Commitment needs to start being considered in the first 4P evolution stage. This characteristic helps to foster co-responsibility since the early beginning of the process. That sense of responsibility will enable that they are engaged throughout the whole 4P development process.
- **Coordination:** Coordination should be a priority in the first and second 4P evolution stages. This is because the small and big efforts that are being made by different stakeholders to address small problems in the first 4P evolution stage need to be aligned to form 4Ps per challenge.
- **Embracing Interdependence:** Embracing interdependence should be a priority in the second 4P evolution stage. Understanding interdependencies among city stakeholders is important when developing the first 4Ps to address each specific challenge.
- **Trust:** Fostering trust among stakeholders is key to establish a strong 4P in the long term. Trustworthy relationship will increase the willingness to participate and to contribute to the city resilience building process. Therefore, it needs to be a priority in the early stages (first and second stages) of the 4P development process.
- **Interconnectedness:** The focus on improving interconnectedness level among the 4P and other institutions outside the city boundaries should start in the second 4P evolution stage and continue in the third stage. Once 4Ps per challenge start being developed the need to involve other relevant institutions that could provide a complementary perspective to

the strategies being developed is important. This is why this characteristic needs to start being considered in this stage.

- **Flexibility:** Working on improving flexibility of the 4P is highly important in the first stages of the 4P development. This is important to increase the capacity to adapt the partnerships to address the specific problems and challenges that may arise. The earlier we adopt flexible relationships the easier it will be to adapt to upcoming situations.
- **Diversity:** Diversity should be considered in the second evolution stage of the 4P development process. Involving representatives of all the different stakeholder groups working in the context of crisis management is very important to ensure a meaningful and long-lasting 4P. The second stage is when 4Ps per challenge start to be developed, therefore this characteristic need to start being considered at this stage.
- **Information Quality:** It is important to ensure high quality level of information since the early stages (first and second stages) of the 4P evolution to increase the awareness level of stakeholders. Increasing the awareness level will have an impact on the willingness to be part of the 4P, this is why this characteristic should be considered since the beginning.
- **Information Sharing:** The focus on improving the ways information is shared should be in the first and second 4P evolution stages. In these stages, stakeholders start to collaborate and therefore, it is important to share information that will enable to use available resources effectively and improve the understanding among different stakeholder groups.
- **Participation:** It is important to focus on fostering participation in the first stage of the 4P evolution stage. In this stage, city stakeholders start to contribute to initiatives related to the resilience-building process so

improving the ways in which different stakeholders can participate is key since the beginning of the 4P development process.

- **Information Accessibility:** Information accessibility needs to be considered in the early stages (first and second) of the 4P evolution process. Having access to relevant information that could help to address upcoming challenges and increase the city's resilience level is required.
- **Information Transparency:** Information transparency needs to be considered since the early stages (first and second) of the 4P evolution process. Being transparent since the early beginning will enable to increase trust and strengthen the bonds among different stakeholders.
- **User Friendliness:** Increasing the user friendliness of the information channels should be a priority in the early stages (first and second) of the 4P evolution process. Adapting the information channels according to the characteristics of the stakeholders will enable the participation of all the stakeholder groups in the city resilience-building process.
- **Constructive Resolution:** Constructive resolution needs to be improved in the last stages (second and third) of the 4P evolution process. Dealing effectively with the potential conflicts that may arise due to the high amount of different interests represented in 4Ps is key in the second and third 4P evolution stages. It is in these late stages when 4Ps start to involve all the different stakeholder groups and it is increasingly difficult to find a common solution that every stakeholder agrees on. Moreover, working previously on improving characteristics like trust, information sharing or embracing interdependence makes it easier the implementation of this characteristic.
- **Reflectiveness:** Reflectiveness needs to be improved in the last stages (second and third) of the 4P evolution process. Once stakeholders gain experience on how the partnership can contribute to the city resilience-

building process it is important to reflect on which aspects could be improved not only in normal times but also in times of crises.

- **Perspective Alignment:** Perspective alignment needs to be improved in the last stages (second and third) of the 4P evolution process. The more stakeholders involved in the partnership the more difficult to align all the existing perspectives and to establish common objectives. In the second and third 4P evolution stages, 4Ps start to have a bigger scope what requires de involvement of a higher amount of stakeholders. This is why this characteristic is important to start being implemented in the last stages of the 4P evolution process.

4.2 Integration of the three elements into a holistic 4P framework

The 4P framework for the city resilience building process obtained as a result of this research consists of three different elements (a set of 16 characteristics, three 4P evolution stages and the implementation order) that have been explained in the previous sections. However, the framework cannot be understood considering the elements independently. In order to fully understand the 4P framework, the complementary approaches of the three elements need to be considered. Therefore, it is important to bear in mind that the implementation of the sixteen characteristics of successful partnerships is what makes that partnerships evolve from one evolution stage onto the next one. Characteristics act as drivers of the development process of 4Ps in the city resilience-building process. In fact, the implementation of characteristics makes the 4P advance from one evolution stage onto the next one. Finally, the implementation order establishes a priority order for the implementation of the characteristics in order to use the available resources in the most effective manner.

Due to the particularities of each 4P stage, the priority given to the implementation of each characteristic varies. The holistic view of the 4P

framework allows describing each of the 4P evolution stages using the characteristics as basis and considering the priority order established in the implementation order as guidance. Below, each of the stages will be described integrating all the 4P framework elements.

4.2.1 1st 4P stage

At this stage, citizens are conducting activities to address narrow scope problems related to a bigger challenge either individually or in small coalitions. Therefore, the focus at this point should be first on increasing the **commitment** level of city stakeholders regarding those problems they are addressing and fostering their **participation** in initiatives in the context of the city resilience-building process. In order to do so enhancing **trust** among stakeholders is key. Building trust among different stakeholders will enable sharing efforts and increasing the chance to work together in increasingly bigger challenges. Additionally, establishing appropriate information channels among stakeholders is key to better understand what other stakeholders are doing what will enable to start moving towards the second evolution stage. Therefore, special attention should be paid to the following characteristics: **information quality, information sharing, information accessibility, information transparency and user friendliness**. In fact, the quality of the information provided to city stakeholders, the way it can be effectively shared, how accessible it is for all the different city stakeholders groups and how user friendly the information provided is will enable to improve the preliminary and potential effectiveness of 4Ps. Working on establishing effective information flows among stakeholders will make collaboration easier as information is a basic resource for developing effective partnerships. Finally, dedicating efforts to begin the implementation of characteristics like **coordination and flexibility** is also important at this stage. In fact, improving the coordination of different stakeholder groups within the city and working on enabling sufficient flexibility to the partnership so that is can easily adapt to address wider scope challenges is highly important. These characteristics need to start being considered at this stage because in order to move onto the next stage bigger coalitions involving different stakeholder groups working on wider scope challenges need to be created.

4.2.2 2nd 4P stage

At this stage, city stakeholders start to align their perspectives on the three major challenges in the context of city resilience in order to be consistent and use the available resources in the most effective manner. At this stage, the focus should still continue on improving complex characteristics like **trust** between different city stakeholder groups. Eventually implementing trust is what makes the implementation of **embracing interdependence** more easily achievable. This means that the understanding level about existing interdependencies among stakeholder groups to identify existing task overlaps will increase. Implementing this characteristic will also enable to continue improving the **coordination** of available resources and enabling sufficient **flexibility** to deal with the unexpected. Therefore, focusing on improving coordination and flexibility is highly important as at this stage partnerships will be bigger and the challenge to address will also have a wider scope and with potential unexpected evolution. **Information quality, sharing, accessibility, transparency and user friendliness** continue being important at this stage as good communication is key for the correct functioning of a multi-stakeholder partnership. Moreover, at this stage, characteristics like **interconnectedness** and **diversity** need to start being considered to ensure that all the stakeholders working in each challenge are properly represented. Considering other entities outside the city boundaries is important as well making sure that all the different city stakeholder groups are properly represented in the 4P is highly important at this stage. Due to the importance of aligning the contributions of all the city stakeholders in the context of each challenge, it is important to start implementing the characteristics of the conflict resolution dimension like **constructive resolution, reflectiveness** and **perspective alignment**. In order to improve these characteristics it is important that the work made previously on implementing the characteristics in the stakeholder relationship and information flow characteristic has been good. A good implementation of those characteristics is what sets a good base to implement the characteristics in the conflict resolution dimension and to move forward onto the next 4P evolution stage. Implementing them is key to move forward onto the last 4P evolution stage. In this last stage,

all the city stakeholders working on the city resilience building process will be stakeholders of the 4P. Aligning the interests of public entities, private companies and citizens is not an easy task. Therefore, focusing on the characteristics within the conflict resolution dimension starts to be highly important.

4.2.3 3rd 4P stage

At this stage, city stakeholders realize that although some of them are working only in one challenge others are working in more than one at the same time. This fact makes them realize that resources could be used more effectively if they adopt a holistic resilience approach that considers the challenges and their interdependencies at the same time. In fact, once the relationship among stakeholder is appropriate and the existing information flow works properly, the focus needs to be on how to solve potential conflicts that may arise while defending particular interests effectively. Therefore, at this stage the priority should be given to characteristics like **constructive resolution, reflectiveness** and **perspective alignment** characteristics. Finally, working on **interconnectedness**, what means identifying ways to reach to other institutions outside a particular city's resilience building process is also important at this stage as a final step to develop a meaningful and long-lasting 4P in the city resilience building process.

4.3 Discussion

One of the main conclusions obtained after analyzing the framework obtained as a result of this research is that causal relationships exists between the three different 4P dimensions presented as part of the classification scheme designed for the set of sixteen characteristics. What could be deduced analyzing the implementation order is that on the early 4P evolution stages all the investments should focus on the implementation of the characteristics included in the "stakeholder relationship" and "information flow" dimensions. Investing efforts on the implementation of the characteristics included in the "conflict resolution" dimension is not effective unless we have previously worked in establishing a meaningful relationship among stakeholders and improve the

available information channels. Therefore, this illustrates the existing causal relationship among the different 4P dimensions. Furthermore, it is important to bear in mind that according to the experts that have contributed in this research, the implementation of the dimensions included in the "conflict resolution" dimension is the most difficult to achieve because of the existing barriers. According to them, the way to overcome these barriers is to previously work on improving the characteristics of the other two 4P dimensions (stakeholder relationship and information flow). Therefore, at the beginning of the 4P development process the resource investment should be focused more on improving the characteristics included in the "stakeholder relationship" and in the "information flow" dimensions. The more we work on improving those dimensions the easier will be to overcome barriers related to the characteristics included in the "conflict resolution" dimension.

4.4 Conclusions

The aim of the 4P framework presented in this chapter is to support the city resilience building process. The framework includes a set of 16 characteristics of successful 4Ps in the city resilience building process, three 4P evolution stages and the implementation order.

Working on improving the characteristics of successful 4Ps included in this framework is what triggers to move forward in the 4P development process from one evolution stage onto the next one. Finally, the implementation order gives support when deciding which characteristics should start being considered at each stage in order to invest the available limited resources in the most effective manner.

5 Case Studies

This section presents two case studies that were carried out as part of this research in order to validate the 4P framework in the city resilience building process. The aim of these case studies was to find evidence that could validate the three components of the framework; the set of 16 characteristics, the three 4P evolution stages and the priority implementation order. In fact, the information gathered has enabled to illustrate how the characteristics are being implemented in the cities, to show which the current evolution stage of each city is and to see which the remaining characteristics that still need to be further implemented are. Finally, the case study will also present suggestions to overcome remaining challenges in each city in order to develop a meaningful and long-lasting 4P in the city resilience building process.

5.1 Introduction

The aim of the 4P framework is to provide guidance and support to cities willing to develop successful 4Ps that contribute to the city resilience building process. It is composed by three different components; a set of 16 characteristics of successful 4Ps, three 4P evolution stages that describe the development process of 4Ps in the context of city resilience and a implementation order that establishes at which 4P evolution stage each characteristic should start being implemented.

The purpose of the validation was to confirm that the 4P framework supports the creation of meaningful city stakeholder collaboration that enables to develop and implement resilience building processes more effectively. The validation was designed to check that the following three characteristics were achieved.

- Completeness: the 4P framework should include all the factors that need to be considered when developing meaningful and long lasting collaboration arrangements in the context of city resilience.
- Usefulness: the 4P framework should allow city stakeholders to assess their current status in the 4P development process enabling to identify future steps that need to be taken to develop effective 4Ps in the city resilience context.
- Relevancy: the 4P framework should provide relevant support to local authorities willing to develop this type of mechanisms at their city.

In order to validate this framework two case studies were conducted to prove that the implementation of characteristics of successful 4Ps following the priority implementation order proposed by this research drive to an effective development process of 4Ps in the city resilience building process. The aim of the case study was to prove the correctness of the 4P framework using the experience of the city in the context of city resilience.

The first case study was conducted in the city of Wellington (New Zealand). The reason behind choosing this city was that New Zealand is a disaster prone

area in which the concept of resilience has been embraced by local authorities since long time ago. Moreover, the city is part of international networks like the 100 Resilient Cities from the Rockefeller foundation and have launched their own co-created city resilience strategy (100 Resilient Cities, 2017).

The second case study was conducted in the city of Donostia/San Sebastian (Spain). This city has less experience than Wellington working in projects in the context of city resilience although it has participate in European projects whose main aim is to develop tools to increase city resilience like the Smart Mature Resilience (SMR consortium, 2015). In fact, the city has not developed their own city resilience yet. However, it has experience in dealing with the effects of emerging challenges like climate change, social issues and the increasing reliance on the products and services provided by CIs. For instance, the city is part of the Covenant of Mayors for Climate and Energy (Covenant of Mayors, 2018).

During both case studies, a set of semi structured interviews were conducted with multi-disciplinary experts with diverse backgrounds representing different city stakeholder groups and working in different fields related to city resilience. The interviews consisted of general questions whose aim was to obtain information of how each characteristic was being implemented in practice as well as general plans that have been developed in the context of the city challenges addressed in this thesis. Moreover, analyzing their efforts during the implementation of the characteristics and identifying existing plans allowed us to assess their experience level in developing multi-stakeholder partnerships in the context of city resilience. Therefore, this enabled us to assess in which 4P evolution stage the city is and to determine the next characteristics that should be implemented according to the implementation order.

5.2 Case study of the city of Wellington (New Zealand)

The city of Wellington is located in the south of New Zealand's North Island. Geologically the city is located in an area whose most notable features are a series of north–south trending faults that reflect the stresses of the tectonic plate boundary located to the east of New Zealand.

Moreover, being the capital of New Zealand and an important institutional and economic engine, Wellington is seen as a critical point for New Zealanders' welfare. In fact, apart from hosting some of the most important national institutions, relevant infrastructures for the proper functioning of the country are also located within the city and its surroundings. For instance, the main state highways, the main trunk rail line, the inter-island ferries and the cable power grid connection between the North and South Island are located in this region.

These geological and geographic features combined with human activity present a number of hazards. In fact, the city of Wellington has experienced several emergencies caused by hazards, including earthquakes, floods, landslides, droughts and pandemics in the past.

Within this context, crisis management is a highly relevant activity for the city of Wellington. Moreover, one of the most relevant risks the city is exposed to are earthquakes and tsunamis. Being these type of events unpredictable and often with unexpected consequences due to complex cascading effects, a traditional risk management approach is not sufficient. Therefore, a resilience approach is adopted in crisis management practices.

In the following sub-section, the results gathered after conducting the case study in Wellington will be presented. First, the evidences found to illustrate how the characteristics of successful 4Ps are being implemented will be presented. After considering the evidences found, an analysis of which is the 4P evolution stage in which the city of Wellington is located will be presented. Finally, taking into consideration the implementation order included in the 4P framework, suggestions on how to implement remaining characteristics will be provided.

5.2.1 Evidences of the 16 successful characteristics

5.2.1.1 Stakeholder Relationship

- Commitment

  Experts in Wellington stated that commitment is fostered, listening to the specific needs of each stakeholder groups and creating meaningful dialogues between partners with different perspectives. For them, setting a common context so that different stakeholder groups can understand each other is key. Talking about each stakeholders' concerns and challenges is required so that they are really interested in the outcomes obtained from the partnership. In order to do this, workshops are arranged with different stakeholder groups depending on the topic that aims to be addressed. Based on their experience, the more the awareness on the upcoming problems and challenges, the more willingness to commit with the resilience-building process within the city joining the 4P. Therefore, according to Wellington's experience the commitment of politicians and the selection of "hot-topics" concerning all the stakeholders is key when starting with the development of 4Ps within the city. For instance, a strategic initiative fostered by local authorities in the context of climate change prevention and gas emission reduction was to build a cycle lane from the CBD (Central Business District) to Island bay. City stakeholders found this a controversial issue for the city and therefore their commitment level to be active part of the 4P sharing their perspective and contributing to the debate generated on this regards and on climate change prevention initiatives increased.

- Coordination

  The experience of Wellington showed us that the coordination of efforts of all the city stakeholders is key for a successful city-resilience building process. In the city, 4Ps are seen as a good mechanism to support coordination and prevent duplication of

efforts. According to experts, in order to improve coordination among city stakeholders, first, it is important to identify key entities that should be considered in the city resilience-building process. Creating a multi-stakeholder steering group with people representing relevant institutions and community groups has been proved to be a successful effort in Wellington. In fact, they created a steering group when the development process of the Wellington resilience strategy started (Wellington City Council, 2018c). People involved were senior managers that have the whole picture of what it is being done in their institution. Experts also highlighted the importance of defining responsibilities of each city stakeholder and realising that they may change over time in order to address different realities.

- Embracing Interdependence

  Regarding experts consulted, workshops are the best way for embracing interdependence among different city stakeholders. These workshops are conducted to work on merging existing multi-disciplinary ideas into more integrated initiatives. For instance, during the workshops conducted to create the Wellington Resilience Strategy about 200 people representing from all the city stakeholder groups came up with about 600 different ideas(100 Resilient Cities, 2017 p.7-11). After analysing the similarities and interdependencies among them, those ideas were integrated into 30 main initiatives. Moreover, in order to be able to come up with joint solutions experts suggest that it is important to work around values. According to their experience, sometimes the path to be followed to achieve a certain objective is not shared by all the stakeholders but when the stakeholders are seeking to achieve the same objective or value it is more likely that they will share efforts and coordinate more easily to achieve it.

- Trust
  According to the experts in Wellington, fostering trust is key for the development of effective 4Ps in the city resilience building process. Working on creating informal connections among city stakeholder groups before a crisis strikes it is key to deal with upcoming uncertainties in the most effective manner. In fact, trust is what enables collaboration among stakeholders when an unexpected event occurs enhancing the capacity to improvise. However, creating regular connections require a significant amount of investment. For instance, experts working on the social dimension of resilience in Wellington are trying to find alternative ways to contact community representatives face to face so that they can share information with other city stakeholders. In fact, they are funding different type of projects and not always in the context of crisis management, also at the community level to establish connections. For instance, they fund community centres to foster the interaction among neighbours and strengthen community resilience (Wellington City Council, 2018a, 2018b). According to them, once a formal or informal relationship exists, the chance to ask them for feedback that is helpful for increasing the city's resilience level increases.

- Interconnectedness
  According to experts, public authorities in Wellington are aware of the importance of dedicating efforts to establish connections with other stakeholders outside the city boundaries to increase the city's resilience level. For instance, the city has close relationship with other cities within New Zealand to share best practices in the context of city resilience. Moreover, the city of Wellington has also contacts in other cities around the world due to the 100 Resilient Cities initiative. This network enables to share lessons learnt and relevant knowledge. They also work with research institutions at the national level such as with the National Institute of Water and

Atmospheric Research (NIWA). NIWA is funded by different institutions at the national level to conduct their research as the outcomes obtained are beneficial for more than one entity and this way duplication of efforts can be prevented.

- Flexibility

  Wellington city conducts different type of trainings with different city stakeholders to show them how they should prevent, respond and recover from a crisis in the most effective manner (Wellington Region Emergency Management Office (WREMO), 2018). Moreover, they are currently working on developing a technology to enable virtual reality simulation scenarios to test the effectiveness of crisis response procedures. This technology enables to experiment which the impacts of certain type of crisis are going to be, for instance, sea level rise or earthquakes. Therefore, different crisis management protocols and procedures could be tested to identify the most effective way to deal with crises when responding to a particular event. Conducting training activities will increase the capacity to improvise and the flexibility of the stakeholders when responding to crises (Audain, 2017). Moreover, according to experts in Wellington it is important to bear in mind that although each city stakeholder group have their own everyday duties, in times of crisis, priorities and responsibilities need to adapt. They have already worked on establishing specific responsibilities for each city stakeholder in case a crisis strikes. For instance, the formal and informal relationships the Community Resilience Group has with different stakeholder groups within the city enables them to delegate some duties to other stakeholders that are better prepared to deal with certain specific duties. Moreover, the Community Resilience Group have arrangements with three different NGOs within the city whose aim is to support homeless people within the city. In case a crisis happens, the city council delegates the task of

ensuring the welfare of vulnerable groups to them, as due to their expertise, they are the most adequate ones to conduct this task.

- Diversity
  According to experts consulted, including the perspectives of all the city stakeholders in the 4P is necessary to be as effective as possible. They stated that the engagement of a wide range of stakeholder groups in the city resilience building process increases the acceptability of the strategies and policies when they need to be implemented. Experts in Wellington highlighted the importance of engaging all the vulnerable groups such as children, elderly people, immigrants or homeless people within the city in the process as they do not always find effective channels to share their knowledge and perspective. In fact, these groups are potentially the ones that most suffer the effects of a crisis. Therefore, experts in Wellington find important to consider as many groups as possible to merge all the perspectives, needs and concerns of each specific stakeholder when developing holistic strategies that address upcoming challenges.

5.2.1.2 Information Flow

- Information Quality
  The experience of Wellington showed us that information in the context of crisis management is hardly ever completely perfect. In order to make decisions, analysing the available information is needed. However, the available information for decision making in the context of crisis management is hardly ever 100% accurate. Experts now realise that it is better to provide and use available information without waiting to have the complete information even if it is not totally accurate because it will help to take better decisions. In order to decide if the quality of the information that it is going to be shared in the context of crisis management has enough

quality, public authorities in Wellington stated that establishing a close contact with certain partners in advance is useful. For instance, they have close contact with scientific and academic institutions working in the context of resilience and crisis management.

- Information Sharing
  Regarding information sharing, experts highlighted the importance of sharing the information early and taking risks even if the information available is not 100% accurate. In fact, they consider that making decisions without any information available could be worse. They also stated that legislation does not always allow to collect certain useful information by the local government. For instance, local authorities are not allowed to have information about the number and type of businesses that are located in the city. This information is collected at a national level. Currently, there is not a channel to convert this database into a living document so that it is useful for the city council. Therefore, Wellington and other cities in New Zealand are working on improving existing protocols to share information across different governmental levels. Moreover, experts stated that although public entities are usually the ones that collect relevant information and adequate its content and appearance to different audiences, the task of sharing and delivering should be a shared responsibility. Citizens could inform about the current state of infrastructure when a crisis strikes through social media what could ease the coordination of response activities of other stakeholder groups. Additionally, Wellington city council is working on developing protocols to collect relevant information in the context of crisis management and resilience facilitated by different entities and to share it with partners so that they also share to their audience. This way, information in the context of resilience would reach a higher amount of institutions and citizens. In fact, crossing campaigns are starting to be used by local authorities in

Wellington. These campaigns consist of using networks of different stakeholder groups to acknowledge other institution's work in the context of resilience in Wellington.

- Participation
  The local government of Wellington is now working on establishing trustworthy channels to connect with communities and gather tacit knowledge that contribute to the city's resilience building process. Improving the channels to connect with different city stakeholders will serve to increase the overall participation level in the city resilience building process. Therefore, their focus is now on promoting different ways to get in touch with city stakeholders (social media channels, coffee catch-ups, surveys, meetings, workshops...). Choosing the most adequate channel to receive feedback depends on the type of the problem, the area and the stakeholders involved. This is key to foster participation. Moreover, experts interviewed highlighted the importance of encouraging the participation of the "silent majority" or the groups in society that are not used to give their opinion. Sometimes, controversial proposals need to be made on purpose to encourage and force the "silent majority" to contribute with their insights.

- Information Accessibility
  According to experts, the capacity to adapt to changing situations is highly influenced by the capacity to have access to useful information. Therefore, Wellington city council is making a high investment converting information related to crisis management in relevant digital content like designing pictures or reports. All this information is available in the city's main webpage. However, the sections of the webpage that present information regarding crisis management or city resilience are flexible to adapt to the situation. For example, after the Kaikoura earthquake in 2016, there was a specific webpage with all the information regarding the crisis

response as well as and tips to recover in the most effective manner. After recovering from the event, the information has been reorganised, as there is no need to have a specific section dedicated to this topic anymore. In fact, citizens are not interested on the concept of resilience in a strategic and holistic context. They are usually interested on having specific information to solve their specific concerns. Those small activities contribute to the city resilience-building process but it is easier to classify that information into more specific topics so that citizens can find the information they want more easily. Apart from the webpage, which is described as a passive channel by experts in Wellington, other social media channels like twitter, facebook or traditional media (for instance, television, radio and newspapers) are used to deliver information to the society. Moreover, stakeholders in Wellington are also aware of the fact that there are certain groups in society that are not used to use digital channels so they are also working on creating alternative channels to reach those minority groups. For instance, thinking on specific groups like elderly people, they have created a call centre that is available in times of crises to inform them about the situation.

- Information Transparency

  Stakeholders in Wellington highlight the importance of creating effective ways in which public entities, private companies and citizens can share transparent and meaningful information that could be useful to prevent, respond and recover from crises. Creating ways in which stakeholders can share sensible information without being afraid of putting into danger their reputation is key to increase the effectiveness of crisis management. For instance, in order to achieve this, confidential information is being shared between many stakeholders within the city to develop digital maps including key critical infrastructures and services that need to be consider when a crisis strikes. This maps or GIS (geographical information system)

have more than one interface depending on the user type that access to the platform. However, being transparent does not mean that all the information have to be publicly available. In the case of Wellington, partners representing the healthcare system, civil protection units, police and firefighters have agreed to share their sensitive information among them considering that it could be useful for other relevant city stakeholders and could be helpful conducting tasks related to crisis management, improving the overall resilience level of the city. In fact, not all the stakeholders need that all the information is publicly available. In fact, the platform is designed in such a way that citizens will only have access to certain information. In order to develop this platform, the city hall is closely working with a private company called NEC (Nipon technology provider). Moreover, Wellington is using sensors to gather data that in the future will be open access. Although, at this moment, the data gathered through sensors is not totally reliable, once it is reliable it will be available for all the city stakeholders. Private companies will be able to use this data for their own purposes. Moreover, anyone will be able to create sensors and add to the infrastructure already located in the lights of the street. This sensor could be designed to plug in in some standardized boxes.

- User Friendliness

  Adapting the language of the message to the audience is seen as highly important for city resilience experts in Wellington. According to experts in Wellington, when the message needs to be understood by all the city stakeholder groups, including citizens, using plain language and visual content (images, photos or cartoons) is usually more powerful than just using technical language. It is also relevant to consider the diverse stakeholder groups within the city. For instance, effort is being invested in Wellington to translate relevant information regarding resilience and crisis management to braille for blind people, to sign language

as well as to other different languages. Sometimes, the work of translating relevant materials is conducted by citizens themselves. For instance, the Colombian community in Wellington is collaborating with WREMO into translating some of their materials to Spanish, so they can share them with Colombian people that have just arrived to New Zealand.

5.2.1.3 Conflict Resolution

- Constructive Resolution

  Making people understand that when building resilience there is a need to negotiate and to understand that sometimes self-interests need to let aside for the common good is highly important for experts interviewed. Although it is highly complex that all stakeholder groups reach to an agreement on how to proceed to address certain controversial issues, in order to increase the acceptance level of the majority of stakeholders, there is a need to involve them in the decision making process as soon as possible. Public authorities in Wellington are aware of this fact and are consequently trying to foster constructive conversation through workshops or meetings. For instance, now there is a need to drill holes in certain areas of the city to ensure water supply in case a crisis occurs. Although this initiative is for the common good, landowners are reluctant to give permission to drill the holes in their land areas. Therefore, public authorities have engaged all the city stakeholders in a conversation to explain the problem and come to a solution that benefit the community as a whole.

- Reflectiveness

  It is highly important to learn from experiences to improve the future. Kaikoura earthquake back in 2016 was a wakeup call for city stakeholders in Wellington. The city had been prepared for those earthquakes in which the epicentre was in the Wellington fault itself. However, Kaikura earthquake's effects were different from the

expected and affected unexpected areas. Therefore, its effects were not the same as the ones for which Wellington had been preparing for. Local authorities in Wellington have realised that analysing the new conflicting areas, updating the building codes and the district plans as well as revising evacuation protocols is necessary to increase the city's resilience level. Moreover, the use of sensors like accelerometers placed in buildings in Wellington could support the analysis of an earthquake measuring the damage caused by an earthquake in different types of buildings. Moreover, having a tight conversation between all the stakeholders to receive feedback on how the implementation of resilience building policies is going is also interesting to ensure available resources in Wellington are being invested in the most effective manner. However, they are still working on effective ways to giving accountability and informing city stakeholder about which the outcomes of the resilience building activities implemented in the city have been.

- Perspective Alignment
  Dedicating efforts to join all the city stakeholders to work on together to establish common understanding and goals to face the challenges that will affect Wellington in the short and long term is seen as necessary by experts. Enhancing common understanding on the complexity of the main concerns of the city is required to have meaningful conversations that come to joint solutions. For instance, Wellington is conducting small group exercises in different contexts. The aim of these exercises is to make certain stakeholder groups to defend the other group's point of view rather than the one your group defends. This activity enables to better understand all the existing perspectives and assuming that although usually a one-size-fits-all solution is not possible, these conversations enable aligning different perspectives on the same challenges. Actually, through these initiatives, the acceptability of the final conclusion increases. Although public authorities are aware of the importance

of aligning the perspectives of all the city stakeholders they are still working on finding incentives that lead up to prevent acting for pure self-interests.

5.2.2 Discussion case study Wellington

City stakeholder groups in Wellington are familiar with the resilience concept and its meaning. Using this concept in long-term strategic planning is common. The awareness level on the potential impacts of acute shocks derived from sudden events like earthquakes or tsunamis is very high. However, Wellingtonians are not so aware of the effects of other long-term stresses like climate change. However, in general, city stakeholders in Wellington share the responsibility of contributing to the city resilience building process of the city.

The importance of aligning available resources and efforts in the context of city resilience is perceived by not only local authorities but also by the rest of the city stakeholder groups. Therefore, fostering dialogues among public entities, private companies and citizens is seen as highly important by local authorities.

The city of Wellington have already worked on integrating the activities into a unique strategy that embraces all the initiatives that are being conducted in the context of different challenges. In fact, a resilience strategy was developed analyzing existing interdependencies among different sectors and stakeholders and aligning all those efforts. This strategy sums up the activities, initiatives, workshops, methodologies and so on that should be implemented in order to increase the resilience level of Wellington. This strategy includes operational level activities whose aim is to address narrow scope problems like improving access to household items to enhance preparedness and recovery and also holistic strategic initiatives like helping communities to develop their own resilience level in the context of crisis management.

After conducting the case study in the city of Wellington, we came up with the conclusion that according to the implementation level of the

characteristics and also considering they have already developed a resilience strategy that includes all the resilience building activities that are being conducted at the city, Wellington is placed in the third 4P evolution stage (Figure 5.1).

All the city stakeholders in Wellington are committed with the need to increase the city's resilience level and they are aware of the fact that their own resilience level depends on the resilience level of other stakeholders. Therefore, our recommendation would be to continue finding ways to find incentives to align existing perspectives to prevent acting for pure self-interest without considering the potential impacts of their decisions in other stakeholders. We would also like to suggest that city stakeholder's in Wellington share their experience and best practices gathered while implementing their own resilience building process through national and international networks with other cities willing to implement their own process.

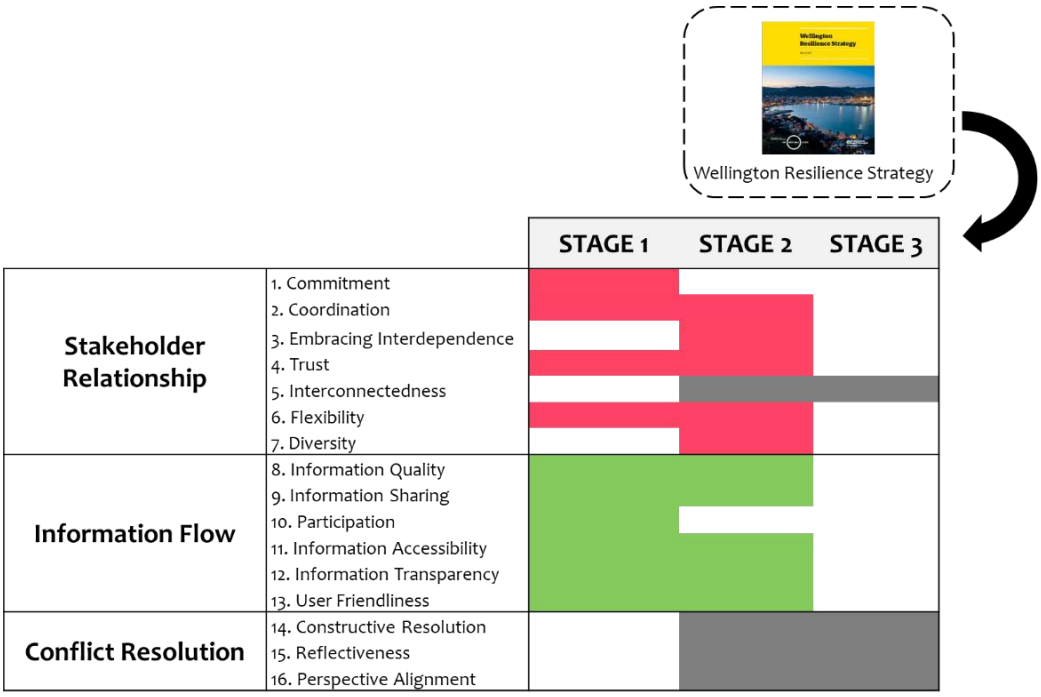


Figure 5.1: Current 4P development status of the city of Wellington

5.3 Case study of the city of Donostia/San Sebastian

The city of Donostia is located in the Basque Country in the north of Spain. Geographically the city is located in the cost of the Bay of Biscay in the Cantabrian sea. Moreover, Donostia is the capital of a province called Gipuzkoa in the region of the Basque Country. During the last years, tourism has been the main economic activity of the city.

These geological and geographic features combined with human activity present a number of hazards. In fact, the city of Donostia has experienced several emergencies caused by hazards, including floods, fires and waves. Due to the importance of the three urban beaches for touristic purposes, sea level rise derived from climate change is also a big concern for city stakeholders.

Within the crisis management context, city stakeholders are increasingly aware of the need to adopt a resilience approach when addressing unexpected crisis and impacts although most of the stakeholders are yet not familiar with the meaning of the concept.

In the following sub-section, the results gathered after conducting the case study in Donostia will be presented. First, the evidences found to illustrate the implementation of the characteristics of successful 4Ps within the city of Donostia will be presented. After considering the evidences found, an analysis of which is the 4P evolution stage in which the city of Donostia is located will be presented. Finally, taking into consideration the implementation order included in the 4P framework, suggestions on how to implement the remaining characteristics will be provided.

5.3.1 Evidences of the 16 successful characteristics

5.3.1.1 Stakeholder Relationship

- Commitment

  According to experts in Donostia, in order to generate commitment among city stakeholders on the need to get involved in the city's resilience building process, there is a need to increase the awareness level on these topics and to foster co-responsibility. On the one hand, they see important to make people realize that the whole responsibility to address wide scope challenges cannot only rely on public authorities. In the case of Donostia, citizens worry about concrete problems that affect to their everyday life patterns. Stresses like climate change are not seen as a priority for them yet. In order to develop Donostia's climate change adaption plan, efforts were made to contact neighbors. However, as citizens still do not see as a relevant problem that directly affects their own wellbeing, the commitment level on this participation process was low. Therefore, public authorities are trying to foster citizens' commitment focusing on specific problems that affect to their everyday life patterns. For instance, they are working with vulnerable groups on analyzing how heat waves could be effectively managed. On the other hand, in order to increase the commitment level of private companies in the context of the city resilience building process, emerging challenges need to be seen as business opportunities. The city council of Donostia together with certain community group associations and private companies are conducting participatory processes to reflect on topics affecting directly to community. For instance, Donostia Lagunkoia is a project that engages community representatives and private companies in the ageing sector to foster participatory governance and come to joint solutions to address the upcoming challenges in the sector together with decision makers.

- Coordination
  There are many stakeholders working in the context of resilience in Donostia. Moreover, traditionally Donostia has been a city in which the culture of volunteering has traditionally had a great tradition. However, there is still not a clear framework to assign a responsible to each volunteer group working in different areas. Moreover, in some sectors volunteers are seen as intruders by some professionals working in the area of civil protection. Civil Protection and Security department of the city are in charge of arranging training exercises to address shocks that usually occur in Donostia like floods or fires. In those training exercises, different stakeholders like firefighters and police participate. However, the resources that volunteer groups can offer are not taken into account. Furthermore, these trainings are usually prepared in advance. Therefore, city stakeholders are now working on conducting exercises in which the reaction capacity and the ability to coordinate all the available resources are trained.

- Embracing Interdependence
  Defining the competences of each city hall department in the context of resilience and existing challenges is found difficult in Donostia. For instance, they are increasingly aware that the decisions taken in the urbanism department could have an environmental impact and that sometimes there is no communication among the different departments (silo-thinking). As wide scope challenges need a transversal approach, the city of Donostia is working on how transversal projects could be managed. They have seen that it is not effective to assign it to a particular department as the collaboration of different departments is equally needed. Moreover, these transversal plans are seen as plans for the entire city, therefore the involvement of other stakeholders (private companies and community groups) is also seen as highly relevant. For instance, the initiative of Donostia Lagunkoia was first assigned

to the department of social services. However, the decisions taken in the context of this project, like accessibility issues, also affect other city hall departments like urbanism so tight collaboration with other departments was required to overcome the challenges behind this project. Moreover, involving other relevant stakeholders in this type of transversal plans for the city is also seen as a key factor to ensure the success of the project.

- Trust

  For public authorities working in the resilience context, the most important thing to foster trust among different stakeholder groups is to generate and maintain a strong collaboration network in the context of other type of projects not strictly related to crisis management. For community groups, for instance, this is a way to generate trust in public entities showing them that contacting public authorities to share any concern is accessible. Not just using the tacit knowledge of citizens but empowering them to carry on their initiatives and support them is a way to generate trust. Public authorities of Donostia are putting their efforts onto listening and demonstrating that the perspective shared by different community representatives is considered when developing later plans or activities whose aim is to solve their short-term and long-term problems. The important thing in order to create trust is that those community representatives obtain feedback on how their perspectives have been considered and which the impacts generated by their participation have been. This is how they will recognize the consequences of their efforts. There are different participatory processes in which the knowledge of citizens is serving as input to develop plans to address upcoming challenges like the ageing of population. The network created in the context of the Donostia Lagunkoia project is a good example. Moreover, according to the interviewed experts, fostering collaboration with individuals rather than with organizations is easier but sometimes more dangerous

because if that person leaves the organization the relationship may disappear. Some public administration departments only have contact with some NGOs because of the good relationship that exist with the people in charge. Technicians working in different departments of the city are aware of this limitation and are working to address this challenge to not only rely on a single person when working with external entities.

- Interconnectedness
  Fostering collaboration with regional and national government as well as with other relevant entities settled outside the city boundaries is important to prevent duplication of efforts and to be coherent when addressing wide scope challenges. Local authorities in San Sebastian are working on developing activities aligned with the ones supported by regional and national governments. They also pay attention on how they can collaborate. For instance, in Donostia the public health service depends of the regional government while local authorities are in charge of managing sport facilities. A pilot project still in development process is being implemented in the city in which local and regional authorities collaborate. This project consists on dealing with heart problems illnesses through the exercise. When an unfit person that presents potential heart problems that whose symptoms could be improved doing exercise; the patient is derived from the health center managed by the regional government to the sport facility in the same neighborhood managed by local authorities. In this facility, a specific exercise plan is designed for the patient in order to improve their fitness level and their own well-being. Moreover, they also have close contact with them when they need to respond to imminent crises. For instance, when traffic is affected by heavy snow falls decisions like closing a specific road are taken consensually.

- Flexibility

  In order to be flexible enough to prevent, respond and recover effectively from unexpected events and consequences, experts in Donostia think that different perspectives of different city stakeholders need to be considered. Moreover, sharing concerns of different city stakeholder enable to come up with alternative protocols to address the consequences of upcoming challenges affecting citizens' wellbeing more effectively. For instance, in a particular neighborhood of Donostia called Martutene where floods happen frequently, new initiatives have been designed and implemented to reduce the harm caused by water. Citizens were concerned of the damage caused by the water to the cars parked on the street. Together with local authorities, they established a special plan that included different activities to reduce damage. For instance, a public bus service was arranged it order to enable people to park the cars up on a hill before the flooding occurs in order to leave cars in a save place and prevent damage. That bus allows to connect that parking with the neighborhood easily. Another initiative designed in the context of the co-created plan for floods in Martutene were a SMS warning system for people willing to receive alerts when floods are about to occur.

- Diversity

  Local authorities in Donostia are aware of the importance of engaging all the different city stakeholder groups in the city resilience building process in order to analyse how they can contribute to improve it. Therefore, they are investing efforts to identify existing volunteer groups or other community groups that could contribute to increase the effectiveness of crisis management. However, integrating the tangible and intangible resources of volunteer groups like the Red Cross and DYA is not always easy because public entities do not certainly know if they can count of them when a crisis with widespread consequences occur. Certain

private companies are also being consider as project facilitators in issues to which public entities do not reach. Funding this type of projects is important to approach the holistic perspective of city resilience. Moreover, local authorities consider that the needs of most vulnerable groups need to be well identified because they are the ones who most suffer the impacts of any type of crisis. For instance, the social department of the city has a list that includes contact details of people older than 80 years living on their own. This way, in case an evacuation is needed, first responders have more information about who will require special attention.

5.3.1.2 Information Flow

- Information Quality

  Managing uncertainty is highly important in times of crisis. Therefore, according to the experts in Donostia finding the most adequate information channels, being transparent and sharing early information of good quality is highly important. Public administration is obliged by law to share information in open data platforms to give citizens the chance to access to public data. In the city hall of Donostia there is a department called Unity of Information. Members of this unity are currently working in integrating cartography data with other data like demographical data and making it publicly available in different types of maps. It is the responsibility of this department to prepare and organize available data into different layers in order to filter the information according to the type of user. This department also works on establishing common standards and metrics to ensure the consistency of the data stored. There are some sectors, like the social sector in general and the home assistance service in particular that are key for the city of Donostia considering the imminent demographic change is going to happen in the upcoming years. These service providers are usually private companies that still do not digitally gather useful information regarding the service that

could be highly useful to improve existing activities and services in the future. Therefore, efforts are being invested to overcome this existing limitation.

- Information Sharing
  City stakeholders in Donostia are used to share information through social media platforms like twitter. According to experts in Donostia, these channels are effective to share information objectively and not giving the media the chance to manipulate the information. Moreover, in certain sectors, legislation is also forcing some entities to share information by law. This is the case of private companies related to environmental information. Community representatives in Donostia claim that sometimes they receive information regarding a project or an initiative that is going to affect their expertize area through traditional media channels. They feel the contact with local authorities should improve in order to explain which the needs of society are. According to them, existing information channels are not always effective. In an attempt to overcome this limitation a mailbox is available in the webpage of the city council in which citizens can send suggestions to local authorities. However, it takes a long time to receive an answer and therefore it is not effective to address urgent problems like black-outs.

- Participation
  Fostering the participation of representatives of different city stakeholder groups in Donostia is a challenge itself. On the one hand, community groups sometimes feel that they are seen as trouble makers by politicians since they do not share their vision and therefore criticize certain attitudes or decisions. In order to be heard and due to the controversial nature of certain activities, community groups need to get in contact with politicians, as they are the decision makers, not with technicians working in departments of

the city council. However, getting in touch with politicians is not always easy due to their time availability. When developing formal contractual agreements for the city resilience building process, private companies find sometimes difficulties to participate in Donostia. Due to the legal status of the private company, they sometimes cannot send proposals to certain projects in the social sector, because the proposals only allows to participate to nonprofit companies. Therefore, they are sometimes invited but without any economic profit for them. Public authorities are aware of this limitation and are now thinking on changing the characteristics of the calls so that private companies can also apply not only NGOs or other associations. It is important to note that sometimes it is difficult for citizens to find time to participate in this type of projects. Considering this fact, Donostia has designed a project to implement active listening in communities within the city. They realized that numerical data could explain certain realities but not everything that happens at the local level. They are analyzing how available technology allows to translate real conversations into data through algorithms in real time. They are also reflecting on conducting active listening in public libraries and sport and health centers to facilitate the perspective sharing of citizens.

- Information Accessibility
  Having access to relevant information is key to address upcoming challenges for experts interviewed in Donostia. Using social media is useful but there are certain groups in society that are not used to find information through digital channels. Local authorities in Donostia are aware of this and have alternative ways to inform citizens about imminent crises using face to face like warning sirens by police services or firefighters. Moreover, more sophisticated technology is being tested that could be used to alert citizens about an upcoming crisis visually when the river's level increases to the point in which flooding could happen. They also use accessible

channels like an SMS system that could alert people that are signed up on the system. This way, the most vulnerable groups in society that are not used to using mobile phones could be warned by neighbors or familiars that receive the alert.

- Information Transparency
  Fostering information transparency among different city stakeholders is not easy. In general, public and private companies are usually reluctant to share some information between them. For instance, private companies that work in the social sector in Donostia are not well seen and therefore they are reluctant to share economic data because they could be publicly criticized because of their revenue. There are other sectors in which information transparency is highly important to prevent potential problems. In this regard, environmental crises could be very controversial. In the summer of 2018 a problem happened with the water quality in la Concha beach. The Red Cross, who are in charge of bay watching, was informed about this issue and alerts were put in the changing rooms. There was no time to properly inform citizens using other channels. The environmental department of the city hall suffered a reputational crisis as they were severally criticized by not using an effective channel to inform all the society. Moreover, problems may happen with traditional media as often this stakeholder is politicized. Sometimes, local authorities share some information with community group but if they have a strong political influence they filter information to media. Therefore, the ideal way of doing it is sharing with all the stakeholders at the same moment, being transparent and explaining the reason behind taking certain controversial decisions is important. Ensuring the veracity of the information shared is needed. Therefore, it is important to try to give information being as objective as possible and preventing sharing subjective thoughts.

- User Friendliness
  Experts in the city are aware of the fact that the language used in reports related to specific challenges like climate change is usually very technical. Therefore, sharing them with less specialized stakeholders is not effective. According to the experts interviewed in Donostia, when the language of a workshop or a report is too technical, citizens do not feel they can contribute to find a solution with their knowledge. Therefore, they will not found their contribution relevant and eventually will not attend similar events anymore. It is important to balance so that all the different city stakeholder groups feel comfortable participating in this type of cross-sectoral and multi-level initiatives. Moreover, the language used to describe the existing challenges is highly significant, not only in terms of understanding but also because of the negative connotations that could be transmitted regarding a problem. For instance, when working around the challenge of elderly population, depending on the language used, elders that are able to contribute to the resolution of the project could see themselves as part of the problem and not of the solution. Therefore, it is important to dedicate time to create a shared language.

5.3.1.3 Conflict Resolution

- Constructive Resolution
  Experts in Donostia feel that the way to understand each other and to foster constructive resolution is establishing common objectives and metrics to evaluate the outcomes of the projects in the context of city resilience. In order to do that, co-creation is the way to reach shared and reachable objectives for all the stakeholder groups. However, measuring intangible activities in the context of wide scope challenges and in the social context is not easy. Although they are aware of this need little effort has been done yet on this regard.

- Reflectiveness
  Reflecting on the activities that have been done in order to learn from them is seen as important for city stakeholders in Donostia. For instance, after certain crises affecting the city, different departments of the city council come together and reflect on ways to improve crisis management procedures in order to face upcoming crisis more effectively. However, although they see as potentially useful, local authorities in Donostia do not yet involve other city stakeholder groups like community groups with different backgrounds to learn from their particular tacit knowledge.

- Perspective Alignment
  Experts in Donostia find important to talk to all the city stakeholder groups to know which their perspective on decisions affecting the upcoming future is. They are aware of the fact that different groups could have different interests. Therefore, they need to invest efforts to come up with a joint solution achieving a consensus. In order to develop an effective 4P the objectives of all the stakeholders need to be aligned. This will is their incentive to become a partner. Even if their opinion on which is the most effective path to reach those objectives differ. Local authorities feel important to set up spaces to identify and define the paths to address upcoming challenges. For instance, in the context of Klima 2050 project different city stakeholders where invited to discuss about climate change and its consequences. Different groups of society like elderly people, university students, school kids and important private companies in the city like Cementos Rezola, ADEGI or Iberdrola took part.

5.3.2 Discussion case study Donostia

Some city stakeholder groups in Donostia are not familiar with the resilience concept. Society is not familiar with applying the concept of resilience in the urban context. Moreover, it is not common to use this term in long-term strategic

planning. The awareness level on the harmful impacts of emerging long-term challenges is still not high in some stakeholders like private companies and citizens. Therefore, it is difficult to achieve the participation in resilience building processes. However, in other contexts the participation of community is high. For instance, there are several NGOs working around decreasing existing inequalities.

The importance of involving relevant stakeholders representing all the groups of society is perceived by local authorities and consequently they are starting to invest efforts in order to foster the spaces for dialogue in which public entities, private companies and citizens discuss strategic topics to address upcoming city challenges.

However, challenges are considered independently. The resilience approach is not yet seen as an umbrella concept that embraces all the upcoming challenges that may end up affecting the city holistically in the short and long term. Donostia is currently working on the three main upcoming challenges affecting cities, namely, climate change, social issues and critical infrastructure dependency independently. The city has developed a climate change adaption plan, the social department also has transversal projects to address challenges most likely to happen and the security and civil protection units are also collaborating with relevant stakeholders in the resolution of potential crises. However, although they have identified potential opportunities to develop transversal projects that could have a positive impact in more than one challenge, they still lack of a resilience strategy that integrate all the different resilience building activities that are currently being conducted at the city level. Developing this plan could prevent duplication of efforts and the investment of available resources in the most effective manner.

We can therefore assume that the city of Donostia is working to move from the 2nd to the 3rd 4P evolution stage (Figure 5.2). Our recommendation would be to establish a city resilience department that could coordinate transversal strategic activities in order to overcome existing silo-thinking among different city hall departments and with other institutions within and outside the city boundaries. This would enable to improve coordination, better understanding of

the existing interdependencies among city stakeholders and to improve interconnectedness with other relevant institutions outside the city boundaries. Moreover, improving stakeholder relationship will have a positive effect on the characteristics classified in the information flow dimension. Information sharing and transparency among city stakeholders should be fostered in order to integrate and align all their efforts. At this stage, using a user friendly language and preventing the use of technical jargon starts to be highly important in order to make stakeholders feel comfortable in a holistic strategic planning process. Finally, we suggest keeping on working on the characteristics included in the conflict resolution dimension as although stakeholders are starting to be aware of their importance, little evidence has been found of experiences that demonstrate that they are currently being implemented.

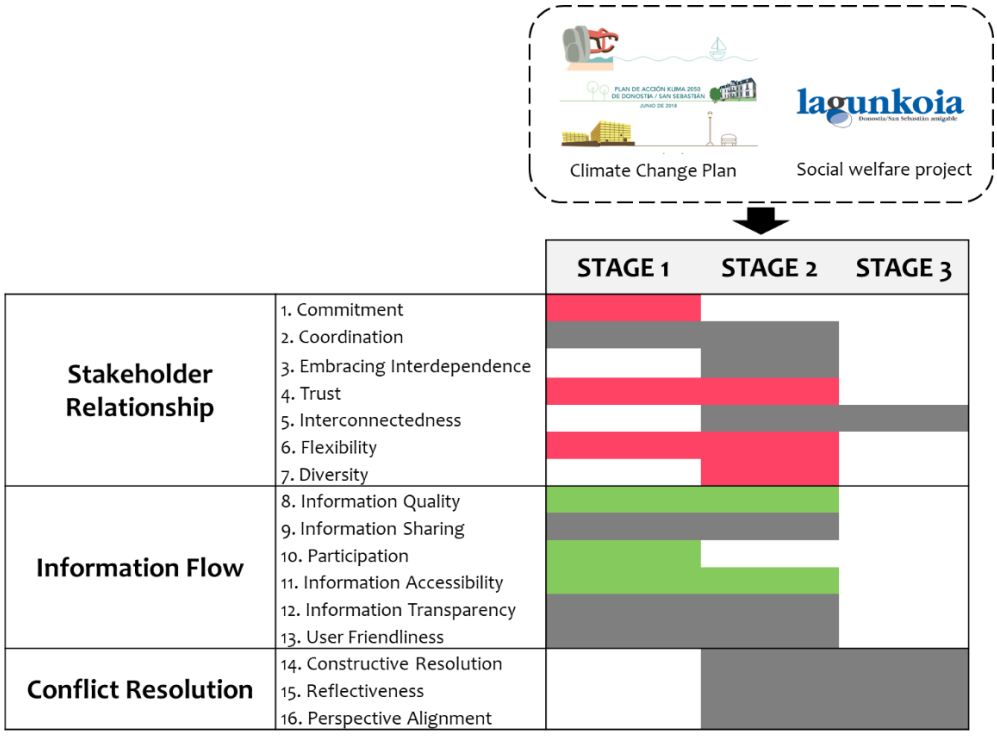


Figure 5.2: Current 4P development status of the city of Donostia

5.4 Comparison between the two case studies

The case studies carried out in this research present the current 4P development status of two different cities. On the one hand, due to its wide experience implementing resilience building activities, the city of Wellington is in the third 4P evolution stage. Wellington is already implementing the holistic resilience strategy presented back in 2017. The creation of this strategy has enabled to strengthen collaboration among different city stakeholders working in different fields and focuses on addressing different challenges.

On the other hand, the city of Donostia is in the second 4P evolution stage. City stakeholders are collaborating to address city challenges independently without considering the existing interdependencies among them. For instance, a climate change adaptation plan has been developed. Therefore, there is still work to do explaining the need to enhance transversal collaboration integrating and aligning the different activities that are being conducted within the scope of each city challenge into a unique resilience strategy.

Based on the evidences gathered, it is possible to conclude that Wellington has reached further in the development process of 4Ps. Its role is to continue working on improving the characteristics included in the conflict resolution dimension. City stakeholders in Wellington are aware of their role and responsibilities in the resilience building process but they still need to work on improving their understanding and setting common goals. Moreover, Wellington needs to share their experience with other cities to speed up other cities' resilience building processes.

Despite the differences between the two cities, in both case studies it has been possible to demonstrate that local authorities in both cities are making efforts to enhance collaboration among public entities, private companies and citizens. Both cities see multi-stakeholder collaboration as the most effective way to use available resources to invest in the city resilience building process in the most effective way.

5.5 Remaining challenges to develop effective 4Ps in the city resilience building process

According to academic and practitioners that participated in both case studies, the positive impact of creating successful and long lasting 4Ps in the city's resilience is a fact. This is why cities are investing resources into creating meaningful formal and informal connections between their different city stakeholder groups. However, although public authorities are committed to improve the quality of their 4Ps, developing them is not a straightforward process. In fact, it is a complex process with numerous challenges and practical hurdles associated with the establishment of people centre approaches that need to be addressed during the 4P development process. The aim of this section is to discuss some of the most relevant existing challenges when developing 4Ps that were recurrently mentioned by experts that participated in both case studies.

5.5.1 Challenges related to the stakeholder relationship dimension

- Making citizens understand that they cannot only rely on public entities to respond to crisis is an important fact that the whole society need to assume and is key to ensure the commitment of society to participate in 4Ps. In fact, they need to realize that their role should be a proactive one in crisis management. Public entities need to guide citizens and give them the specific instructions they need to follow in order to prepare for, respond to and recover from crises in the most effective manner.
- It is important to bear in mind that the peculiarities of different groups in society in order to increase the social dimension of city resilience. Low income people are usually known as a vulnerable group for society. However, due to their living circumstances this group has mechanisms that other groups in society do not have. People that have face more difficulties in their live are more used to deal with uncertainties and have a better capacity to react and improvise. Moreover, they usually have a

stronger sense of community that help to each other in case someone is in need.

- Another challenge is that although city councils are the institutions closest to society some of the services provided rely on other higher institutions like regional governments or national governments.

5.5.2 Challenges related to the information flow dimension

- The task of sharing information related a city's resilience building process cannot be totally in hands of the city council. Public entities are in charge to create the material that should be shared making sure that the information provided is user friendly for all the stakeholders. However, the task of sharing relevant information should conducted by different stakeholders so that the message reaches a significant amount of people.
- It is also important to realise that waiting until the available information is perfect is not a smart decision. It is better to share some information rather than not sharing anything because making decisions in the response phase without having all the information available is even worse.
- In general, using digital tools make information more accessible. However, at the same time, there is a risk to hamper the inclusion of relevant vulnerable groups that are not used to using this communication channels.

5.5.3 Challenges related to the conflict resolution dimension

- It is difficult to find representatives that can defend the interests of the whole community group. It is not easy to find a person that do not act only considering a particular group's interests but also thinking on other groups' views. Sometimes there are small but noisy groups and the media

usually pay more attention to them instead of taking into account the majority's opinion. Moreover, difficulties to enhance participation of the silent majority often exist. Members of these silent groups will not give their opinion or thoughts until a taken decision is controversial.

- Sometimes political interests may hamper the city resilience-building process and sharing certain controversial information. There is a need to be open and honest but politically this is usually hard. However, this is the only way to generate trust and increase the concern and awareness needed so that the citizens are well prepared to face a situation like this.
- One of the hardest thing is the fact of understanding that everyone needs to contribute to the process although the outcomes are usually not measurable nor tangible. Sometimes there is a belief that if our self-interest has not been achieved the process has not been successful but that it not like this. Therefore, it is highly important to find a way to deliver results that can be perceived as valuable by citizens.
- Another important barrier is that private entities need to demonstrate the outcome of their investments. However, it is difficult to justify investments on resilience because of the high investment that needs to be made to reduce the probability of a potential crisis. In fact, if the probability of a potential crisis occurrence is reduced, a new crisis may not happen and preventing the perception of the benefits achieved because of the investments made on resilience. There is still the need to increase the awareness of citizens so that these decisions are taken somehow in a market driven manner. When people are aware of the importance of resilience, they could evaluate if they will pay more for a service or product of a resilient organization.
- Increasing the awareness level regarding risks and upcoming challenges of citizens is required so that they assume their role in addressing future

scenarios. They need to understand the long-term effects of the policies that are planned to be implemented so that the acceptance level of new practices that may affect to the everyday live patterns of citizens increases.

The different initiatives that are currently being conducted in both cities aim to address these challenges. Bearing in mind these challenges is important in order to design and implement initiatives in a way that prevent the occurrence of conflicts among different stakeholders.

5.6 Conclusions

As we highlighted at the beginning of this chapter the goal of the validation phase was to check that the 4P framework was complete, useful and relevant.

In order to prove the completeness of the 4P framework we decided to use all the evidences to illustrate whether ways to implement 4P characteristics in practice. Moreover, we also gathered evidences of existing plans, projects or activities to assess the current 4P evolution stage of the city. In fact, we did not found any evidence which was out of the scope of the 4P framework. This way the completeness of the 4P framework was validated.

Regarding the usefulness of the 4P framework, the case studies proved that the 4P framework could support the 4P development process in the context of city resilience. In both cases, we identified existing barriers and pending challenges for each city that need to be considered to continue their particular 4P development process in the most effective manner.

Finally, we also had to make sure that the 4P framework was relevant for local authorities willing to develop 4Ps in the context of city resilience. During the case study of Donostia (currently in the second 4P evolution stage) experts commented that the logic behind the priority implementation order included in the 4P framework could serve as guidance in the design of policies related multi-stakeholder collaboration in the future.

As a result of the case studies, it was possible to prove the validate the 4P framework, to assess the current 4P evolution stage of each city and to provide recommendations to increase the effectiveness of the 4P. These recommendations were obtained taking into consideration the 4P implementation order to see which steps should be taken in future to further improve the functioning of the 4P are.

6 Conclusions, Limitations and Future Research

This chapter presents a summary of the outcomes and main conclusions obtained within this research. Moreover, it presents the main limitations of the 4P framework for the city resilience building process. Finally, it proposes the future research lines to address the existing limitations and to increase the positive impact of the 4P framework in any city resilience building process.

6.1 Conclusions

According to the literature review carried out on city resilience, academics and practitioners are increasingly aware of the need to foster multi-stakeholder collaboration to address emerging complex challenges that will affect the wellbeing of society in the near future. In this context, developing mechanisms like 4Ps seem to be necessary to increase the resilience level of cities.

The final aim of this research study was to fulfil the main research objectives presented in the Introduction section. In order to do that a framework to develop effective 4Ps that can provide support in the city resilience building process has been created within the scope of this research.

6.1.1 Research methodology

The information needed to create the framework was obtained through a three-phase process. In each phase, different methodologies were used to gather useful information to develop the 4P framework for the city resilience building process. In the first phase, the conceptualization phase, a literature review was conducted to obtain the research questions and sub-questions as well as to define the research contribution. In the second phase, the development phase, the information gathered through semi-structured interviews, review of resilience strategies and a Delphi process was triangulated in order to obtain the final version of the 4P framework. Finally, in the third phase, the validation phase, two case studies were conducted in the cities of Wellington (New Zealand) and Donostia/San Sebastian (Spain). Through the case studies, it was possible to asses the current 4P evolution stage of each city and the remaining barriers needed to overcome in order to move onto the next 4P evolution stage.

6.1.2 4P framework for the city resilience building process

The main aim of the 4P framework of the city resilience building process is to support the development process of 4Ps in the city resilience building process. The 4P framework is composed of three elements; a set of 16 characteristics that should be considered when developing effective 4Ps, three 4P evolution stages

that describe the development process of the 4P and an implementation order that determines in which 4P evolution stage should each characteristic start being implemented. The 4P framework also suggests best practices to improve each of the 16 characteristics. Moreover, some barriers that still need to be overcome have also been presented.

The 4P framework serve to guide city stakeholders on how to develop a strong, meaningful and long-lasting multi-stakeholder partnerships in which all the relevant stakeholders, namely, public entities, private companies and society are represented. Eventually the involvement of city stakeholders in the city resilience building process would increase the acceptance level of resilience building policies when they are implemented.

6.2 Research limitations

The 4P framework in the city resilience building process developed in this research have some limitations. The list below explains the main limitations of this research:

- Regarding the limitations of this framework, it is important to bear in mind that in order to start developing 4Ps in a city a minimum awareness level of city stakeholders is required. Understanding the importance of investing efforts into fostering collaborations among city stakeholder groups working in different sectors is required in order to create a meaningful and long-lasting 4P in the city.
- In this research, the need to involve all the relevant city stakeholders in the city resilience building process has been recurrently highlighted. However, in a globalized world, cities cannot be considered as isolated entities anymore. Many cities share resources and services with other cities to ensure the wellbeing of their citizens and therefore, they need to collaborate in order to increase their own resilience level. 4Ps representing different cities need to participate in networks, having a proactive posture and a continuous learning attitude in order to share best practices that

would allow to be prepared to address upcoming challenges more effectively. One of the main limitations of our 4P framework is that it does not explore the ways in which different 4Ps of different cities could collaborate creating partnerships or join networks to further increase all the city resilience levels, learning from each other or sharing resources.

- The best practices proposed in this research to improve the characteristics of 4P framework have been defined at a strategic level. Therefore, when implementing the characteristics in practice, there is a need to define actions or best practices at operational level to facilitate their accomplishment. In order to achieve that it is important to gather information from concrete activities conducted in different cities that could be replicable in other cities.
- Due to the limited time to conduct this research, the framework was not fully implemented in a city. Although the evidences that illustrate how the characteristics could be implemented in cities to move forward from one 4P evolution stage onto the next one were found, the full implementation of the 4P framework was not possible due to the time limitation. Therefore, the full validation of the implementation methodology of the 4P framework is still pending.

6.3 Future Research

The future research is oriented to overcome the limitations of this research presented in the previous section and, thus, to improve the 4P framework for city resilience building and its implementation:

- Cities could not be considered as isolated entities anymore due to the globalization phenomenon. Their correct functioning depends on the correct functioning of other systems outside the city boundaries. Therefore, after creating a meaningful and long-lasting 4P in the city resilience building process the focus moves to develop relationships with 4Ps created in other cities. The aim of promoting

this type of relationships is to share best practices and to foster collaboration of all the city partners to support the resilience building process. At this moment, the 4P framework in the city resilience building process only explore the 4P development process considering stakeholder groups within the city. Therefore, a further analysis should be conducted on how 4Ps representing different cities could establish strong relationships to share resources and increase their resilience level.

- The set of 16 characteristics included in the 4P framework are classified into three different dimensions (stakeholder relationship, information flow and conflict resolution). However, it is important to bear in mind that the characteristics included in the three different dimensions are closely related among each other. The literature review has shown us that improving one 4P dimension has co-lateral effects on the other dimensions. In turn, the characteristics of different dimensions are interrelated each other. For instance, improving the relationship of different city stakeholders will have a potential impact on the amount and quality of the information they share between them (O'Sullivan et al., 2015). When a sense of belonging and trust among different entities exists, there is a bigger chance to improve the information flow among the partners. Improving the quality, accessibility and sharing of information also improves the coordination of city stakeholders and the sense of inclusiveness (Davenport et al., 2010). Although each best practice is related to one of the 4P dimensions, the effects of their implementation are usually transversal and affect not only to the improvement of their own dimension but also to the others. Therefore, further research should be conducted to better understand the cause-effect relationship in the implementation of characteristics in order to use the available resources in the most effective manner.
- It would be highly interesting to implement this framework in cities that are about to start the 4P development process in a city. This

way we could contrast how taking the 4P framework developed within this research as a basis the available resources to develop these type of mechanisms could be invested in a more effective way. This comparison would enable to have more consistent arguments when demonstrating the added value of the 4P framework. Moreover, the full implementation of the framework would also be useful to continue improve the list of best practices available for each successful characteristic. Finally, the full implementation would also be useful to assess how the implementation order proposed enables a more effective 4P development.

- It is important to bear in mind that some cities could find easier to develop one dimension rather than other because of cultural aspects. Drivers and barriers influenced by cultural aspects exist when implementing characteristics of different dimensions. For instance, in some countries, like the ones in northern Europe, more attention is paid to the standardization of information sharing procedures. Therefore, these countries may find easier to improve the information flow dimension. However, other countries with a different cultural background, for instance the countries in the Mediterranean Sea, may find easier to establish informal relationships among stakeholders first due to their feature of being more sociable. Therefore, the analysis of how cultural aspects can influence in the development of 4Ps is a future research to be addressed.

References

100 Resilient Cities (2017) Wellington Resilience Strategy. Available from: http://www.100resilientcities.org/strategies/wellington/.

Adams LM (2016) Promoting Disaster Resilience Through Use of Interdisciplinary Teams: A Program Evaluation of the Integrated Care Team Approach. *World Medical and Health Policy* 8(1): 8–26.

Addison CC, Campbell Jenkins BW, Odom D, et al. (2015) Building collaborative health promotion partnerships: The Jackson heart study. *International Journal of Environmental Research and Public Health* 13(1): 25.

Adini B, Cohen O, Eide AW, et al. (2017) Striving to be resilient: What concepts, approaches and practices should be incorporated in resilience management guidelines? *Technological Forecasting and Social Change* 121: 39–49.

Ainuddin S and Routray JK (2012) Community resilience framework for an earthquake prone area in Baluchistan. *International Journal of Disaster Risk Reduction* 2: 25–36.

Akamani K, Wilson PI and Hall TE (2015) Barriers to collaborative forest management and implications for building the resilience of forest-dependent communities in the Ashanti region of Ghana. *Journal of Environmental Management* 151.

Aldrich DP and Kyota E (2017) Creating Community Resilience Through Elder-Led Physical and Social Infrastructure. *Disaster Medicine and Public Health Preparedness* 11(1): 120–126. Available from: https://www.cambridge.org/core/product/identifier/S1935789316002068/type/journal_article.

Aldrich DP and Meyer MA (2015) Social Capital and Community Resilience. *American Behavioral Scientist* 59(2): 254–269. Available from: http://journals.sagepub.com/doi/10.1177/0002764214550299.

Allen DK, Karanasios S and Norman A (2014) Information sharing and interoperability: The case of major incident management. *European Journal of Information Systems* 23(4): 418–432.

Almklov PG and Antonsen S (2010) The commoditization of societal safety. *Journal of Contingencies and Crisis Management* 18(3): 132–144.

Andrews R and Entwistle T (2010) Does cross-sectoral partnership deliver? An empirical exploration of public service effectiveness, efficiency, and equity. *Journal of Public Administration Research and Theory* 20(3): 679–701.

Ansell C, Boin A and Keller A (2010) Managing Transboundary Crises: Identifying the Building Blocks of an Effective Response System. *Journal of Contingencies and Crisis Management* 18(4): 195–207.

Atela JO, Minang PA, Quinn CH, et al. (2015) Implementing REDD+ at the local level: Assessing the key enablers for credible mitigation and sustainable livelihood outcomes. *Journal of Environmental Management* 157: 238–249.

Audain S (2017) Engaging reality- a week of virtual reality in the city. Available from: https://www.linkedin.com/pulse/engaging-reality-week-virtual-city-sean-audain/ (accessed 31 May 2018).

Bäckstrand K (2006) Multi-stakeholder Partnerships for Sustainable Development. *European Environment* 16(5): 290–306.

Bäng M and Rankin A (2016) *Multidisciplinary literature synthesis*. Available from: http://smr-project.eu/fileadmin/user_upload/Documents/Resources/WP_1/D1.3.SMR_Final.pdf.

Bava S, Coffey EP, Weingarten K, et al. (2010) Lessons in Collaboration, Four Years Post-Katrina. *Family Process* 49(4): 543–558.

Bekhet AK and Zauszniewski JA (2012) Methodological triangulation: An approach to understanding data. *Nurse Researcher*.

Benbasat I, Goldstein DK and Mead M (1987) The Case Research Strategy in

Studies of Information Systems. *MIS Quarterly*: 369–386.

Berkowitz M (2016) What is resilience and why does it matter now more than ever? Available from: http://www.100resilientcities.org/what-is-resilience-and-why-does-it-matter-now-more-than-ever/#/-_/. (accessed 15 October 2018).

Bettencourt LMA (2013) The origins of scaling in cities. *Science* 340(6139): 1438–1441.

Boin A and Lagadec P (2000) Preparing for the Future: Critical Challenges in Crisis Management. *Journal of Contingencies & Crisis Management* 8(4): 185–191.

Boin A and McConnell A (2007) Preparing for Critical Infrastructure Breakdowns: The limits of crisis management and the need for resilience. *Journal of contingencies and crisis management* 15(1): 50–59.

Boin A, Lagadec P, Michel-Kerjan E, et al. (2003) Critical Infrastructures under Threat: Learning from the Anthrax Scare. *Journal of Contingencies and Crisis Management* 11(3): 99–104.

Boin A, Busuioc M and Groenleer M (2014) Building European Union capacity to manage transboundary crises: Network or lead-agency model? *Regulation and Governance* 8(4): 418–436.

Bolger F and Wright G (1994) Assessing the Quality of Expert Judgment - Issues and Analysis. *Decision Support Systems* 11(1): 1–24. Available from: isi:A1994MP91400001.

British Red Cross (2018) Indonesia earthquake and tsunami: the Red Cross is there to help. Available from: http://blogs.redcross.org.uk/appeals/2018/09/indonesia-earthquake-and-tsunami-the-red-cross-is-there-to-help/ (accessed 24 October 2018).

Brogt E, Grimshaw M and Baird N (2015) Clergy views on their role in city resilience: lessons from the Canterbury earthquakes. *Kotuitui* 10(2): 83–90.

Bromley E, Eisenman DP, Magana A, et al. (2017) How do communities use a participatory public health approach to build resilience? The Los Angeles county community disaster resilience project. *International Journal of Environmental Research and Public Health* 14(10): 1267.

Brown TJ and Dacin PA (1997) The Company and the Product: Corporate Associations and Consumer Product Responses. *Journal of Marketing* 61(1): 68–84. Available from: http://www.jstor.org/stable/1252190?origin=crossref.

Browning MHEM, Stern MJ, Ardoin NM, et al. (2018) Factors that contribute to

community members' support of local nature centers. *Environmental Education Research* 24(3): 326–342.

Bulkeley H (2013) Cities and climate change. In: *Cities and Climate Change*, London: Routledge.

Busch NE and Givens AD (2012) Public-Private Partnerships in Homeland Security : Opportunities and Challenges. *Homeland Security Affairs*.

Chandra A, Williams M, Plough A, et al. (2013) Getting actionable about community resilience: The Los Angeles county community disaster resilience project. *American Journal of Public Health* 103(7): 1181–1189.

Chandra A, Williams M V, Lopez C, et al. (2015) Developing a Tabletop Exercise to Test Community Resilience: Lessons from the Los Angeles County Community Disaster Resilience Project. *Disaster medicine and public health preparedness* 9(5): 484–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/26279093.

Chi GC, Williams M, Chandra A, et al. (2015) Partnerships for community resilience: Perspectives from the Los Angeles County Community Disaster Resilience project. *Public Health* 129(9): 1297.

Coffin SL and Barbero C (2009) Research article: Making connections in the brownfield marketplace. *Environmental Practice*, Universidad de Navarra 11(3): 170–178.

Cohen O, Goldberg A, Lahad M, et al. (2017) Building resilience: The relationship between information provided by municipal authorities during emergency situations and community resilience. *Technological Forecasting and Social Change* 121: 119–125.

Covenant of Mayors (2018) Covenant of Mayors for Climate & Energy. Available from: https://www.covenantofmayors.eu/en/ (accessed 24 October 2018).

Davenport MA, Bridges CA, Mangun JC, et al. (2010) Building local community commitment to wetlands restoration: A case study of the cache river wetlands in Southern Illinois, USA. *Environmental Management* 45(4): 711–722.

De Bruijne M (2006) *Networked reliability: Institutional fragmentation and the reliability of service provision in critical infrastructures*. Doctoral dissertation, TU Delft, Delft University of Technology.

De Bruijne M and van Eeten M (2007) Systems that should have failed: Critical infrastructure protection in an institutionally fragmented environment. *Journal of Contingencies and Crisis Management* 15(1): 18–29.

Denzin NK (1978) *The Research Act*. New York: McGraw-Hill.

Devinney TM (2009) Is the Socially Responsible Corporation a Myth? The Good, the Bad, and the Ugly of Corporate Social Responsibility. *Academy of Management Perspectives* 23(2): 44–56. Available from: http://amp.aom.org/cgi/doi/10.5465/AMP.2009.39985540.

DiCicco-Bloom B and Crabtree BF (2006) The qualitative research interview. *Medical Education* 40(4): 314–321.

Dobson S (2017) Community-driven pathways for implementation of global urban resilience goals in Africa. *International Journal of Disaster Risk Reduction*, Elsevier Ltd 26(September): 78–84. Available from: https://doi.org/10.1016/j.ijdrr.2017.09.028.

Doyle E and Paton D (2017) Decision-Making: Preventing Miscommunication and Creating Shared Meaning Between Stakeholders. In: *Advances in Volcanology*, pp. 549–570.

Doyle EEH, Becker JS, Neely DP, et al. (2015) Knowledge transfer between communities, practitioners, and researchers: A case study for community resilience in Wellington, New Zealand. 19(2): 55.

Dunn-Cavelty M and Suter M (2009) Public-Private Partnerships are no silver bullet: An expanded governance model for Critical Infrastructure Protection. *International Journal of Critical Infrastructure Protection* 2(4): 179–187.

Edwards M (2001) Participatory governance into the future: Roles of the government and community sectors. *Australian Journal of Public Administration* 60(3): 78–88.

Eisenman D, Chandra A, Fogleman S, et al. (2014) The Los Angeles county community disaster resilience project - A Community-Level, public health initiative to build community disaster resilience. *International Journal of Environmental Research and Public Health* 11(8): 8475–8490.

ENISA (2011) *Good Practice Guide on Cooperatve Models for Effective PPPs*. Available from: https://www.enisa.europa.eu/activities/Resilience-and-CIIP/public-private-partnership/national-public-private-partnerships-ppps/good-practice-guide-on-cooperatve-models-for-effective-ppps.

Evers M, Jonoski A, Almoradie A, et al. (2016) Collaborative decision making in sustainable flood risk management: A socio-technical approach and tools for participatory governance. *Environmental Science and Policy*.

Falagas ME, Pitsouni EI, Malietzis GA, et al. (2008) Comparison of PubMed,

Scopus, Web of Science, and Google Scholar: strengths and weaknesses. *FASEB Journal*.

FEMA (2011) *A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action. Fdoc 104-008-1*. Available from: https://www.fema.gov/media-library-data/20130726-1813-25045-0649/whole_community_dec2011__2_.pdf.

Fitzpatrick T and Molloy J (2014) The role of NGOs in building sustainable community resilience. *International Journal of Disaster Resilience in the Built Environment* 5(3): 292–304.

Fontainha TC, Leiras A, Bandeira RA de M, et al. (2017) Public-Private-People Relationship Stakeholder Model for disaster and humanitarian operations. *International Journal of Disaster Risk Reduction* 22: 371–386.

Forino G, von Meding J and Brewer GJ (2015) A conceptual governance framework for climate change adaptation and disaster risk reduction integration. *International Journal of Disaster Risk Science*, Beijing Normal University Press 6(4): 372–384.

Frantzeskaki N and Kabisch N (2015) Designing a knowledge co-production operating space for urban environmental governance—Lessons from Rotterdam, Netherlands and Berlin, Germany. *Environmental Science and Policy*, Elsevier Ltd 62: 90–98. Available from: http://dx.doi.org/10.1016/j.envsci.2016.01.010.

Gagnon E, O'Sullivan T, Lane DE, et al. (2016) Exploring partnership functioning within a community-based participatory intervention to improve disaster resilience. *Journal of Higher Education Outreach and Engagement* 20(2).

Gimenez R (2017) *Building City Resilience through Collaboration*. Available from: https://dadun.unav.edu/handle/10171/43813.

Gimenez R, Labaka L and Hernantes J (2017) A maturity model for the involvement of stakeholders in the city resilience building process. *Technological Forecasting and Social Change* 121: 7–16.

Gimenez R, Hernantes J, Labaka L, et al. (2017) Improving the resilience of disaster management organizations through virtual communities of practice: A Delphi study. *Journal of Contingencies and Crisis Management* 25(3): 160–170.

Global Facility for Disaster Reduction and Recovery (2018) Resilient Cities. Available from: https://www.gfdrr.org/en/resilient-cities (accessed 24 May 2018).

Godschalk DR (2003) Urban Hazard Mitigation: Creating Resilient Cities.

Natural Hazards Review 4(3): 136–143. Available from: http://ascelibrary.org/doi/10.1061/%28ASCE%291527-6988%282003%294%3A3%28136%29.

Goldstein BE, Wessells AT, Lejano R, et al. (2015) Narrating Resilience : Transforming Urban Systems Through Collaborative Storytelling. 52(May): 1285–1303.

Gonzalez JJ, Bång M, Eden C, et al. (2017) *Stalking resilience: Cities as vertebrae in society's resilience backbone*. *IFIP Advances in Information and Communication Technology*.

Grace R, Kropczynski J, Pezanowski S, et al. (2017) Social Triangulation: A new method to identify local citizens using social media and their local information curation behaviors. In: *Proceedings of the 14th International Conference on Information Systems for Crisis Response and Management*.

Guz AN and Rushchitsky JJ (2009) Scopus: A system for the evaluation of scientific journals. *International Applied Mechanics* 45(4): 351–362.

Habermas J (1984) The theory of communicative action. *The theory of communicative action*.

Haigh R and Amaratunga D (2010) An integrative review of the built environment discipline's role in the development of society's resilience to disasters. *International Journal of Disaster Resilience in the Built Environment*.

Hatvani-Kovacs G, Belusko M, Skinner N, et al. (2016) Heat stress risk and resilience in the urban environment. *Sustainable Cities and Society* 26: 278–288.

Hernantes J, Maraña P, Gimenez R, et al. (2018) Towards resilient cities: A maturity model for operationalizing resilience. *Cities*. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0264275117315020.

Husted BW and De Jesus Salazar J (2006) Taking friedman seriously: Maximizing profits and social performance. *Journal of Management Studies* 43(1): 75–92.

International Federation of Red Cross and Red Crescent Societies (2015) *World Disasters Report Focus on local actors, the key to humanitarian effectiveness*. Available from: http://ifrc-media.org/interactive/wp-content/uploads/2015/09/1293600-World-Disasters-Report-2015_en.pdf.

Jabareen Y (2013) Planning the resilient city: Concepts and strategies for coping with climate change and environmental risk. *Cities* 31: 220–229.

Janssen C, Sen S and Bhattacharya CB (2015) Corporate crises in the age of

corporate social responsibility. *Business Horizons*, 'Kelley School of Business, Indiana University' 58(2): 183–192. Available from: http://dx.doi.org/10.1016/j.bushor.2014.11.002.

Jick TD (1979) Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Administrative Science Quarterly* 24(4): 602. Available from: http://www.jstor.org/stable/2392366?origin=crossref.

Jung K (2017) Sources of organizational resilience for sustainable communities: An institutional collective action perspective. *Sustainability (Switzerland)* 9(7): 1141.

Kapucu N (2012) Disaster Resilience and Adaptive Capacity in Central Florida, US, and in Eastern Marmara Region, Turkey. *Journal of Comparative Policy Analysis: Research and Practice* 14(3): 202–216. Available from: http://www.tandfonline.com/doi/abs/10.1080/13876988.2012.687620%5Cn http://www.tandfonline.com/doi/abs/10.1080/13876988.2012.687620#preview.

Katina PF, Ariel Pinto C, Bradley JM, et al. (2014) Interdependency-induced risk with applications to healthcare. *International Journal of Critical Infrastructure Protection* 7(1): 12–26.

Kawachi I, Kennedy BP, Lochner K, et al. (1997) Social capital, income inequality, and mortality. *American Journal of Public Health* 87(9): 1491.

Koch H, Franco ZE, O'Sullivan T, et al. (2017) Community views of the federal emergency management agency's 'whole community' strategy in a complex US City: Re-envisioning societal resilience. *Technological Forecasting and Social Change* 121: 31–38.

Kumaraswamy M, Zou W and Zhang J (2015) Reinforcing relationships for resilience – by embedding end-user 'people' in public–private partnerships. *Civil Engineering and Environmental Systems* 32: 119–129.

Kvale S (2007) *Doing Interviews*. SAGE.

Labaka L (2013) Resilience Framework for Critical Infrastructures. (July).

Labaka L, Hernantes J and Sarriegi JM (2016) A holistic framework for building critical infrastructure resilience. *Technological Forecasting and Social Change* 103: 21–33.

Landeta J (2006) Current validity of the Delphi method in social sciences. *Technological Forecasting and Social Change* 73(5): 467–482.

Lauge A (2014) Crisis Management Toolbox : the Relevant Role of Critical Infrastructures and their Dependencies. (November).

Linstone, Harold A. Turoff M (1975) Delphi Method: Techniques and Applications.

Loo R (2002) The Delphi method: A powerful tool for strategic management. *Policing* 25(4): 762–769.

Lorenza J, Battiston S and Schweitzer F (2009) Systemic risk in a unifying framework for cascading processes on networks. *European Physical Journal B* 71(4): 441–460.

Madni AM and Jackson S (2009) Towards a conceptual framework for resilience engineering. *IEEE Systems Journal* 3(2): 181–191.

Majamaa W, Junnila S, Doloi H, et al. (2008) End-user oriented public-private partnerships in real estate industry. *International Journal of Strategic Property Management* 12(1): 1–17.

Malalgoda C, Amaratunga D and Haigh R (2014) Challenges in Creating a Disaster Resilient Built Environment. *Procedia Economics and Finance* 18(736–744).

Marana P, Labaka L and Sarriegi JM (2017) Barriers that hamper the efficiency of public-private partnerships (PPPs) in critical infrastructure protection. In: *Risk, Reliability and Safety: Innovating Theory and Practice - Proceedings of the 26th European Safety and Reliability Conference, ESREL 2016*, pp. 532–539.

Marana P, Labaka L and Sarriegi JM (2018) A framework for public-private-people partnerships in the city resilience-building process. *Safety Science* 110: 39–50.

Martino JP (1972) *An introduction to technological forecasting*. Gordon and Breach.

Mason M (2010) Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung* 11(3).

McKnight B and Linnenluecke MK (2016) How Firm Responses to Natural Disasters Strengthen Community Resilience: A Stakeholder-Based Perspective. *Organization and Environment* 29(3): 290–307.

Mohr J and Spekman R (1994) Characteristics of Partnership Success - Partnership Attributes, Communication Behavior, and Conflict-Resolution Techniques. *Strategic Management Journal* 15(2): 135–152.

Moteff JD (2012) Critical Infrastructure Resilience : The Evolution of Policy and Programs and Issues for Congress. *US Congressional Research Service*: 1–20.

O'Brien G and Read P (2005) Future UK emergency management: New wine, old skin? *Disaster Prevention and Management: An International Journal*.

O'Brien K (2012) Global environmental change II: From adaptation to deliberate transformation. *Progress in Human Geography* 36(5): 667–676.

O'Rourke TD (2007) Critical infrastructure, interdependencies, and resilience. *Bridge-Washington-National Academy of Engineering-* 37(1): 22. Available from: http://pdf.aminer.org/000/243/970/robust_and_resilient_critical_infrastructure_systems.pdf.

O'Sullivan TL, Corneil W, Kuziemsky CE, et al. (2015) Use of the Structured Interview Matrix to Enhance Community Resilience Through Collaboration and Inclusive Engagement. *Systems Research and Behavioral Science* 32(6): 616–628.

Okoli C and Pawlowski SD (2004) The Delphi method as a research tool: An example, design considerations and applications. *Information and Management* 42(1): 15–29.

Oxley MC (2013) A 'People-centred Principles-based' post-Hyogo framework to strengthen the resilience of nations and communities. *International Journal of Disaster Risk Reduction* 4: 1–9.

Patel RB and Gleason KM (2018) The association between social cohesion and community resilience in two urban slums of Port au Prince, Haiti. *International Journal of Disaster Risk Reduction*, Elsevier Ltd 27: 161–167. Available from: https://doi.org/10.1016/j.ijdrr.2017.10.003.

Pearson CM and Sommer SA (2011) Infusing creativity into crisis management. An essential approach today. *Organizational Dynamics* 40(1): 27–33.

Pelling M (2004) The Vulnerability of Cities : Natural Disasters and Social Resilience. *Prevention*, New York: Taylor & Francis.

Pelling M (2011) *Adaptation to climate change: from resilience to transformation*. London: Routledge.

Pfefferbaum RL, Pfefferbaum B, Van Horn RL, et al. (2013) The Communities Advancing Resilience Toolkit (CART): An Intervention to Build Community Resilience to Disasters. *Journal of Public Health Management and Practice* 19(3): 250–258.

Piñeiro J and Romero N (2011) Responsabilidad social empresarial y resiliencia. *Responsabilidad social empresarial y resiliencia* 20: 1–34.

Puerari E, Concilio G and Longo A (2014) Knowledge co-creation for urban services innovation. In: *Ifkad 2014: 9th International Forum on Knowledge Asset Dynamics*, pp. 1628–1647.

Pyrko I, Howick S and Eden C (2017) Risk systemicity and city resilience. In:

EURAM 2017, Glasgow. Available from: https://strathprints.strath.ac.uk/61171/1/Pyrko_etal_EURAM_2017_Risk_systemicity_and_city_resilience.pdf.

Quick KS and Feldman MS (2014) Boundaries as junctures: Collaborative boundary work for building efficient resilience. *Journal of Public Administration Research and Theory* 24(3): 673–695.

Roche S, Propeck-Zimmermann E and Mericskay B (2013) GeoWeb and crisis management: Issues and perspectives of volunteered geographic information. *GeoJournal* 78(1): 21–40.

Rockefeller Foundation (2017) 100 Resilient Cities. Available from: http://www.100resilientcities.org/strategies/.

Rogers P, Burnside-Lawry J, Dragisic J, et al. (2016) Collaboration and communication: Building a research agenda and way of working towards community disaster resilience. *Journal of Small Business and Enterprise Development* 25(1): 75–90.

Rosenau PV (1999) Introduction: The Strengths and Weaknesses of Public-Private Policy Partnerships. *American Behavioral Scientist*.

Sampson RJ (2017) Urban sustainability in an age of enduring inequalities: Advancing theory and ecometrics for the 21st-century city. *Proceedings of the National Academy of Sciences*.

Satterthwaite D (2011) Editorial: Why is community action needed for disaster risk reduction and climate change adaptation? *Environment and Urbanization* 23(2): 339–349. Available from: http://journals.sagepub.com/doi/10.1177/0956247811420009.

Schauppenlehner-Kloyber E and Penker M (2016) Between participation and collective action-from occasional liaisons towards long-term co-management for urban resilience. *Sustainability (Switzerland)* 8(7).

Scolobig A and Lilliestam J (2016) Comparing Approaches for the Integration of Stakeholder Perspectives in Environmental Decision Making. *Resources* 5(4): 37. Available from: http://www.mdpi.com/2079-9276/5/4/37.

Scolobig A, Prior T, Schröter D, et al. (2015) Towards people-centred approaches for effective disaster risk management: Balancing rhetoric with reality. *International Journal of Disaster Risk Reduction*, Elsevier 12: 202–212. Available from: http://dx.doi.org/10.1016/j.ijdrr.2015.01.006.

Setola R (2010) How to measure the degree of interdependencies among critical infrastructures. *Int. J. System of Systems Engineering* 2(1): 38–59.

Setola R, De Porcellinis S and Sforna M (2009) Critical infrastructure dependency assessment using the input-output inoperability model. *International Journal of Critical Infrastructure Protection* 2(4): 170–178.

Shoaf KI, Kelley MM, O'Keefe K, et al. (2014) Enhancing emergency preparedness and response systems: Correlates of collaboration between local health departments and school districts. *Public Health Reports* 129: 107–113.

Skulmoski GJ and Hartman FT (2007) The Delphi Method for Graduate Research. *Journal of Information Technology Education* 6: 1–21.

SMR consortium (2015) SMR Project. Available from: http://smr-project.eu/home/ (accessed 27 July 2017).

Stewart GT, Kolluru R and Smith M (2009) Leveraging public-private partnerships to improve community resilience in times of disaster. *International Journal of Physical Distribution & Logistics Management* 39(5): 343–364.

Suter M (2011) *Focal Report 7 : SKI Resilience and Risk Management in Critical Infrastructure Protection Policy : Exploring the Relationship and Comparing its Use*. Available from: https://www.files.ethz.ch/isn/164305/Focal-Report-7-SKI.pdf.

Tickle M, Adebanjo D and Michaelides Z (2011) Developmental approaches to B2B virtual communities. *Technovation* 31(7): 296–308.

Toubin M, Laganier R, Diab Y, et al. (2015) Improving the Conditions for Urban Resilience through Collaborative Learning of Parisian Urban Services. *Journal of Urban Planning and Development* 141(4): 5014021. Available from: http://www.scopus.com/inward/record.url?eid=2-s2.0-84947998343&partnerID=tZOtx3y1.

Twigg J (2001) *Corporate social responsibility and disaster reduction: a global overview*. *Report to the Department for International Development.*, London: Benfield Greig Hazard Research Centre. Available from: http://www.dfid.gov.uk/r4d/PDF/Outputs/Mis_SPC/R7893CSROverview.pdf.

UNISDR (2017) Terminology on Disaster Risk Reduction. Available from: https://www.unisdr.org/we/inform/terminology (accessed 2 July 2018).

United Nations (2015) Sendai Framework for Disaster Risk Reduction 2015-2030.: 37. Available from: http://www.unisdr.org/we/inform/publications/43291.

United Nations Department of Economic and Social Affairs (2018) 2018 Revision

of World Urbanization Prospects. Available from: https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html (accessed 15 October 2018).

United Nations Economic and Social Council (2008) *Guidebook on Promoting Good Governance in Public-Private Partnerships*.

United States. President's Commission on Critical Infrastructure Protection (1997) *Critical Foundations: Protecting America's Infrastructures. The Report of the President's Commission on Critical Infrastructure Protection*. Washington, DC.

Vedeld T, Coly A, Ndour NM, et al. (2016) Climate adaptation at what scale? Multi-level governance, resilience, and coproduction in Saint Louis, Senegal. *Natural Hazards* 82(1): 173–199.

Wellington City Council (2018a) Community Centres. Available from: https://wellington.govt.nz/services/community-and-culture/community-centres (accessed 24 October 2018).

Wellington City Council (2018b) Community Patrols. Available from: https://wellington.govt.nz/services/community-and-culture/community-safety/safety-in-wellington/community-patrols (accessed 24 October 2018).

Wellington City Council (2018c) Implementing Wellington's Resilience Strategy. Available from: https://wellington.govt.nz/~/media/about-wellington/resilient-wellington/files/strategy/10-j001767-100-resilience-strategy-web-implementation.pdf.

Wellington Region Emergency Management Office (WREMO) (2018) Workshops. Available from: https://getprepared.nz/organisations/training-and-workshops/ (accessed 31 May 2018).

Whittaker J, Mclennan B and Handmer J (2015) A review of informal volunteerism in emergencies and disasters: Definition, opportunities and challenges. *International Journal of Disaster Risk Reduction*.

World Bank (2014) Public Private Partnerships: Reference Guide.: 1–232.

Yin RK (2009) Case Study Research: Design and Methods. *Essential guide to qualitative methods in organizational research*.

Yusta JM, Correa GJ and Lacal-Arántegui R (2011) Methodologies and applications for critical infrastructure protection: State-of-the-art. *Energy Policy* 39(10): 6100–6119.

Zainal Z (2007) Case study as a research method. *Jurnal Kemanusiaan* 9: 1–6.

Zhang J (2012) Public-private-people-partnership (4P) for disaster preparedness, mitigation and post-disaster reconstruction. The University of Hong Kong. Available from: http://hub.hku.hk/handle/10722/180983.

Zhang J, Zou W and Kumaraswamy M (2015) Developing public private people partnership (4P) for post disaster infrastructure procurement. *International Journal of Disaster Resilience in the Built Environment* 6(4): 468–484.

Appendix A: Results of the Literature Review

This appendix presents the quantitative and qualitative results of the literature review conducted within the scope of this research. The literature review presents all the papers analysed in detail in order to answer RQ1.2, RQ1.3. Moreover, the following table details which paper is mentioning each of the 16 characteristics of successful 4Ps in the city resilience building process.

			1st layer: General Partnerships								2nd layer: Topic: City Resilience					3rd layer: Stakeholders: 4P		
		Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Promoting Disaster Resilience Through Use of Interdisciplinary Teams: A Program Evaluation of the Integrated Care Team Approach (Adams, L.M., 2016)	2 and 3	x	x			x				x		x		x	x		
2	Lessons in Collaboration, Four Years Post-Katrina (Bava, S., Coffey, E. P., Weingarten, K., & Becker, C., 2010)	2	x	x	x	x			x	x					x			
3	Adaptive climate change governance for urban resilience (Boyd, E., & Juhola, S., 2015)	2	x	x								x						
4	Clergy views on their role in city resilience: lessons from the Canterbury earthquakes (Brogt, E., Grimshaw, M., & Baird, N., 2015)	2					x						x					
5	Getting actionable about community resilience: The Los Angeles county community disaster resilience project (Chandra, A., Williams, M., Plough, A., Stayton, A., Wells, K. B., Horta, M., & Tang, J., 2013)	2 and 3			x				x				x					x
6	Developing a Tabletop Exercise to Test Community Resilience: Lessons from the Los Angeles County Community Disaster Resilience Project (Chandra, A., Williams, M. V., Lopez, C., Tang, J., Eisenman, D., & Magana, A., 2015)	2	x					x	x		x							

			1st layer: General Partnerships								2nd layer: Topic: City Resilience					3rd layer: Stakeholders: 4P		
		Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
7	Partnerships for community resilience: Perspectives from the Los Angeles County Community Disaster Resilience project (APA Chi, G. C., Williams, M., Chandra, A., Plough, A., & Eisenman, D., 2015)	2				x			x		x			x				
8	Knowledge transfer between communities, practitioners, and researchers: A case study for community resilience in Wellington, New Zealand (Doyle, E. E, 2014)	2 and 3	x	x	x	x	x		x		x	x		x		x	x	
9	The Los Angeles county community disaster resilience project - A Community-Level, public health initiative to build community disaster resilience (Eisenman, D., 2014)	2	x		x	x		x	x		x							
10	The role of NGOs in building sustainable community resilience (Fitzpatrick, T., & Molloy, J., 2014)	2			x	x		x	x		x	x			x			
11	Exploring partnership functioning within a community-based participatory intervention to improve disaster resilience (Gagnon, E., O'Sullivan, T., Lane, D. E., & Paré, N., 2016)	2	x	x	x	x					x			x				
12	Disaster Resilience and Adaptive Capacity in Central Florida, US, and in Eastern Marmara Region, Turkey (Kapucu, N., 2012).	2		x	x		x	x		x	x	x		x				
13	What does built environment research have to do with risk mitigation, resilience and disaster recovery? (Miller, W., 2015).)	2					x	x										

			1st layer: General Partnerships								2nd layer: Topic: City Resilience					3rd layer: Stakeholders: 4P		
		Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
14	A conceptual model of a school-community collaborative network in enhancing coastal community resilience in Banda Aceh, Indonesia (Oktari, R. S., Shiwaku, K., Munadi, K., & Shaw, R., 2015)	2	x	x	x			x	x		x							
15	Use of the Structured Interview Matrix to Enhance Community Resilience Through Collaboration and Inclusive Engagement (O'Sullivan, T. L., Corneil, W., Kuziemsky, C. E., & Toal-Sullivan, D., 2015)	2 and 3	x	x	x			x	x	x						x		
16	The communities advancing resilience toolkit (CART): An intervention to build community resilience to disasters (Pfefferbaum, R. L., Pfefferbaum, B., Van Horn, R. L., Klomp, R. W., Norris, F. H., & Reissman, D. B., 2013)	2 and 3	x	x	x			x	x	x		x			x	x		
17	Collaboration and communication: Building a research agenda and way of working towards community disaster resilience (Rogers, P., Burnside-Lawry, J., Dragisic, J., & Mills, C., 2016)	2	x	x	x	x	x	x		x			x		x			
18	Between participation and collective action-from occasional liaisons towards long-term co-management for urban resilience (Schauppenlehner-Kloyber, E., & Penker, M., 2016)	2			x	x			x	x		x		x	x			

			1st layer: General Partnerships								2nd layer: Topic: City Resilience					3rd layer: Stakeholders: 4P		
		Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
19	Enhancing emergency preparedness and response systems: Correlates of collaboration between local health departments and school districts (Shoaf, K. I., Kelley, M. M., O'Keefe, K., Arrington, K. D., & Prelip, M. L., 2014)	2	x	x	x	x		x			x			x				
20	Leveraging public-private partnerships to improve community resilience in times of disaster (Stewart, G. T., Kolluru, R., & Smith, M., 2009)	2	x	x		x		x				x		x				
21	Improving the conditions for urban resilience through collaborative learning of Parisian urban services (Toubin, M., Laganier, R., Diab, Y., & Serre, D., 2014)	2	x		x	x		x					x		x			
22	Opportunities and challenges for public libraries to enhance community resilience (Veil, S. R., & Bishop, B. W., 2014)	2		x		x	x	x			x				x			
23	Community Resilience after Disaster in Taiwan: A Case Study of Jialan Village with the Strengths Perspective (Veil, S. R., & Bishop, B. W., 2014)	2		x	x		x	x							x			
24	Building Community Resilience to Counter Violent Extremism (Veil, S. R., & Bishop, B. W., 2014)	2 and 3	x			x			x							x		
25	Applying community engagement to disaster planning: Developing the vision and design for the Los Angeles county community disaster resilience initiative (Wells, K. B., Tang, J., Lizaola, E., Jones, F., Brown, A., Stayton, A. & Plough, A., 2013)	2 and 3	x	x		x		x			x						x	
26	Toward a digital resilience (Wright, D. J., 2016)	2 and 3	x			x		x					x	x			x	

			1st layer: General Partnerships								2nd layer: Topic: City Resilience					3rd layer: Stakeholders: 4P		
		Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
27	Building collaborative health promotion partnerships: The Jackson heart study (Addison, C. C., Campbell Jenkins, B. W., Odom, D., Fortenberry, M., Wilson, G., Young, L., & Antoine-LaVigne, D., 2015)	3	x			x			x								x	x
28	Barriers to collaborative forest management and implications for building the resilience of forest-dependent communities in the Ashanti region of Ghana (Akamani, K., Wilson, P. I., & Hall, T. E., 2015)	3				1			1							1	1	
29	Implementing REDD+ at the local level: Assessing the key enablers for credible mitigation and sustainable livelihood outcomes (Akamani, K., Wilson, P. I., & Hall, T. E., 2015)	3		x												x		
30	Public-private partnerships in emergency and disaster management: Examples from the Queensland floods 2010-11 (Bajracharya, B., & Hastings, P., 2015)	2 and 3	x	x	x	x		x										x
31	Human resources for health and universal health coverage: Fostering equity and effective coverage (Campbell, J., Buchan, J., Cometto, G., David, B., Dussault, G., Fogstad, H. & Quain, E. E., 2013)	3	x	x					x									x
32	Making connections in the brownfield marketplace (Coffin, S. L., & Barbero, C., 2009)	3	x	x				x	x	x						x		x

			1st layer: General Partnerships								2nd layer: Topic: City Resilience					3rd layer: Stakeholders: 4P		
		Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
33	Building local community commitment to wetlands restoration: A case study of the cache river wetlands in Southern Illinois, USA (Davenport, M. A., Bridges, C. A., Mangun, J. C., Carver, A. D., Williard, K. W., & Jones, E. O., 2010)	3	x	x		x		x	x							x		
34	Why not partner with local government?: Nonprofit managerial perceptions of collaborative disadvantage (Gazley, B., 2010)	3	x		x	x	x	x										x
35	Criteria for the management partnership model in croatian seaports (Perić Hadžić, A., Jugović, A., & Perić, M., 2015)	3		x	x	x			x							x		x
36	Emergent communities of practice in temporary inter-organisational partnerships (Juriado, R., & Gustafsson, N., 2007)	3	x	x		x		x										
37	Toward Landscape-Scale Stewardship and Development: A Theoretical Framework of United States National Heritage Areas (Laven, D. N., Jewiss, J. L., & Mitchell, N. J., 2013)	3		x		x										x	x	
38	End-user oriented public-private partnerships in real estate industry (Majamaa, W., Junnila, S., Doloi, H., & Niemistö, E., 2008)	3							x								x	

		Layer	1st layer: General Partnerships								2nd layer: Topic: City Resilience							3rd layer: Stakeholders: 4P		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
39	Public-private partnerships: The trojan horse of neoliberal development? (Miraftab, F., 2004)	3			x				x							x		x
40	Residents' beliefs about responsibility for the stewardship of park trees and street trees in New York City (Moskell, C., & Allred, S. B., 2013)	3	x	x	x	x			x							x	x	
41	Dimensions of the efficiency of public - Private partnership (Skietrys, E., Raipa, A., & Bartkus, E. V., 2008)	3				x	x	x	x							x	x	x
42	Developing public private people partnership (4P) for post disaster infrastructure procurement (Zhang, J., Zou, W. & Kumaraswamy, M., 2015)	2 and 3	x	x		x		x	x	x						x		x

Appendix B: Videos used for Semi-strucutured Interviews

This appendix presents the videos and questions used in the semi-structured interviews conducted in the development phase of this research.

https://www.youtube.com/watch?v=jJLBIlIyoXw&t=20s

https://www.youtube.com/watch?v=eP3UgDNpesQ

C Appendix C: First Questionnaire of the Delphi

This appendix presents the questionnaire that was sent in the first round of the Delphi study.

Framework for Public Private People Partnerships (4Ps) in City Resilience Building

Objective of the Delphi Questionnaire

Public entities have always been in charge of ensuring the welfare of citizens. Moreover, during the last decades, private companies have also developed a sense of responsibility towards improving the well-being of society. However, nowadays, the entire society is increasingly aware of the fact that the entire responsibility of preventing, responding to and recovering from crises cannot totally fall on public entities and private companies. In fact, the role of the citizens is increasingly powerful, and they are required to prepare for, respond to and recover from crises in the most effective manner. To that end, there is an emerging need to involve not only public entities and private companies but also citizens in order to share different perspectives about the same reality. The aim of this first round of the two-round delphi questionnaire is to validate the sixteen successful characteristics of 4Ps in city resilience building identified within the scope of this PhD thesis.

Before you start completing the questionnaire it is extremely important to watch the following video in which the developed framework is explained.

Framework for Public Private People Partnerships in City Resilience Building

Information about the responder

Could you please give us your email to be able to inform you about the results obtained through this study? *

Tu respuesta

Which group do you represent? *

Elige

Which is your role in the organisation you represent?

Tu respuesta

How many years of experience do you have in this topic?

Elige

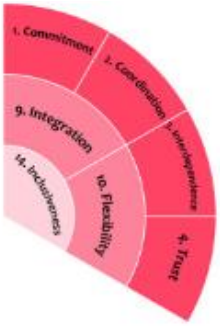
ATRÁS SIGUIENTE

Nunca envíes contraseñas a través de Formularios de Google.

1st dimension: Stakeholder Relationship

The 7 characteristics included in this dimension are related to the attributes and attitudes that stakeholders must possess in order to work together successfully.

Stakeholder Relationship



Commitment

Commitment refers to the willingness of partners to exert effort on behalf of the relationship, leaving aside their self-interests. Committed partners have the capacity to focus on long term goals while overcoming short term problems and discussions.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term commitment to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Coordination

Coordination refers to the need of partners to define the boundaries of each partner's responsibilities and to specify the tasks each partner is expected to perform; partners also need to specify the mechanisms and protocols that will allow them to work together in an effective manner.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term coordination to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Interdependence

Interdependence refers to the capacity of partners to assume that in order to achieve mutually beneficial goals they will depend on each other.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term interdependence to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Trust

Trust refers to the belief that a partner is reliable and that therefore it will fulfil its obligation in an exchange. This belief is what makes it possible to work for shared objectives.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term trust to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Integration

Integration refers to the extent the partnership is interconnected to systems, institutions or other partnerships that have similar or complementary purposes, working together to achieve greater results.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term integration to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Flexibility

Flexibility refers to the adaptability of the partnership in the face of changing circumstances, new challenges or sudden crises.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term flexibility to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Inclusiveness

Inclusiveness refers to the need to involve representatives from different groups in order to create a sense of shared ownership or joint vision.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term inclusiveness to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

ATRÁS SIGUIENTE

2nd dimension: Information Flow

The 6 characteristics included in this dimension are related to the communication channels and protocols that stakeholders must use to invest resources in the most effective manner.

Information Flow

Information Quality

Information quality refers to timeliness, accuracy and relevance of exchanged information. This enables fluent communication among partners, improving the ability to make better decisions.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term information quality to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Information Sharing

Information sharing refers to the extent to which information is communicated to other partners, allowing tasks to be completed more effectively.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term information sharing to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Participation

Participation refers to the extent to which partners engage jointly in planning, goal setting and responsibility distribution, as well as in the execution of different tasks.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term participation to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Information Accessibility

Information accessibility refers to how quickly information is available to the relevant stakeholders and the ease with which the information can be used by stakeholders.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term information accessibility to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Information Transparency

Information transparency refers to the extent to which critical and sensitive information is shared with other partners, allowing tasks to be completed more effectively.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term information transparency to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

User Friendliness

User friendliness refers to the ease with which all partners understand and can use information. It means that there is a need to adapt how information is expressed so that the highest number of stakeholders will find it understandable, giving all stakeholders equal access to the content.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term user friendliness to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

ATRÁS SIGUIENTE

3rd dimension: Conflict Resolution

The 3 characteristics in this dimension are related to the problem solving techniques used to solve existing problems related to the correct functioning of the partnership.

Conflict Resolution

Constructive Resolution

Constructive conflict resolution refers to the way conflicts between different partners are solved in an effective manner, thereby promoting win-win solutions in which every partner feels their interests are being represented.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term costructive conflict resolution to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Reflectiveness

Reflectiveness refers to the ability of the partnership to use past experience to inform future decisions, modifying procedures and behaviours accordingly.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term reflectiveness to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

Perspective Alignment

Perspective alignment refers to the capacity to analyse all the existing self-interests from different partners and discuss their commonalities and how to align the different existing perspectives and meet a mutually beneficial goal.

To what extent do you agree with the definition provided? *

Elige

Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition?

Tu respuesta

Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? *

Elige

Only in case you do not agree on using the term perspective alignment to refer to this idea, could you please suggest new terms to refer the concept considering its definition?

Tu respuesta

ATRÁS SIGUIENTE

Additional information

Do you think there is any successful characteristic of Public Private People Partnership in city resilience building missing in this framework? *

Elige

Only in case you answered yes in the question before, could you please tell us which is it and how would you define it?

Tu respuesta

Could you please specify any sources where we can obtain more information on how Public Private People Partnerships contribute to city resilience building? (internet sources, contact persons, available documents...)

Tu respuesta

ATRÁS ENVIAR

Appendix D: Second Questionnaire of the Delphi

This appendix presents the questionnaire that was sent in the second round of the Delphi study.

Objectives of the second round of this Delphi process

This second questionnaire has two main objectives.
1. The first objective is to validate the final version of the characteristics list and definition after considering the comments received from experts. Therefore, the first section will focus validating the characteristics that have suffer major changes from the preliminary version.
2. The second main objective of this questionnaire is to obtain the most effective implementation order of the previously validated characteristics considering the different stages in the development process of Public Private People Partnerships (4Ps) in City Resilience Building. Following the priority implementation order of the characteristics obtained after gathering information from this second questionnaire, it will be ensured that 4Ps in City Resilience Building are being developed in the most effective manner.

Stages in the development process of 4Ps in City Resilience Building

SIGUIENTE

1st objective: Validate changes made to the framework after considering experts opinion

In this section we will ask you to validate the changes made to the framework based on the comments received in the first questionnaire. This way we will obtain a final version of the framework.

Commitment

Commitment refers to the willingness of partners to exert effort on behalf of the relationship, understanding existing self-interests and renouncing to a part of their own interests in order to obtain a more general shared goal. Committed partners have the capacity to focus on long term goals while overcoming short-term problems and discussions.

To what extent do you agree with the updated version of the characteristic? *

Elige

Coordination

Coordination refers to the need of partners to define the boundaries of each partner's responsibilities, to be aware of other partners' work or interests and to specify the tasks each partner is expected to perform within the relationship. Partners also need to specify the mechanisms and protocols that will allow them to create a shared understanding of each partner's individual responsibility and work together in an effective manner.

To what extent do you agree with the updated version of the characteristic? *

Elige

Embracing Interdependence

Embracing interdependence understanding refers to the capacity of partners to assume that in order to achieve mutually beneficial goals they will depend on each other. Partners need to have the capacity to understand existing interdependencies among them and be aware that they rely on one each other to fulfill the goals that cannot obtain on their own.

To what extent do you agree with the updated version of the characteristic? *

Elige

Trust

Trust refers to the belief that a partner is capable, credible and reliable, and that therefore it will fulfil its obligations. This belief is what makes it possible to work for shared objectives.

To what extent do you agree with the updated version of the characteristic? *

Elige

Participation

Participation refers to the extent to which partners engage jointly in planning, goal setting and responsibility distribution, as well as in the execution of different tasks providing meaningful insights for all the partners involved.

To what extent do you agree with the updated version of the characteristic? *

Elige

Constructive Resolution

Constructive resolution refers to the way conflicts between different partners are solved in an effective manner, thereby promoting solutions in which every partner feels their interests are being represented. Partners must show compromise to achieve success and to resolve issues amicably.

To what extent do you agree with the updated version of the characteristic? *

Elige

Interconnectedness

Interconnectedness refers to the extent the partnership is interconnected to systems, institutions or other partnerships that have similar or complementary purposes to achieve greater results.

To what extent do you agree with the updated version of the characteristic? *

Elige

Information Accessibility

Information accessibility refers to how easy the information is available to the relevant stakeholders when it is needed.

To what extent do you agree with the updated version of the characteristic? *

Elige

Information Transparency

Information transparency refers to the extent to which shareable, appropriate, critical and sensitive information and data is made available to relevant partners, allowing tasks to be completed more effectively.

To what extent do you agree with the updated version of the characteristic? *

Elige

Diversity

Diversity refers to the involvement of representatives from different city stakeholder groups (including minority groups) in the partnership in order to create a sense of shared ownership or joint vision.

To what extent do you agree with the updated version of the characteristic? *

Elige

User Friendliness

User friendliness refers to the ease with which all partners understand and can use information. It means that there is a need to adapt how information is expressed so that the highest number of stakeholders will find it understandable, giving all stakeholders equal access to the content.

To what extent do you agree with the updated version of the characteristic? *

Elige

Would you like to add any additional comments?

Tu respuesta

ATRÁS SIGUIENTE

2nd objective: Obtain the most effective implementation order of the validated characteristics

In this section we will ask you about the implementation order of the characteristics. First each development stage will be described and then in which stage should each of the characteristics start to be implemented will be asked. Moreover, experts will be asked about how many resources are needed to start implementing each characteristic and how many to maintain it over time.

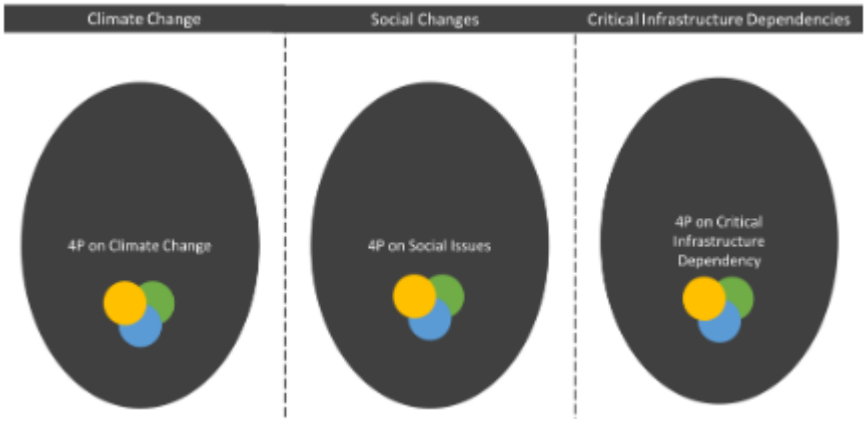
1st Stage

Public Private People Partnerships (4Ps) have not been developed yet, therefore the city vertebra is still not developed.
Emerging challenges (climate change, social problems and critical infrastructure protection) related under the wide scope of city resilience start to increase the concerns of city stakeholders. Therefore, preliminary resilience building policies start to be developed by each stakeholder in small coalitions or individually without explicitly knowing that what they are doing is related to city resilience. However, there is still not a shared view on how this challenges affecting the city should be addressed. Each stakeholder faces the problems without considering the other's initiatives.

1st Stage

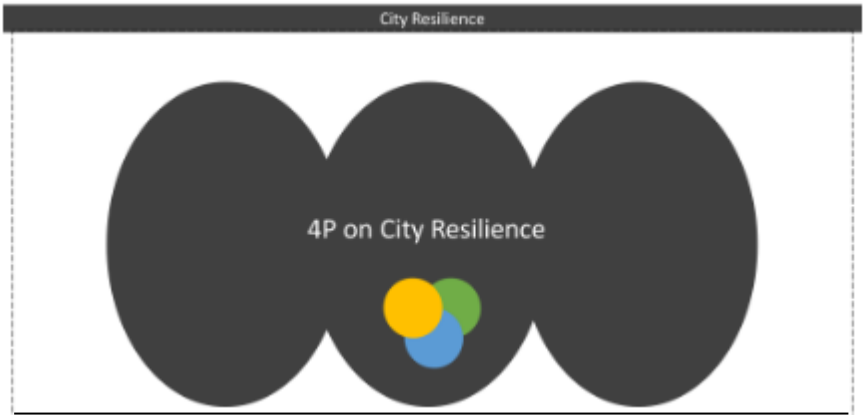
2nd Stage

Stakeholders with the same concerns regarding some of the three major challenges start developing 4Ps. Therefore, at this stage some mini-vertebras per challenge are developed. At this point, apart from emerging specific challenges, the concept of resilience starts to be a more explicit concern for city stakeholders. Relevant stakeholders from different areas working on the different important challenges affecting cities start to cooperate between them sharing efforts and aligning perspectives. However, these partnerships are still focused on developing solutions to those specific challenges. At this point partnerships to address resilience as a whole have not been developed yet.



3rd Stage

Stakeholders realise that those three major challenges are all under the scope of city resilience. Therefore, at this stage, 4Ps in city resilience building start to developed. The "city vertebra" is created through multi-stakeholder collaboration.
At this stage, relevant stakeholders regarding city resilience start to be part on a big partnership. The same stakeholder could be affected by more than one challenge in the future, therefore a holistic view of the whole situation is needed to use the available resources in the most effective manner and avoid duplication of effort. This big partnership is known as city vertebra. Building resilience is now seen as a path to be followed in order to address city challenges already identified and as an opportunity to align all the efforts from all the city stakeholders under the same strategy. At this point every city stakeholder is represented in the city vertebra.



Ideally, in which stage do you think we should start implementing the following characteristics to develop a 4P in the most effective way?

Select the corresponding stage for each characteristic. *

	1st Stage	2nd Stage	3rd Stage
Commitment	○	○	○
Coordination	○	○	○
Interdependence	○	○	○
Trust	○	○	○
Information Quality	○	○	○
Information Sharing	○	○	○
Participation	○	○	○
Constructive Resolution	○	○	○
Integration	○	○	○
Flexibility	○	○	○
Information Accessibility	○	○	○
Information Transparency	○	○	○
Reflectiveness	○	○	○
Inclusiveness	○	○	○
User Friendliness	○	○	○
Perspective Alignment	○	○	○

How much effort should it be invested in order to start implementing each of the following characteristics?

*With effort, we are referring to the time and money needed to be invested in order to be able to implement this characteristic.

How much money should it be invested to start implementing each of the following characteristics? *

	Small Budget	Medium Budget	High Budget
Commitment	○	○	○
Coordination	○	○	○
Interdependence	○	○	○
Trust	○	○	○
Information Quality	○	○	○
Information Sharing	○	○	○
Participation	○	○	○
Constructive Resolution	○	○	○
Integration	○	○	○
Flexibility	○	○	○
Information Accessibility	○	○	○
Information Transparency	○	○	○
Reflectiveness	○	○	○
Inclusiveness	○	○	○
User Friendliness	○	○	○
Perspective Alignment	○	○	○

How much time should it be invested to start implementing each of the following characteristics? *

	Small amount of time	Medium amount of time	High amount of time
Commitment	○	○	○
Coordination	○	○	○
Interdependence	○	○	○
Trust	○	○	○
Information Quality	○	○	○
Information Sharing	○	○	○
Participation	○	○	○
Constructive Resolution	○	○	○
Integration	○	○	○
Flexibility	○	○	○
Information Accessibility	○	○	○
Information Transparency	○	○	○
Reflectiveness	○	○	○
Inclusiveness	○	○	○
User Friendliness	○	○	○
Perspective Alignment	○	○	○

How much effort should it be invested in order to maintain the performance level of each of the following characteristic?

*With effort, we are referring to the time and money needed to be invested in order to be able to implement this characteristic.

How much money should it be invested to maintain each of the following characteristics? *

	Small Budget	Medium Budget	High Budget
Commitment	○	○	○
Coordination	○	○	○
Interdependence	○	○	○
Trust	○	○	○
Information Quality	○	○	○
Information Sharing	○	○	○
Participation	○	○	○
Constructive Resolution	○	○	○
Integration	○	○	○
Flexibility	○	○	○
Information Accessibility	○	○	○
Information Transparency	○	○	○
Reflectiveness	○	○	○
Inclusiveness	○	○	○
User Friendliness	○	○	○
Perspective Alignment	○	○	○

How much time should it be invested to maintain each of the following characteristics? *

	Small Budget	Medium Budget	High Budget
Commitment	○	○	○
Coordination	○	○	○
Interdependence	○	○	○
Trust	○	○	○
Information Quality	○	○	○
Information Sharing	○	○	○
Participation	○	○	○
Constructive Resolution	○	○	○
Integration	○	○	○
Flexibility	○	○	○
Information Accessibility	○	○	○
Information Transparency	○	○	○
Reflectiveness	○	○	○
Inclusiveness	○	○	○
User Friendliness	○	○	○
Perspective Alignment	○	○	○

Appendix E: Delphi result reports sent to experts

This appendix presents the reports including the results of the Delphi Questionnaire sent to experts.

First questionnaire results for expert N1

First, we would like to thank you for investing your time on participating on this Delphi process and for contributing with your knowledge to our research.

The aim of this report is to inform you of the main conclusions obtained from the first questionnaire you have already conducted. We will use graphs to illustrate which has been your personal opinion compared to the opinion of the rest of the experts that have participated in the process.

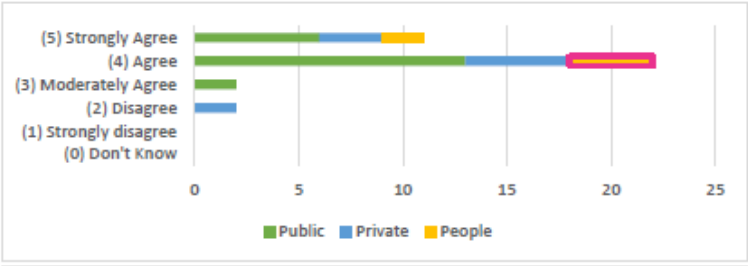
This reports follows the same structure of the questionnaire so that you can easily associate with what you respond.

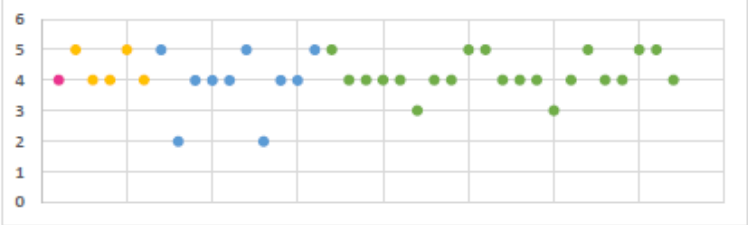
The questionnaire included four different questions to validate each of the characteristics included in the framework. It is important to remember that two of the questions included in the questionnaire were compulsory and had a numerical answer, while the other two were voluntary and focused on gathering additional comments. This report puts its focus on representing the numerical answers received using two graphs per characteristic; the first graph presents the agreement level on the definition provided and the second on the relevancy level of the characteristic when talking about Public Private People Partnership in city resilience building.

The points and lines plotted in the graph have different colors. The ones in yellow refer to the opinion of experts representing the People perspective, the ones in blue refer to the opinion of experts representing the Private perspective, the ones in green refer to the opinion of experts representing the Public perspective and the point in pink illustrates your own opinion. The vertical axis represents the agreement scale, **5 refers to strongly agree, 4 to agree, 3 to moderately agree, 2 to disagree, 1 to strongly disagree and 0 to I don't know.**

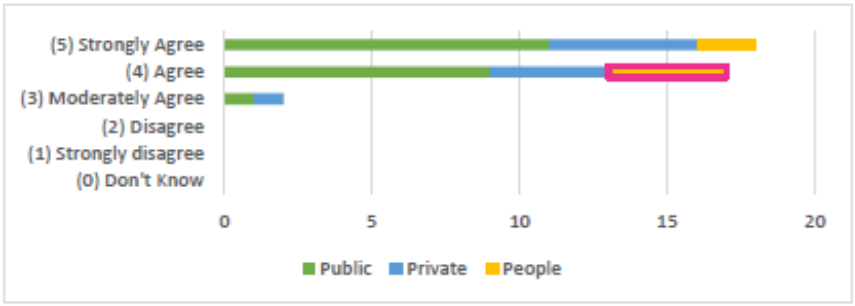
1. Commitment

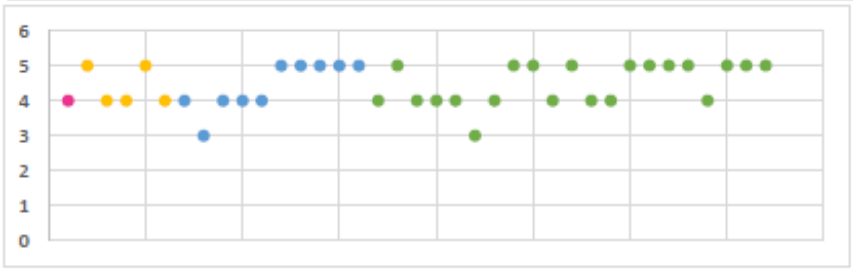
Agreement level regarding the proposed definition:





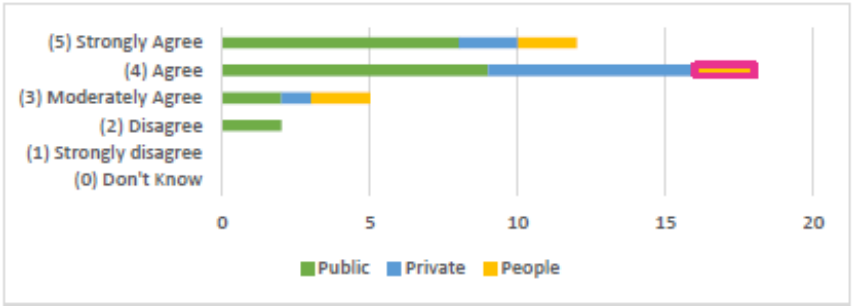
Agreement level regarding the validity of the concept in the proposed framework:

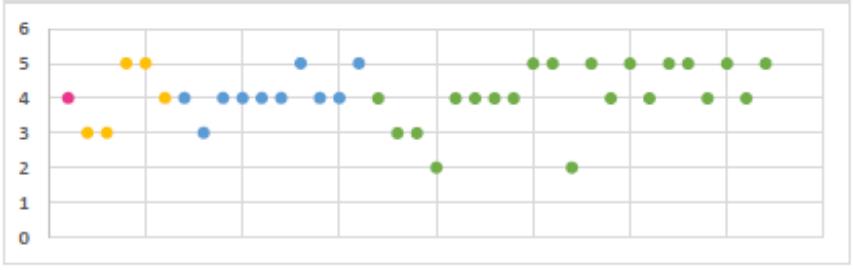




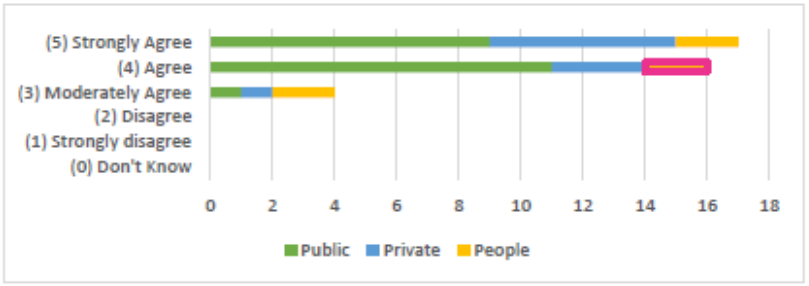
2. Coordination

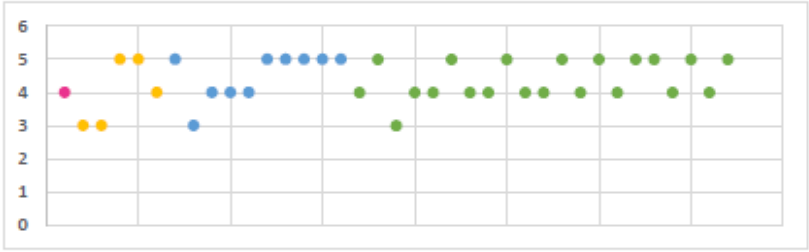
Agreement level regarding the proposed definition:





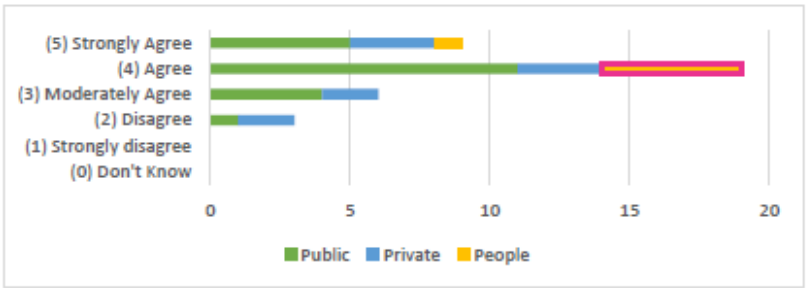
Agreement level regarding the validity of the concept in the proposed framework:

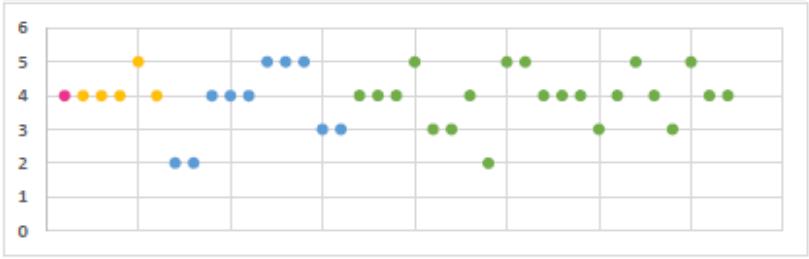




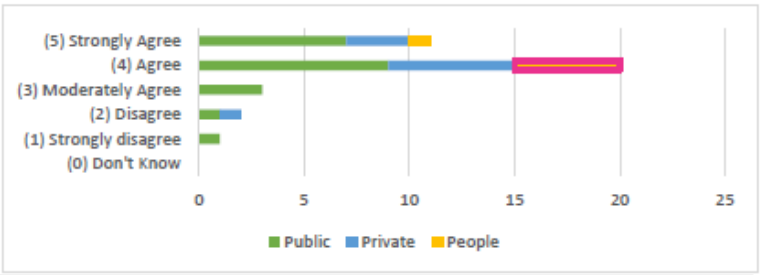
3. Interdependence

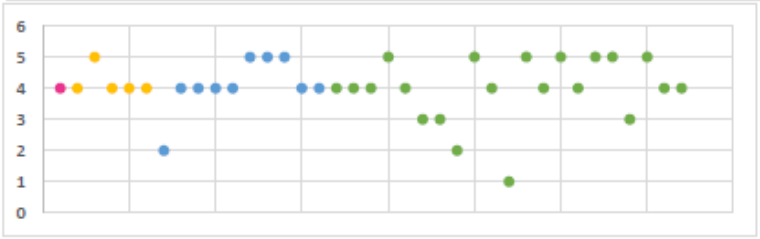
Agreement level regarding the proposed definition:





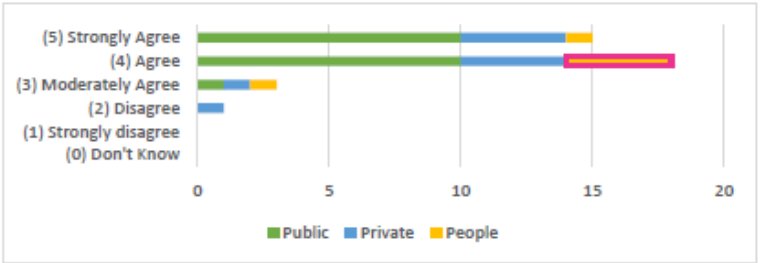
Agreement level regarding the validity of the concept in the proposed framework:

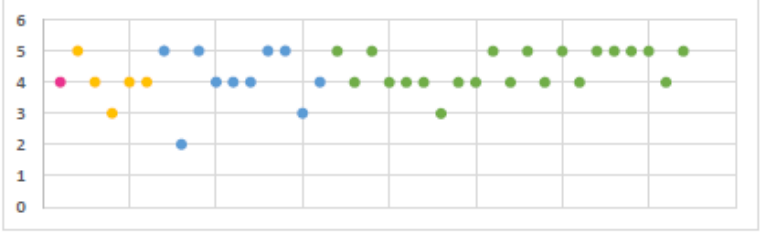




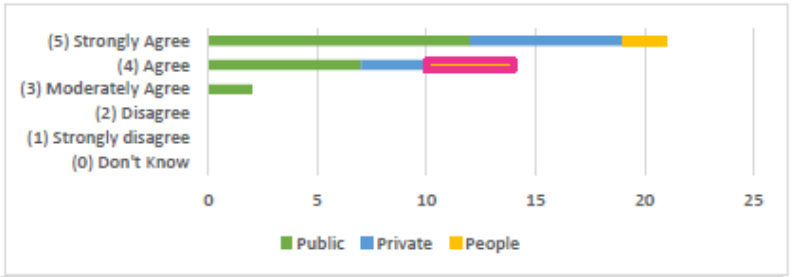
4. Trust

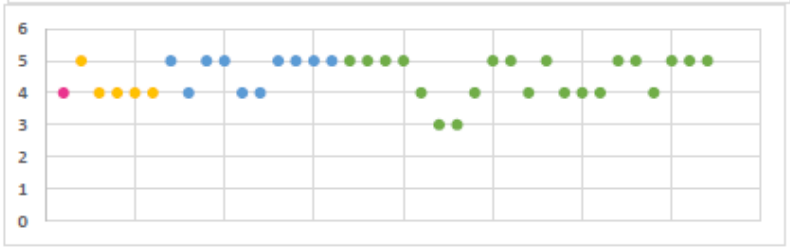
Agreement level regarding the proposed definition:





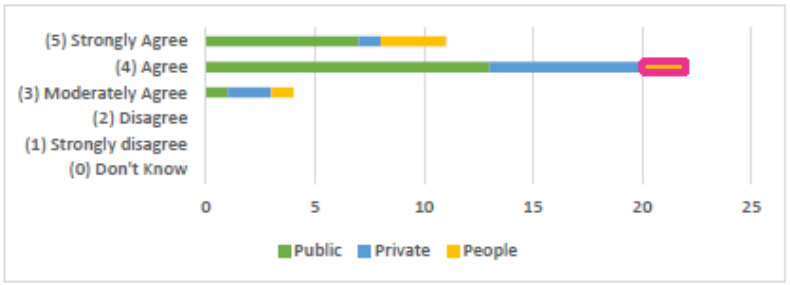
Agreement level regarding the validity of the concept in the proposed framework:

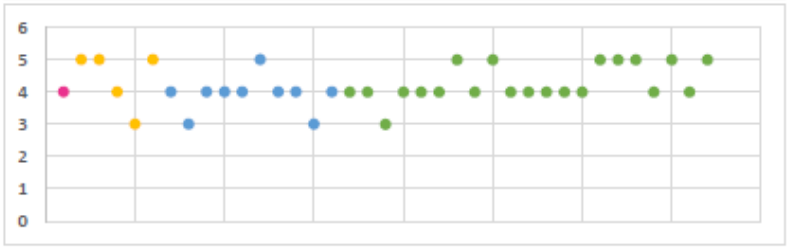




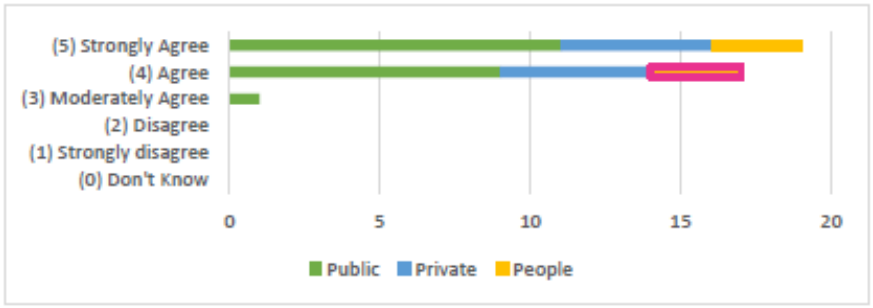
5. Information Quality

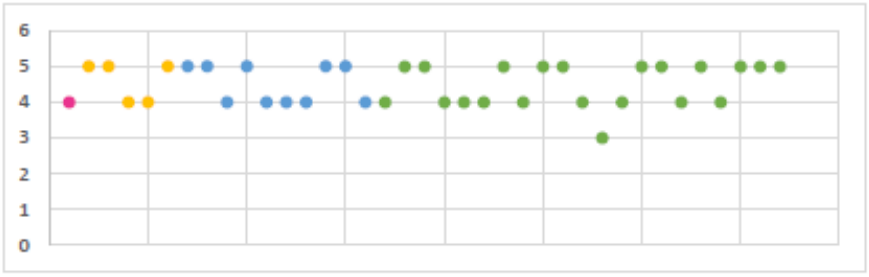
Agreement level regarding the proposed definition:





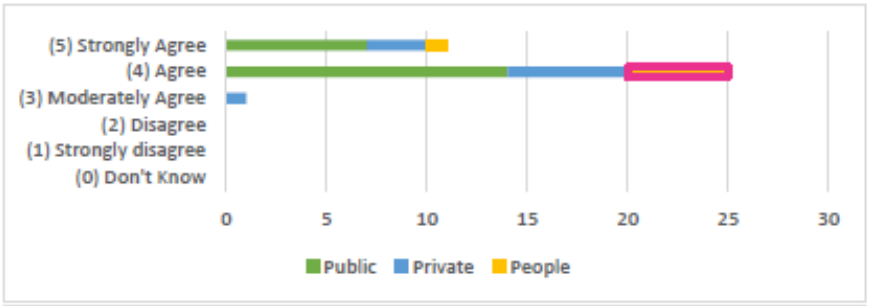
Agreement level regarding the validity of the concept in the proposed framework:

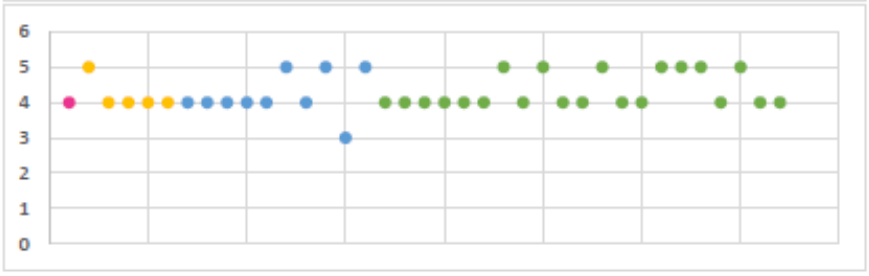




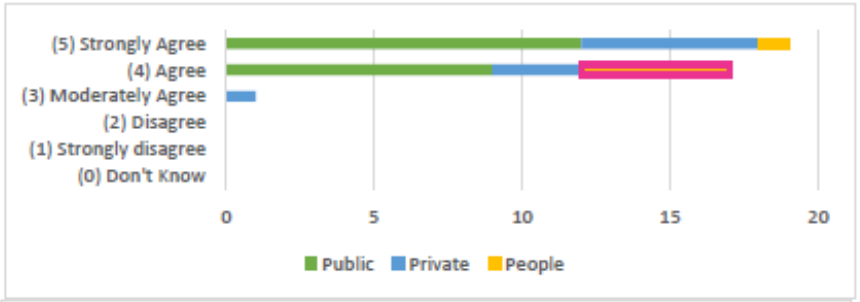
6. Information Sharing

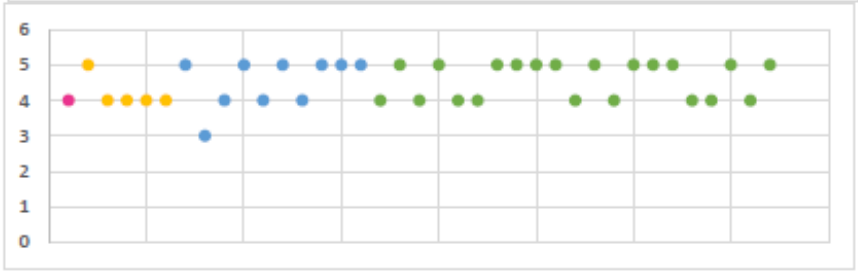
Agreement level regarding the proposed definition:





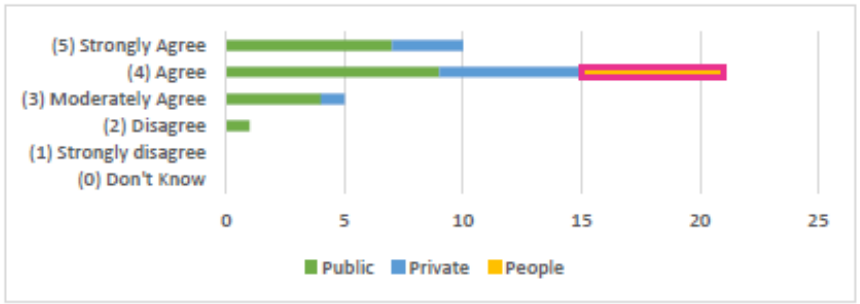
Agreement level regarding the validity of the concept in the proposed framework:

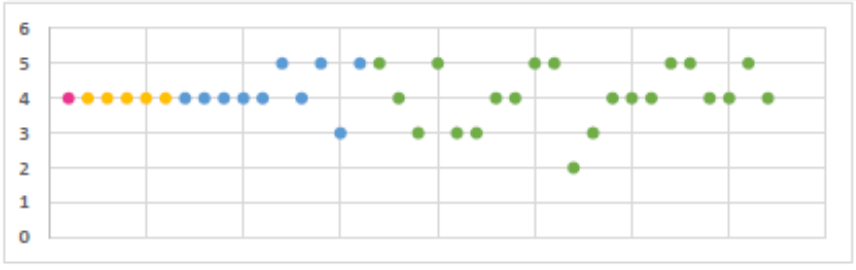




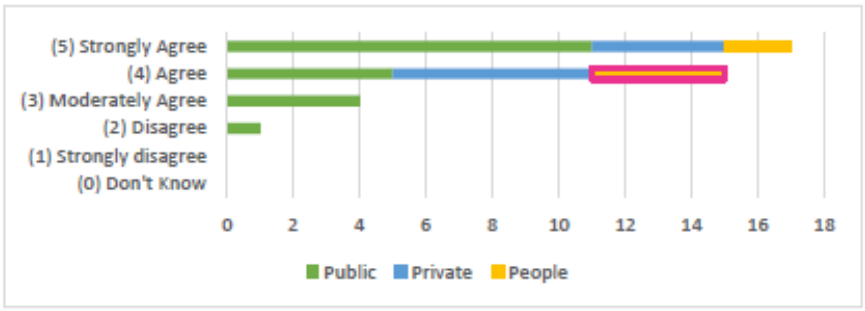
7. Participation

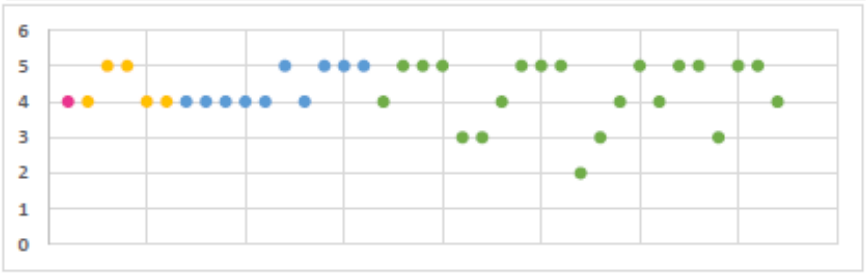
Agreement level regarding the proposed definition:





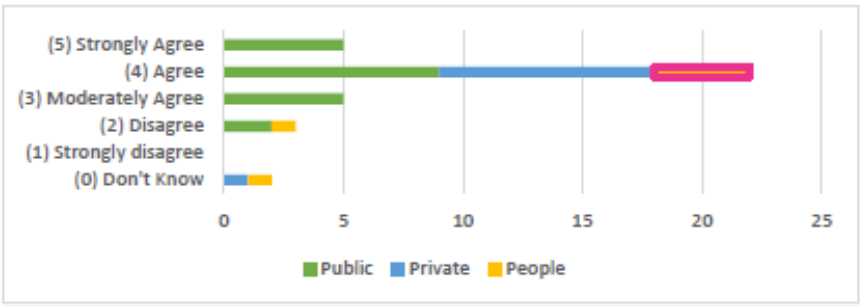
Agreement level regarding the validity of the concept in the proposed framework:

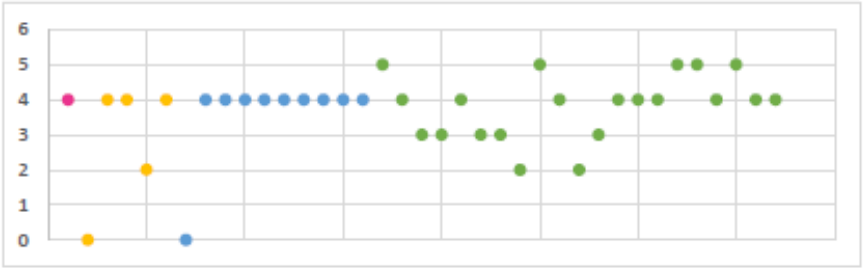




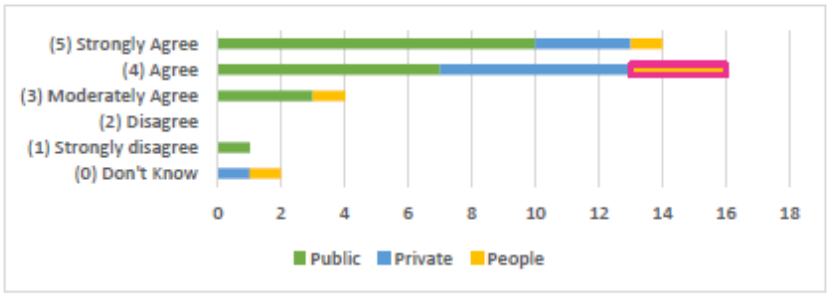
8. Constructive Resolution

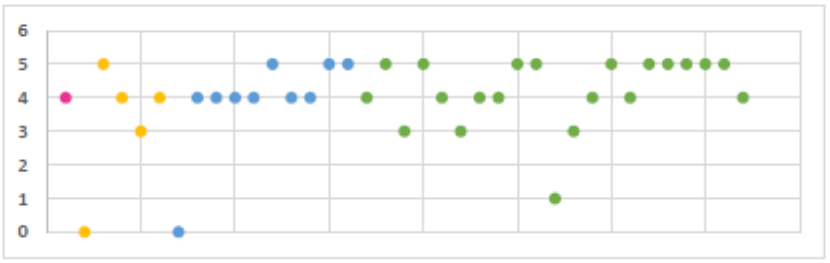
Agreement level regarding the proposed definition:





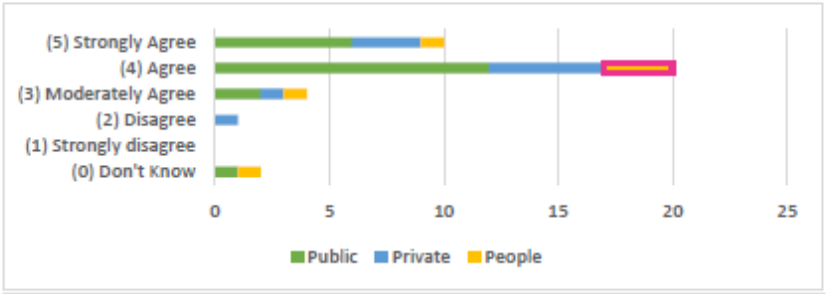
Agreement level regarding the validity of the concept in the proposed framework:

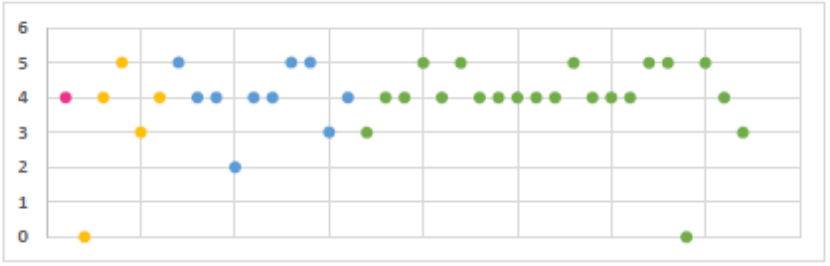




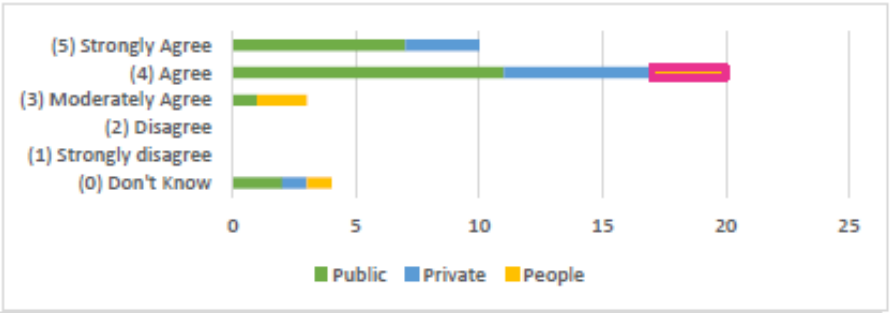
9. Integration

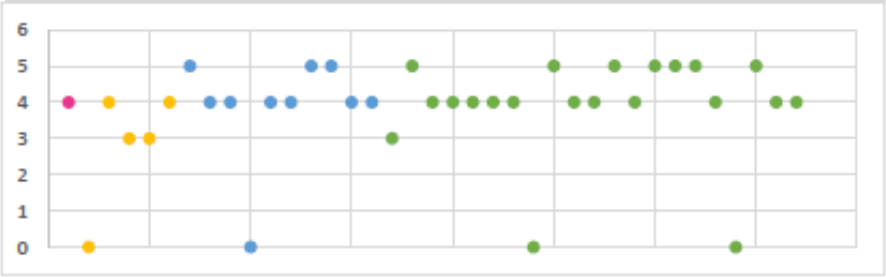
Agreement level regarding the proposed definition:





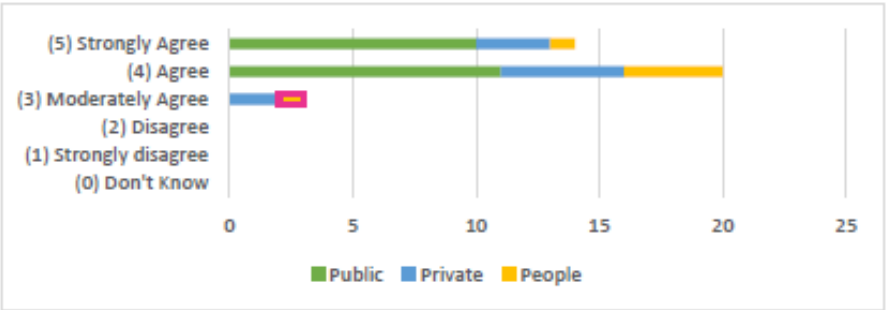
Agreement level regarding the validity of the concept in the proposed framework:

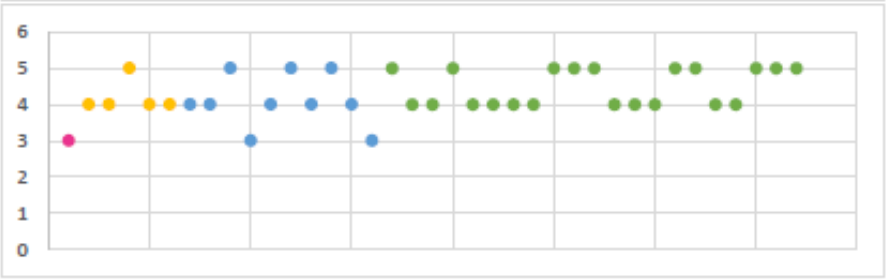




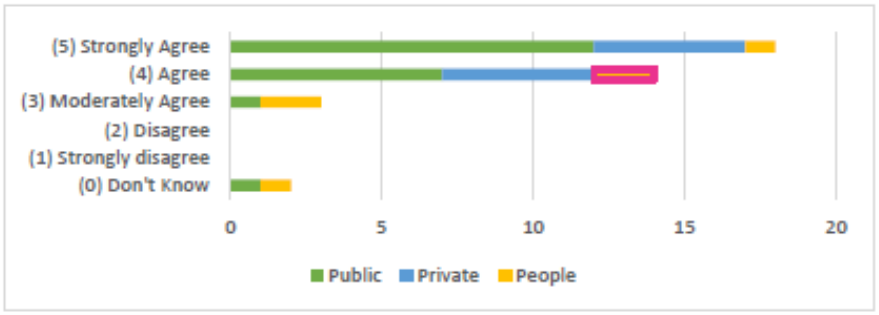
10. Flexibility

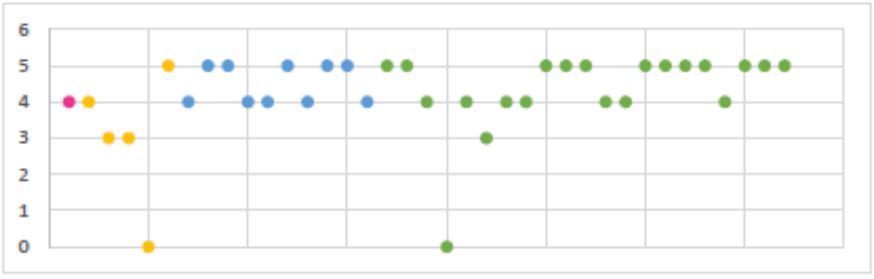
Agreement level regarding the proposed definition:





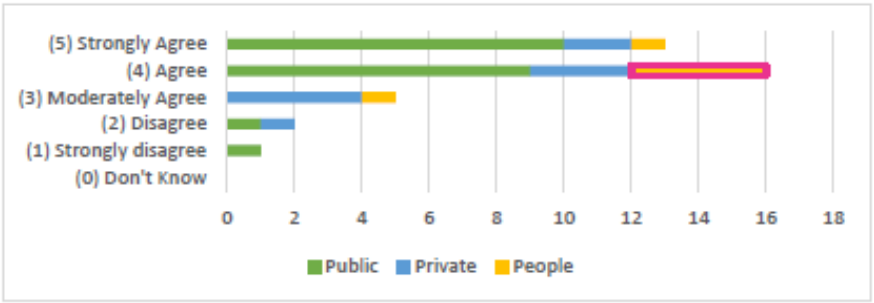
Agreement level regarding the validity of the concept in the proposed framework:

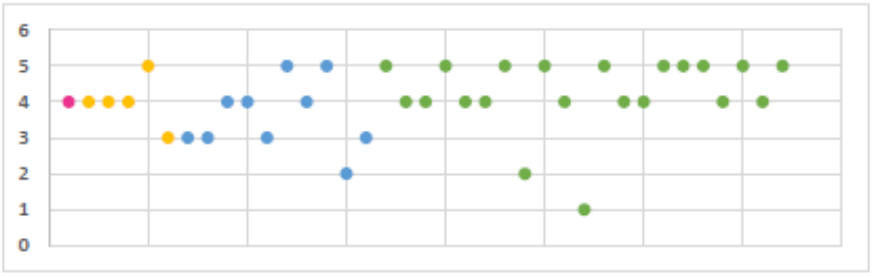




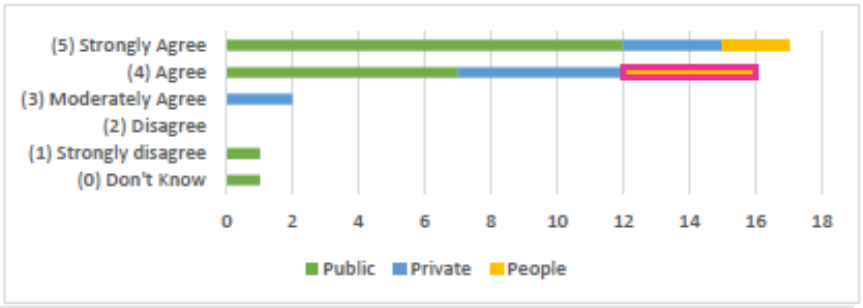
11. Information Accessibility

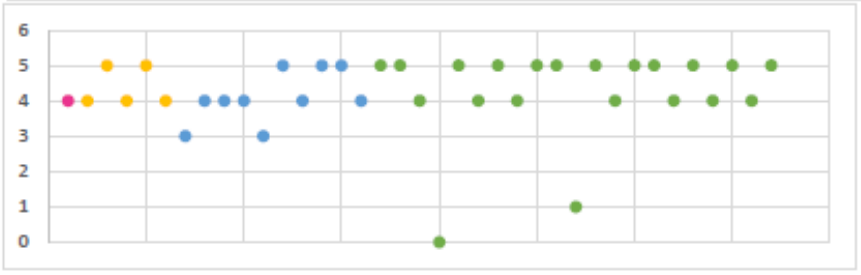
Agreement level regarding the proposed definition:





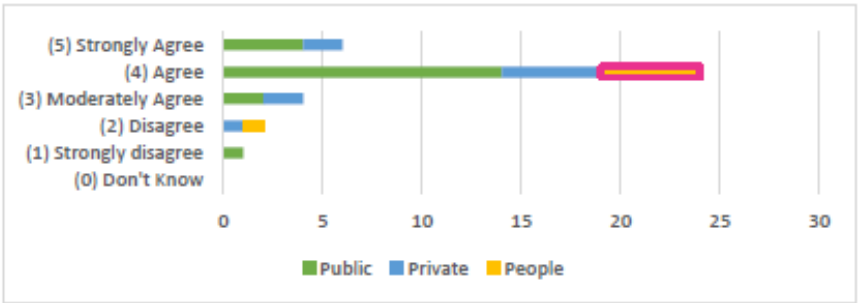
Agreement level regarding the validity of the concept in the proposed framework:

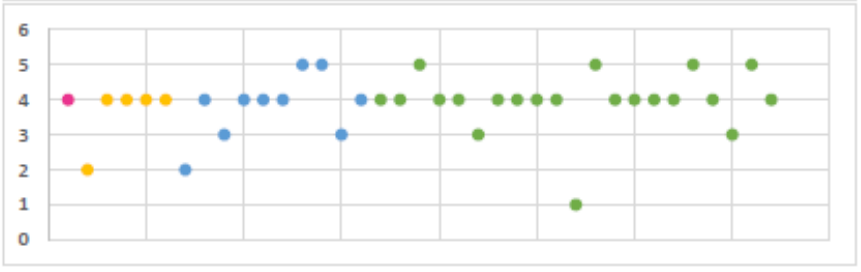




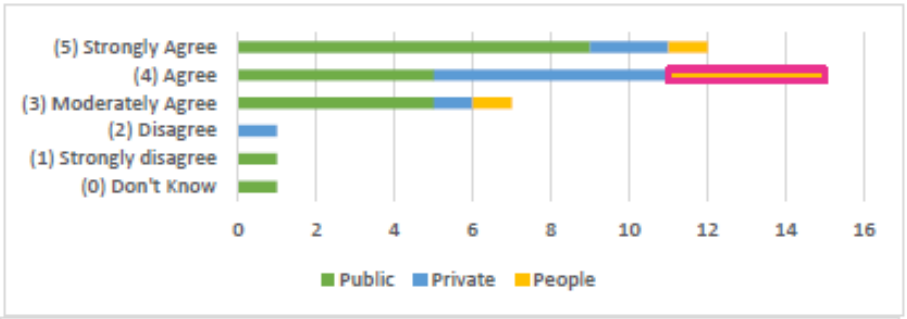
12. Information Transparency

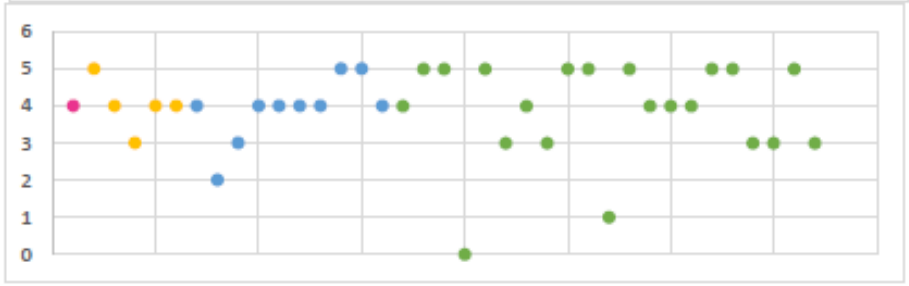
Agreement level regarding the proposed definition:





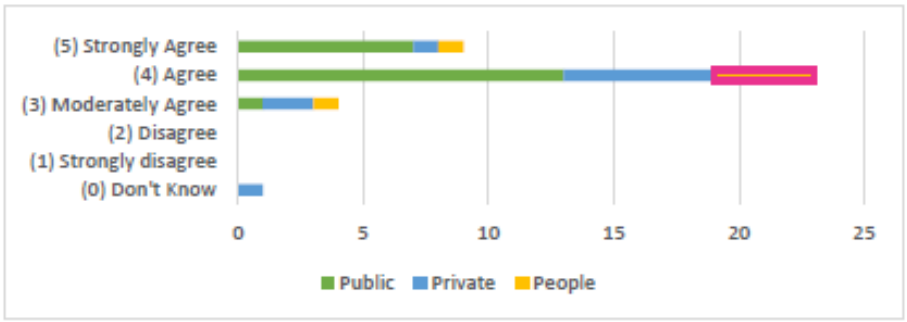
Agreement level regarding the validity of the concept in the proposed framework:

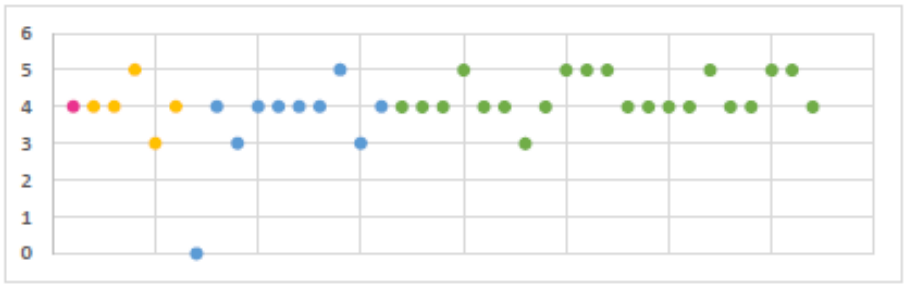




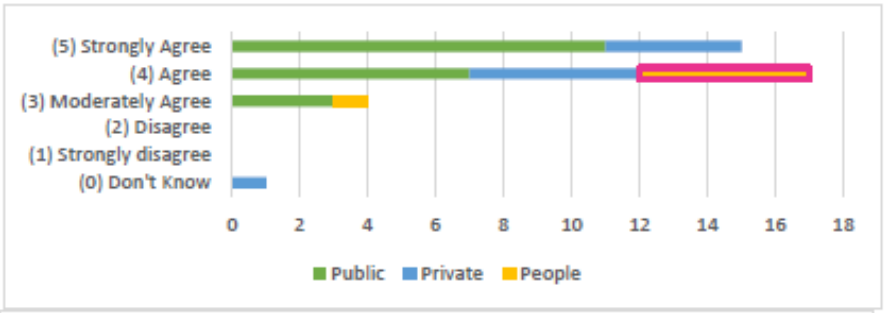
13. Reflectiveness

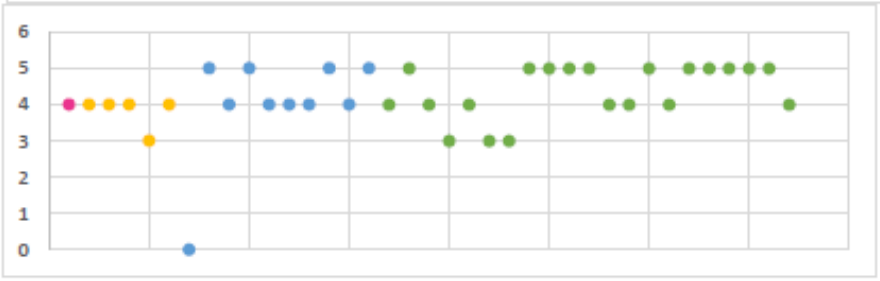
Agreement level regarding the proposed definition:





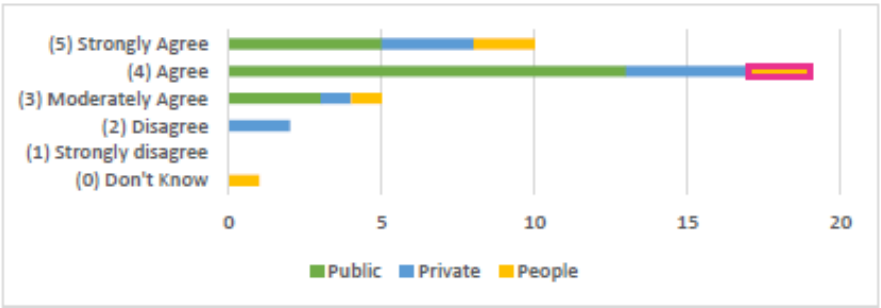
Agreement level regarding the validity of the concept in the proposed framework:

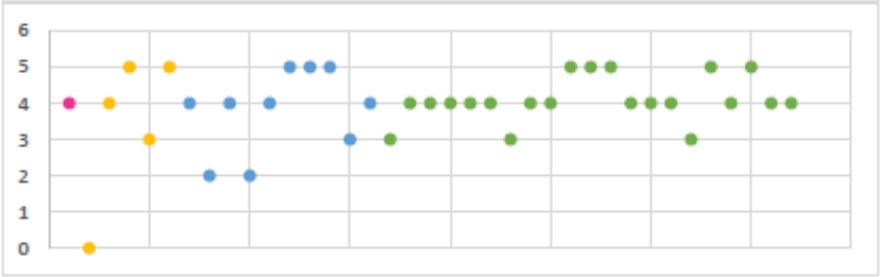




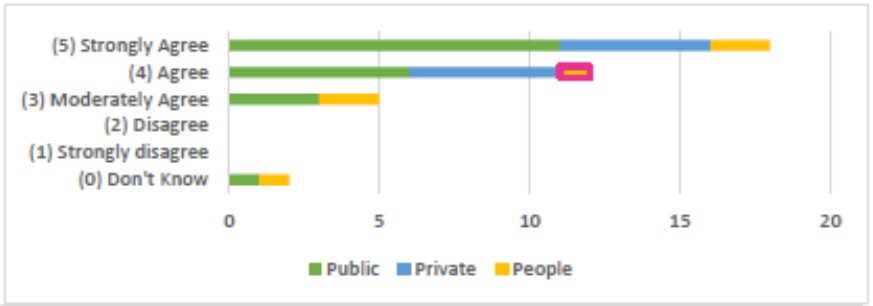
14. Inclusiveness

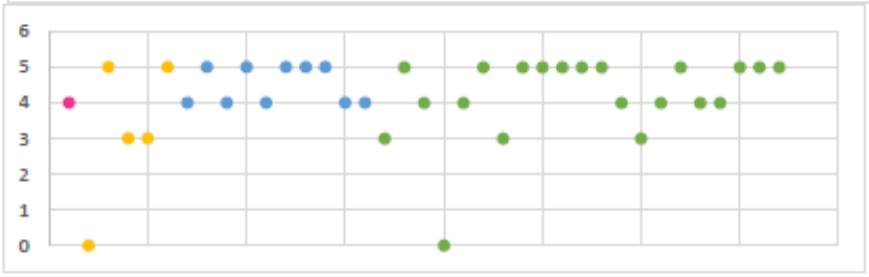
Agreement level regarding the proposed definition:





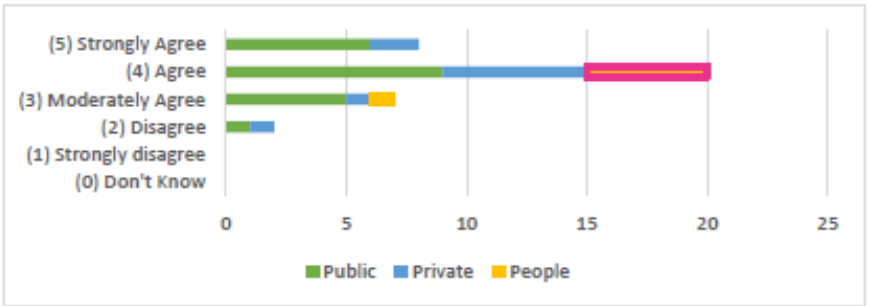
Agreement level regarding the validity of the concept in the proposed framework:

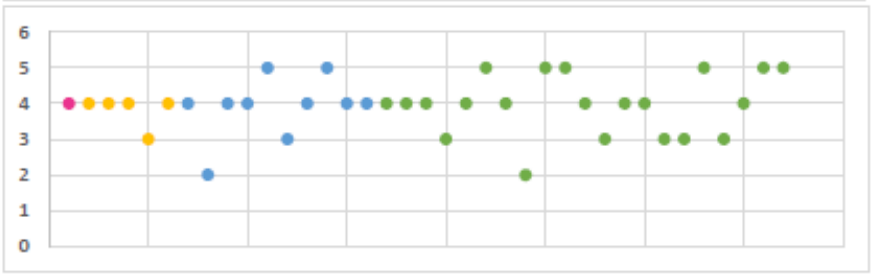




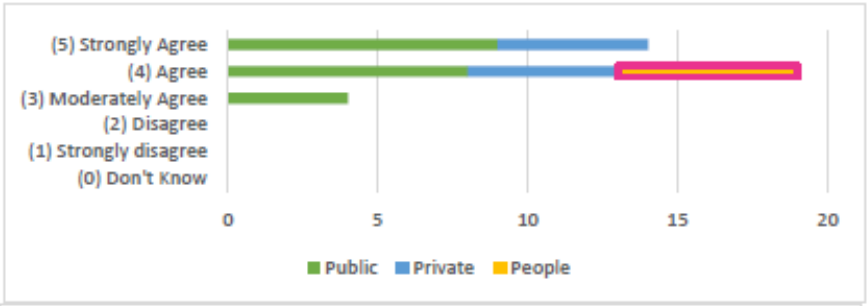
15. User Friendliness

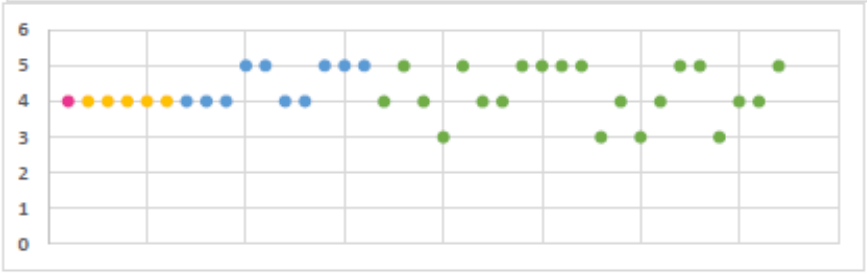
Agreement level regarding the proposed definition:





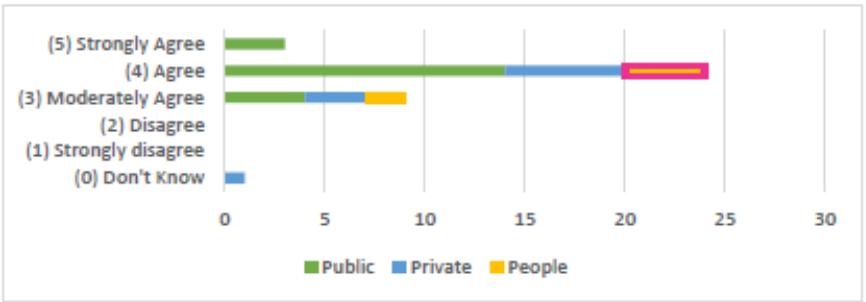
Agreement level regarding the validity of the concept in the proposed framework:

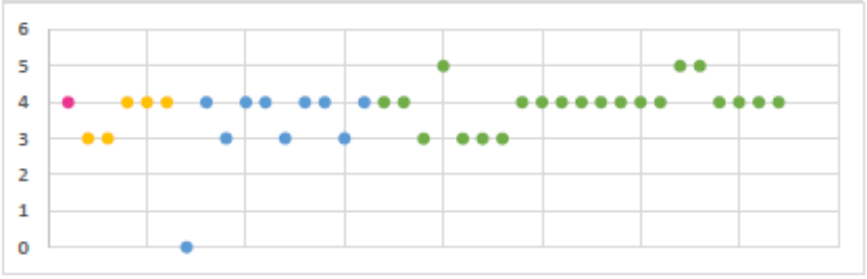




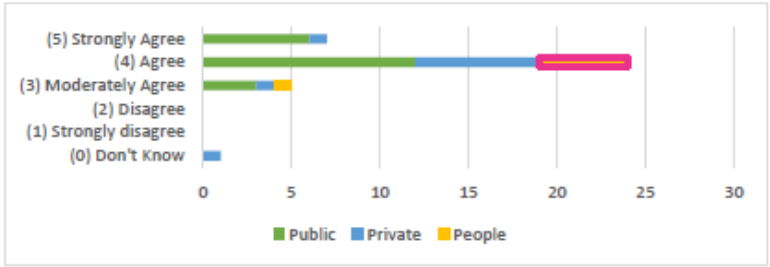
16. Perspective Alignment

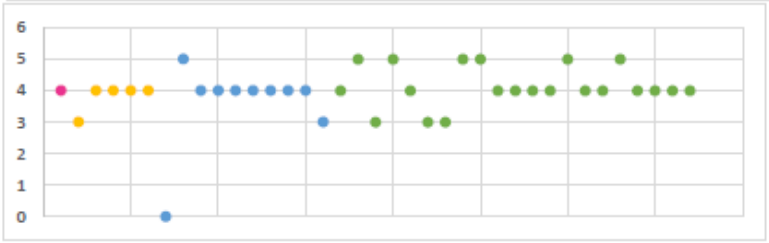
Agreement level regarding the proposed definition:





Agreement level regarding the validity of the concept in the proposed framework:





Conclusions

As you have seen there are some cases in which there is not a clear consensus among all the experts regarding a particular characteristic's definition or regarding the relevancy level. The criteria we have used to decide whether there is a consensus or not in regarding one specific characteristic has been the following:

When one or more experts disagree or strongly disagree in one question, we assume there is not a consensus.

We have improved the names and definitions of some of the characteristics based on the comments received from experts that did not fully agree on the first version provided in the first questionnaire and we have created an updated version of the characteristics and of the framework.

Therefore, the aim of the first section of the second questionnaire will be to fully validate the characteristics included in our framework. This section will only focus on the characteristics in which there has not been a consensus between all the experts.

We would like to thank you again for your help and we are looking forward receiving your valuable answers for the second questionnaire.

Delphi 2nd round Expert 1

First of all, we would like to thank you for your time on participating on this Delphi process and for contributing with your knowledge to our research.

The aim of this report is to inform you of the main conclusions obtained from the second round of the Delphi questionnaire you have already conducted. We will use graphs to illustrate which has been your personal opinion compared to the opinion of the rest of the experts that have participated in the process.

The second round of the Delphi questionnaire consisted on three different sections.

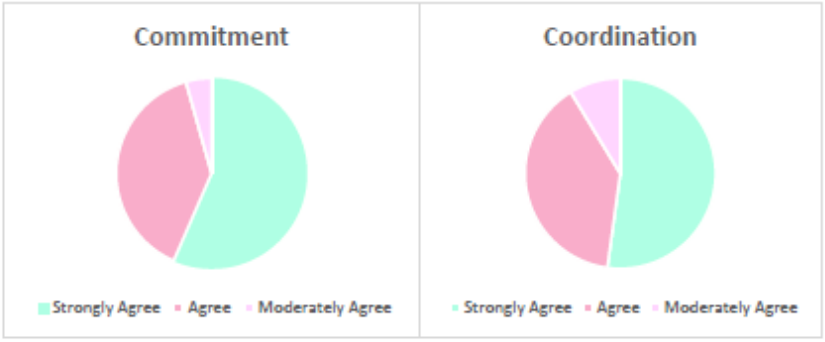
- In the first section, experts were asked to give their feedback about the new version of the characteristics included in the framework. The names and definition of these characteristics have been updated based on the comments received from experts that disagreed with the first version or the characteristics proposed in the first questionnaire.
- In the second section, experts were asked to define the most effective implementation order of the characteristics considering the different stages in the development process of Public Private People Partnerships (4Ps) in city resilience building process.
- Finally, the aim of the third section was to gather information to estimate the amount of resources needed to start implementing and maintaining the effectiveness of the characteristic over time.

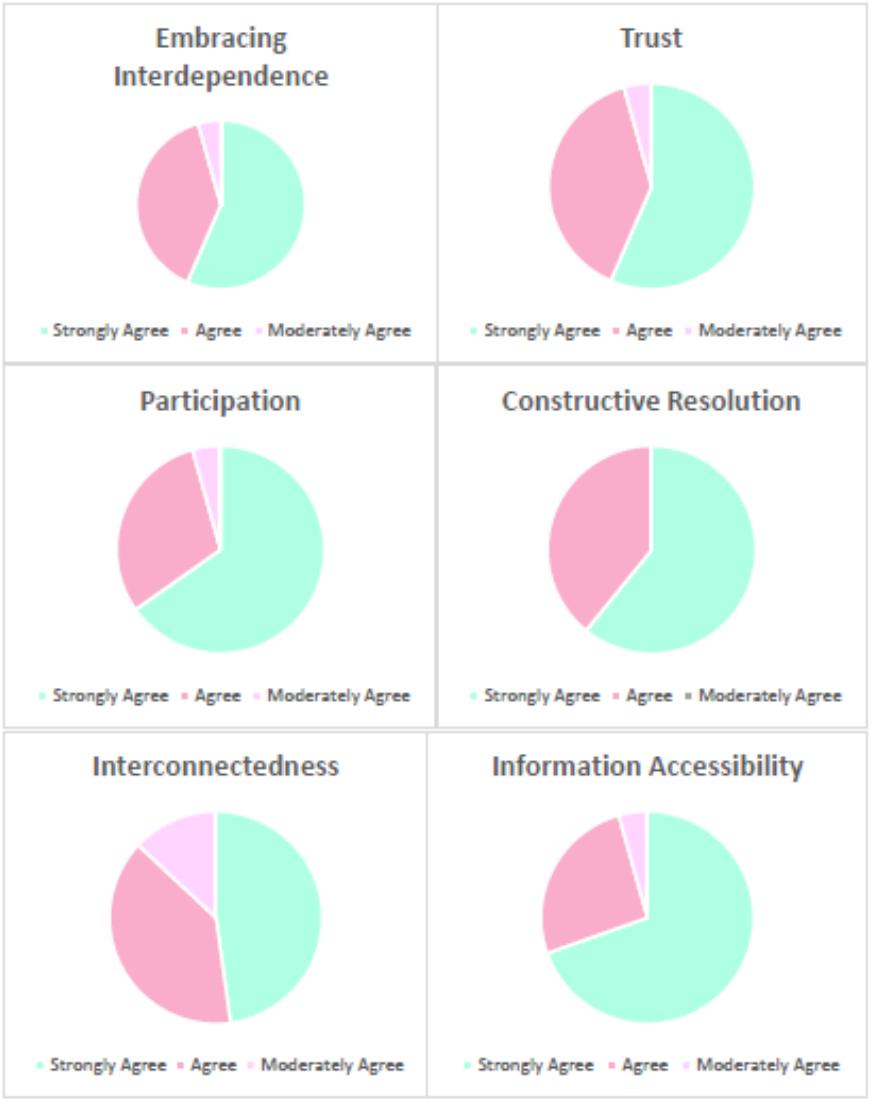
1st section

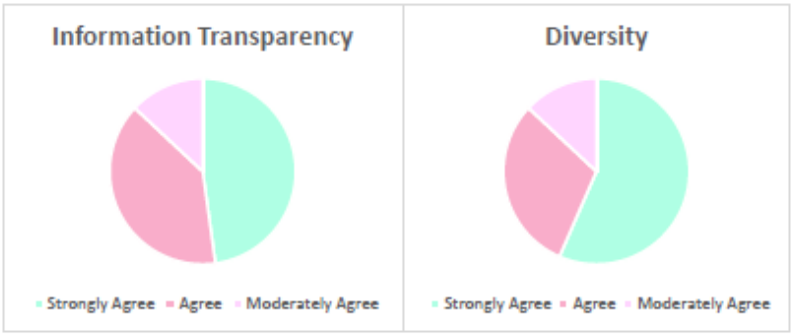
This section presents the agreement level of experts with the updated version of the characteristics that were remaining to be validated after the previous round of the Delphi questionnaire.

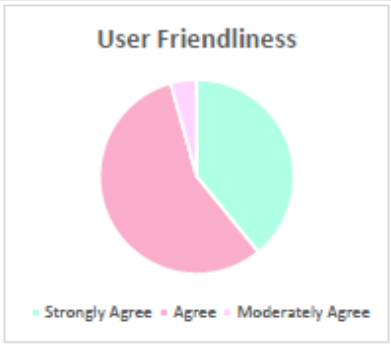
None of the experts has disagreed with the new version of the names and definitions proposed in this second round of the Delphi questionnaire. Therefore, the main outcome of this section is the validated version of the characteristics included in the frameworks for 4P in the city resilience building process.

Your responses have been plotted in blue so it is easier for you to compare your personal answers to the ones received from experts.




Embracing Interdependence
Strongly Agree
Agree
Moderately Agree
Trust
Strongly Agree
Agree
Moderately Agree
Participation
Strongly Agree
Agree
Moderately Agree
Constructive Resolution
Strongly Agree
Agree
Moderately Agree
Interconnectedness
Strongly Agree
Agree
Moderately Agree
Information Accessibility
Strongly Agree
Agree
Moderately Agree





The final version of the characteristics are the following ones:

Commitment	Commitment refers to the willingness of partners to exert effort on behalf of the relationship, understanding existing self-interests and renouncing to a part of their own interests in order to obtain a more general shared goal. Committed partners have the capacity to focus on long term goals while overcoming short-term problems and discussions.
Coordination	Coordination refers to the need of partners to define the boundaries of each partner's responsibilities, to be aware of other partners' work or interests and to specify the tasks each partner is expected to perform within the relationship. Partners also need to specify the mechanisms and protocols that will allow them to create a shared understanding of each partner's individual responsibility and work together in an effective manner.
Embracing Interdependence	Embracing interdependence understanding refers to the capacity of partners to assume that in order to achieve mutually beneficial goals they will depend on each other. Partners need to have the capacity to understand existing interdependencies among them and be aware that they rely on one each other to fulfill the goals that cannot obtain on their own.

Trust	Trust refers to the belief that a partner is capable, credible and reliable, and that therefore it will fulfil its obligations. This belief is what makes it possible to work for shared objectives.
Information Quality	Information quality refers to accuracy, relevance and timeliness of exchanged information. This enables fluent communication among partners thus improving the ability to make better decisions.
Information Sharing	Information sharing refers to the extent to which information is communicated to other partners, allowing tasks to be completed more effectively.
Participation	Participation refers to the extent to which partners engage jointly in planning, goal setting and responsibility distribution, as well as in the execution of different tasks providing meaningful insights for all the partners involved.
Constructive Resolution	Constructive resolution refers to the way conflicts between different partners are solved in an effective manner, thereby promoting solutions in which every partner feels their interests are being represented. Partners must show compromise to achieve success and to resolve issues amicably.
Interconnectedness	Interconnectedness refers to the extent the partnership is interconnected to systems, institutions or other partnerships that have similar or complementary purposes to achieve greater results.
Flexibility	Flexibility refers to the adaptability of each partner in the partnership in the face of changing circumstances, new challenges or sudden crises.
Information Accessibility	Information accessibility refers to how easy the information is available to the relevant stakeholders when it is needed.
Information Transparency	Information transparency refers to the extent to which shareable, appropriate, critical and sensitive information and data is made available to relevant partners, allowing tasks to be completed more effectively.
Reflectiveness	Reflectiveness refers to the ability of the partnership to use past experience to support future decisions, for instance, modifying procedures and behaviours accordingly.
Diversity	Diversity refers to the involvement of representatives from different city stakeholder groups (including minority groups) in the partnership in order to create a sense of shared ownership or joint vision.

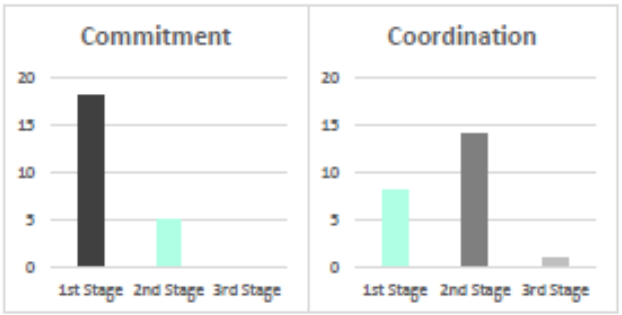
User Friendliness	User friendliness refers to the ease with which all partners understand and can use information. It means that there is a need to adapt how information is expressed so that the highest number of stakeholders will find it understandable, giving all stakeholders equal access to the content.
Perspective Alignment	Perspective alignment refers to the capacity of each partner to analyse all the existing self-interests from different partners and discuss their commonalities and how to align the different existing perspectives and meet a mutually beneficial goal.

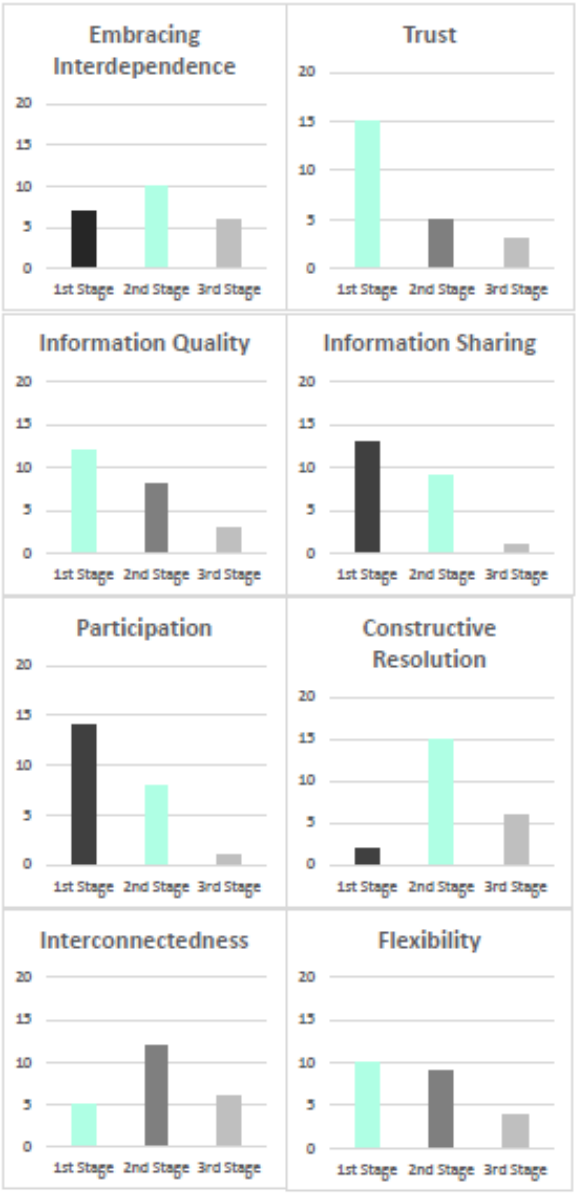
2nd section

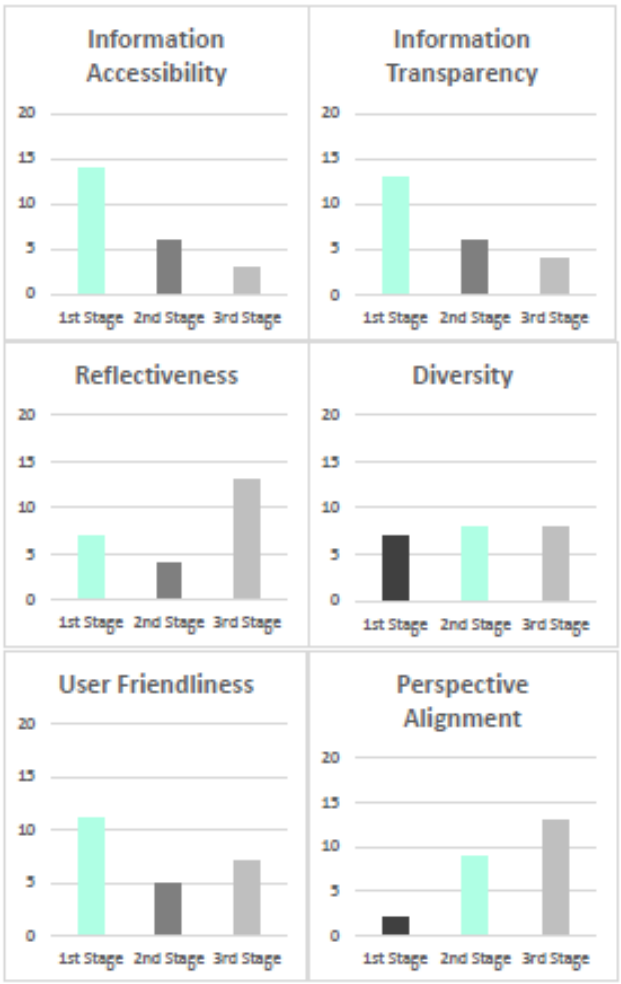
The following section presents the results obtained from the second section of the questionnaire. The information gathered from this section is key to establish the optimum implementation order of the characteristics included in the framework for 4Ps in the city resilience building process. Firstly, the graphs that summarize the responses gathered from experts regarding the implementation stage of each characteristics are presented. After analyzing the sample statistically, the average and standard deviation obtained helped us to stablish the preliminary optimum implementation stage for each of the characteristics included in our framework.

Therefore, through the information gathered in this section we have established the basis for the implementation order and the interdependencies among the different characteristics included in the framework.

Your responses have been plotted in blue so it is easier for you to compare your personal answers to the ones received from experts.



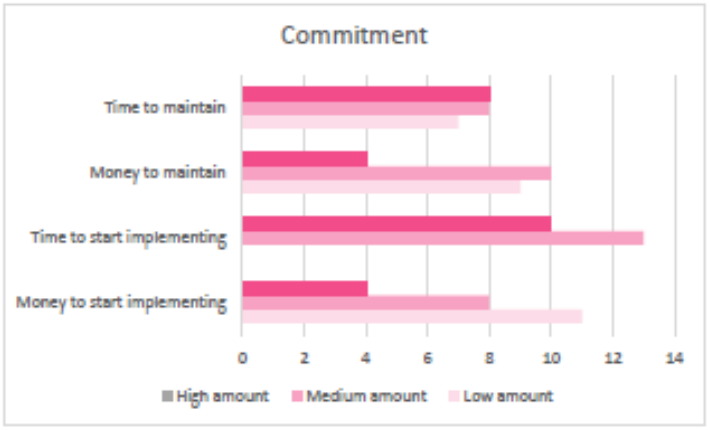

Embracing Interdependence
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Trust
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Information Quality
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Information Sharing
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Participation
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Constructive Resolution
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Interconnectedness
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Flexibility
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage

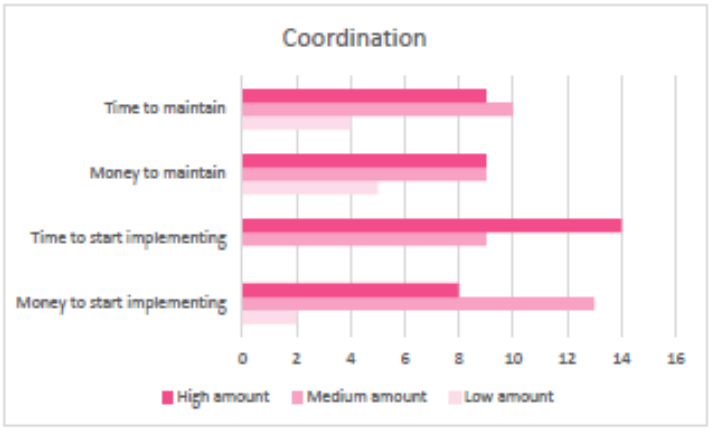

Information Accessibility
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Information Transparency
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Reflectiveness
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Diversity
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
User Friendliness
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage
Perspective Alignment
20
15
10
5
0
1st Stage
2nd Stage
3rd Stage

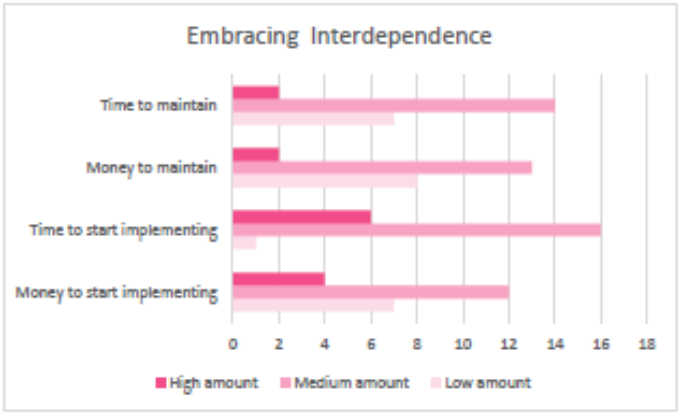
3rd section

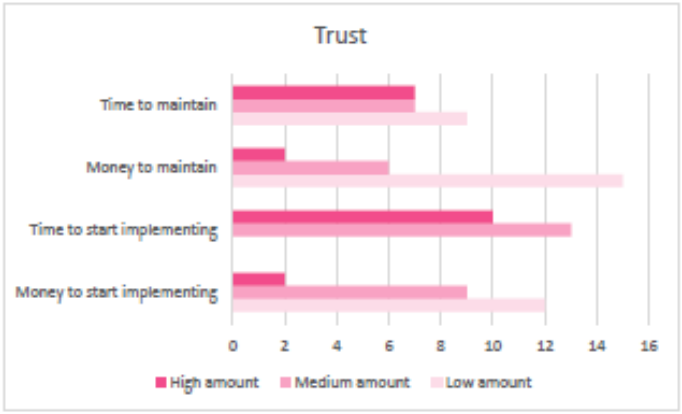
The following section presents the results obtained from the third section of the questionnaire. This section was oriented to obtain the amount of resources needed, in terms of time and money, to ensure the implementation and the maintenance of the characteristics is effective during the whole 4P development process.

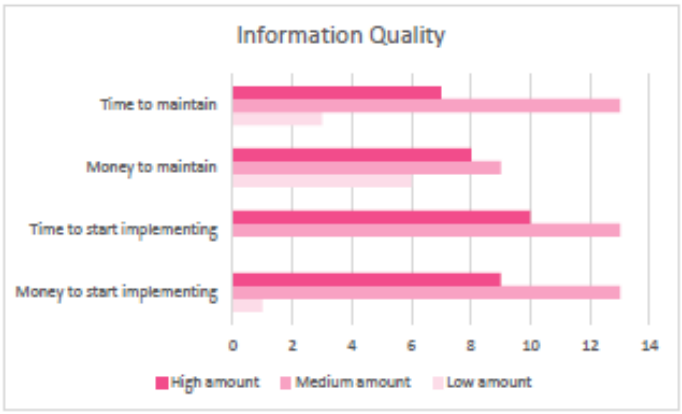
Due to the ambiguity of the question, unfortunately, we have not been able to obtain any relevant conclusion.

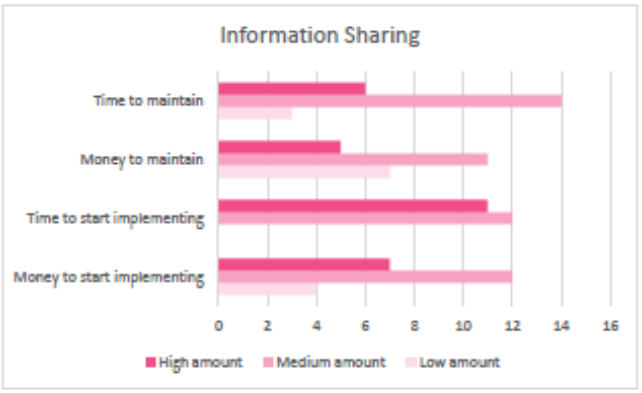




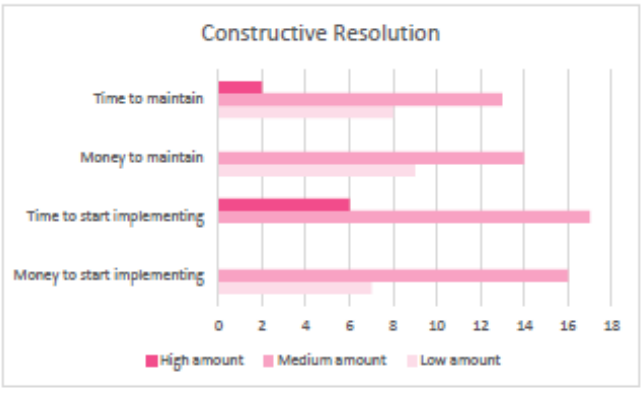

Embracing Interdependence
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16 18
High amount
Medium amount
Low amount

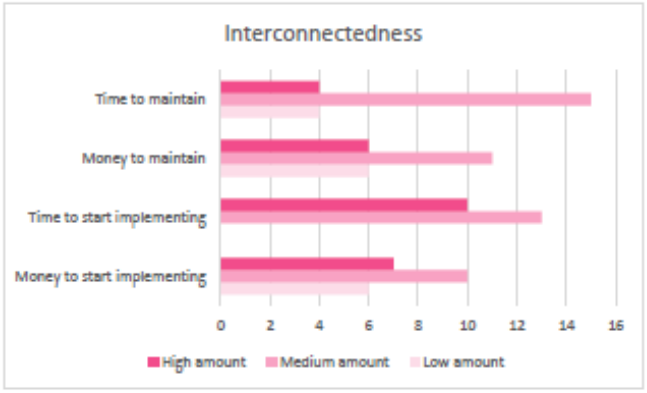

Trust
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16
High amount
Medium amount
Low amount

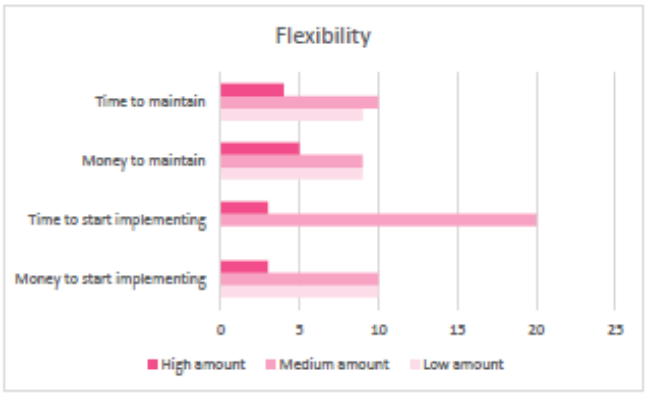

Information Quality
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14
High amount
Medium amount
Low amount

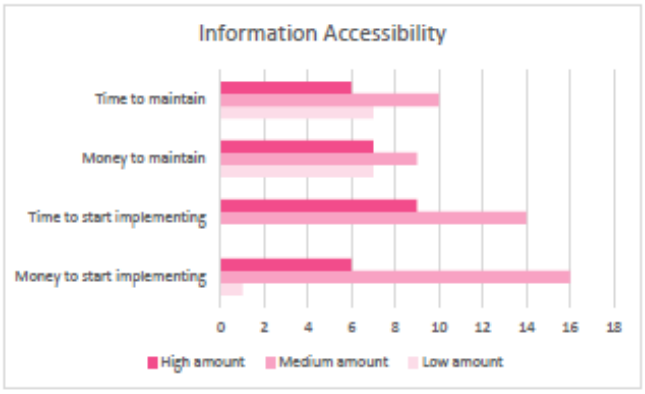

Information Sharing
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16
High amount
Medium amount
Low amount


Participation
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16
High amount
Medium amount
Low amount

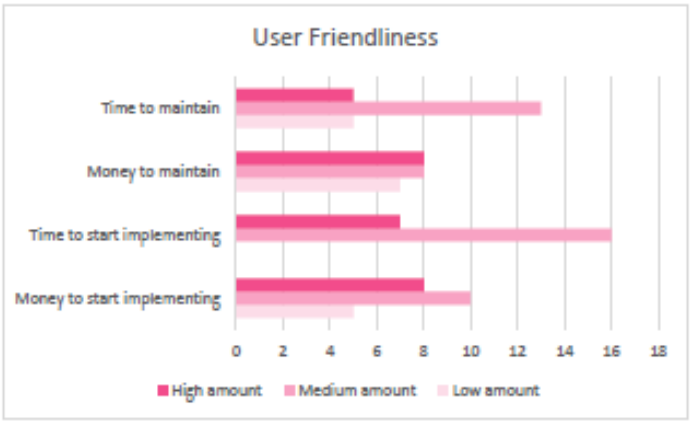

Constructive Resolution
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16 18
High amount
Medium amount
Low amount

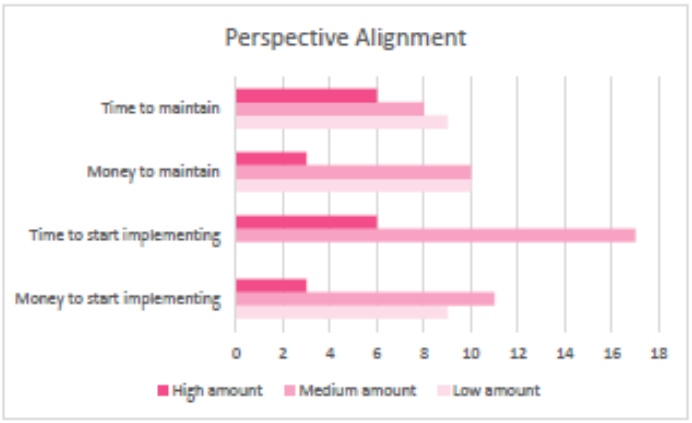

Interconnectedness
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0
2
4
6
8
10
12
14
16
High amount
Medium amount
Low amount


Flexibility
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0
5
10
15
20
25
High amount
Medium amount
Low amount


Information Accessibility
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0
2
4
6
8
10
12
14
16
18
High amount
Medium amount
Low amount


Information Transparency
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16 18
High amount
Medium amount
Low amount
Reflectiveness
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 5 10 15 20 25
High amount
Medium amount
Low amount
Diversity
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 5 10 15 20
High amount
Medium amount
Low amount


User Friendliness
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16 18
High amount
Medium amount
Low amount


Perspective Alignment
Time to maintain
Money to maintain
Time to start implementing
Money to start implementing
0 2 4 6 8 10 12 14 16 18
High amount
Medium amount
Low amount

F Appendix F: Analysis of the Delphi process

This appendix presents the analysis of the results gathered from the Delphi process

AF1. Validation of the characteristics

The main aim of the questionnaire sent in the first round was to validate the 16 characteristics of effective 4Ps in the city resilience-building process. The first round of the questionnaire was composed of the following questions per characteristic:

- Q1: To what extent do you agree with the definition provided? (From 1-Strongly Disagree to 5 Strongly Agree)
- Q2: Only in case you disagree or strongly disagree with the definition provided, could you please add further comments to improve this definition? (Open question)
- Q3: Do you agree that this characteristic is a relevant characteristic for successful Public Private People Partnerships in city resilience building? (From 1-Strongly Disagree to 5 Strongly Agree)
- Q4: Only in case you do not agree on using this term to refer to this concept, could you please suggest more adequate terms considering the definition provided? (Open question)

The table below summarizes the results gathered from Q1 and Q3. The numbers in the table show the number of experts that respond to each option in each question.

Characteristic		Strongly disagree	Disagree	Moderately Agree	Agree	Strongly Agree	N/A
1.Commitment	Q1: Definition	0	1	1	13	7	0
	Q3: Concept	0	0	1	9	12	0
2.Coordination	Q1: Definition	0	1	2	12	7	0
	Q3: Concept	0	0	2	9	11	0
3.Interdependence	Q1: Definition	0	2	3	11	6	0
	Q3: Concept	1	2	3	9	7	0
4. Trust	Q1: Definition	0	0	2	9	11	0
	Q3: Concept	0	0	2	7	13	0
5.Information Quality	Q1: Definition	0	0	3	11	8	0
	Q3: Concept	0	0	1	8	13	0

6.Information Sharing	Q1: Definition	0	0	1	14	7	0
	Q3: Concept	0	0	0	11	11	0
7. Participation	Q1: Definition	0	1	4	11	6	0
	Q3: Concept	0	1	3	8	10	0
8.Constructive Resolution	Q1: Definition	0	3	4	11	3	1
	Q3: Concept	1	0	4	8	8	1
9. Integration	Q1: Definition	0	0	4	10	7	1
	Q3: Concept	0	0	2	12	6	2
10. Flexibility	Q1: Definition	0	0	0	13	9	0
	Q3: Concept	0	0	2	7	12	1
11.Information Accessibility	Q1: Definition	1	2	2	7	10	0
	Q3: Concept	1	0	1	7	13	0

12.Information Transparency	Q1: Definition	1	1	3	11	6	0
	Q3: Concept	1	0	5	9	7	0
13. Reflectiveness	Q1: Definition	0	0	3	13	5	1
	Q3: Concept	0	0	3	10	2	1
14. Inclusiveness	Q1: Definition	0	0	4	9	9	0
	Q3: Concept	0	0	3	6	13	0
15.User Friendliness	Q1: Definition	0	1	5	10	6	0
	Q3: Concept	0	0	2	13	7	0
16.Perspective Alignment	Q1: Definition	0	0	6	14	1	1
	Q3: Concept	0	0	3	16	2	1

Moreover, the answers and comments gathered after analyzing the answers obtained from Q2 and Q4 enabled us to improve the concepts and definitions of those characteristics in which experts did not fully agree on. We considered that the definition and the concept of a characteristic was not valid when any of the experts answered to Q1 or Q3 with a score of 1 (Strongly Disagree) or 2 (Disagree). For those cases in which validation was not achieved in the first round of the Delphi questionnaire, the definition of the characteristic and the

concept used were updated based on the comments gathered from experts in Q2 and Q4.

The first aim of the second round was to validate the updated version of the characteristics of effective 4Ps that were not fully validated in the previous round. Consequently, the first questionnaire of the second round was focused on validating the updated version of the remaining characteristics. This time the question asked was the following:

- Q5: To what extent do you agree with the updated version of the characteristic?

The table below summarizes the results gathered from this questionnaire. The numbers in the table show the number of experts that respond to each option in each question.

Characteristic		Strongly disagree	Disagree	Moderately Agree	Agree	Strongly Agree
1. Commitment	0	0	1	9	12	0
2. Coordination	0	0	2	8	12	0
3.Embracing Interdependence	0	0	1	9	12	0
4. Trust	0	0	1	9	12	0
7. Participation	0	0	1	7	14	0
8.Constructive Resolution	0	0	0	9	13	0

9.Interconnectedness	0	0	3	9	10	0
11.Information Accessibility	0	0	1	6	15	0
12.Information Transparency	0	0	3	9	10	0
14. Diversity	0	0	3	7	12	0
15.User Friendliness	0	0	1	13	8	0

Following the same criterion previously mentioned, and analyzing the results obtained in this second questionnaire all the updated versions of the remaining characteristics were validated. The final version of the definitions is available in the results section.

AF2. Final version of the implementation order of the characteristics

The aim of the second questionnaire was to obtain the most effective order for implementing the previously validated characteristics, considering the previously validated 4P development stages. The experts were asked to specify what stage each characteristic should start being implemented. The table below, presents the quantitative results gathered from this questionnaire.

Characteristic	1st Stage	2nd Stage	3rd Stage	Condifence Interval (-)	Arithmetic Mean	Confidence Interval (+)
1. Commitment	17	5	0	1.05	1.23	1.4
2.Coordination	7	14	1	1.5	1.73	1.95
3.Embracing Interdependence	7	9	6	1.63	1.95	2.28
4. Trust	15	4	3	1.15	1.45	1.75
5.Interconnectedness	4	12	6	1.81	2.09	2.37
6.Flexibility	9	9	4	1.47	1.77	2.08
7.Diversity	7	8	7	1.67	2	2.33
8.Information Quality	11	8	3	1.34	1.64	1.93

9.Information Sharing	12	9	1	1.26	1.5	1.74
10. Participation	14	7	1	1.17	1.41	1.65
11.Information Accessibility	14	5	3	1.2	1.5	1.8
12.Information Transparency	13	6	3	1.24	1.55	1.85
13.User Friendliness	11	5	6	1.42	1.77	2.13
14.Constructive Resolution	2	14	6	1.94	2.18	2.42
15. Reflectiveness	7	4	11	1.81	2.18	2.55
16.Perspective Alignment	2	8	13	2.18	2.45	2.73

The numbers in the second column refer to the number of experts who believe that the characteristic in the row should start being implemented in the first stage. The numbers in the third column refer to the number of experts who think that the characteristic in the row should start being implemented in the second stage. The numbers in the fourth column refer to the number of experts

who think that the characteristic in the row should start being implemented in the third stage. The fifth column presents the lower limit of the confidence interval for each characteristic. The sixth column refers to the arithmetic mean obtained for each characteristic. The last column shows the upper limit of the confidence interval for each characteristic.

While conducting the research, we found that the arithmetic mean was not informative enough to determine when a characteristic should start being implemented. When defining when the a characteristic's implementation should start, it was also necessary to consider the dispersion of the collected data. In order to consider the dispersion of the data, confidence intervals were calculated. The arithmetic mean and the confidence intervals were both used to classify characteristics into the different 4P development stages.

In order to determine the development 4P stage in which each characteristic should start being implemented, a scale was defined in which the responses could only have the following values: 1, 2 and 3. We used these values to calculate the arithmetic mean and the confidence intervals. Moreover, we divided the complete interval between 1 to 3 into 3 equal intervals so that each one could refer to one 4P development stage. Therefore, the first stage goes from 1 to 1.66; the second stage goes from 1.66 to 2.33; the third stage goes from 2.33 to 3.

When then looked at the upper and lower limits of the confidence intervals to decide which development stage each characterstic's implementation should begin in.

The cases in which the confidence interval of a characteristic was narrow and both the upper and lower limits were located in the same stage interval, we assumed there was a clear consensus among all the experts. Therefore, we concluded that the implementation process of that characteristic was limited to one specific stage. This was the case for commitment, embracing interdependence, diversity and participation. However, in the cases where the confidence interval of a characteristic was wide and the upper and lower limits were located in different stage intervals, we assumed that there was not a clear consensus among experts. However, in analyzing this lack of consensus and the comments of experts we concluded that the implementation of one

characteristic could not be limited to one specific stage. In fact, we understood that for some experts, implementing a characteristic in one stage was successful, while for others implementing it in a different stage was equally successful. For instance, we found that in the experience of some experts, implementing coordination in the first stage was successful, while for others implementing the same characteristic in the second stage was effective. This lack of consensus is reflected in the width of the confidence interval, and therefore both stages could be valid periods in which to implement the characteristic effectively.

Therefore, we assumed that for the experts the implementation process could be equally effective even if the characteristic's implementation starts in different development stages.

Although in first questionnaire it was important to reach consensus among experts in terms of how the characteristics and the 4P development stages were defined, in the second questionnaire reaching consensus as to when each characteristic should start being implemented was not determinant. It is important to note that the experts were selected for their expertise in city resilience-building processes, so that ensures that all the opinions gathered from them are equally valuable. This means that according to their experience a characteristic could start to be implemented in different stages and could in both cases be equally successful. The starting implementation stage of some characteristics is bounded to one specific stage while, in other cases, this boundary is less strict and the implementation could start at different stages being the final result equally successful. The figure below summarizes the starting implementation stage/stages for each characteristic. At the same time, it is important to bear in mind that the implementation process of a characteristic is a never-ending process. Although the figure below highlights the stages in which each characteristic should start being implemented (thick line), the characteristic should continue being implemented throughout the whole 4P development process (thin line).

		STAGE 1	STAGE 2	STAGE 3
Stakeholder Relationship	1. Commitment			
	2. Coordination			
	3. Embracing Interdependence			
	4. Trust			
	5. Interconnectedness			
	6. Flexibility			
	7. Diversity			
Information Flow	8. Information Quality			
	9. Information Sharing			
	10. Participation			
	11. Information Accessibility			
	12. Information Transparency			
	13. User Friendliness			
Conflict Resolution	14. Constructive Resolution			
	15. Reflectiveness			
	16. Perspective Alignment			

Publications

In this chapter the publications achieved as a result of this research are included. First, papers directly related to the results of this PhD thesis are included. Secondly, other papers of the author of this PhD thesis are listed. The publications are classified by the different types of publications including conference publications, journal publications, and book chapters.

P.1 Papers directly related to the results of this research

P1.1 Conference Publications

Authors: Patricia Maraña, Leire Labaka, & Jose Mari Sarriegi.

Title: Best Practices to improve Public Private People Partnerships in the city resilience-building process

Conference: European Safety and Reliability conference (ESREL 2018)

Place and date of the Conference: Trondheim, Norway. June 2018.

Authors: Patricia Maraña, Marta Iturriza & Jose Mari Sarriegi

Title: Coordination of fragmented efforts among city stakeholders to address upcoming city challenges

Conference: Cities and Climate Conference

Place and date of the Conference: Potsdam, Germany. September 2017.

Authors: Patricia Maraña, Marta Iturriza, Leire Labaka & Jose Mari Sarriegi

Title: Hiri erresilientziaren eraikitze prozesua hobetzeko erakunde publiko, konpainia pribatuen eta pertsonen arteko elkarlan markoa

Conference: II. Ikergazte nazioarteko ikerketa euskaraz

Place and date of the Conference: Pamplona, Spain. May 2017.

Authors: Patricia Maraña, Leire Labaka & Jose Mari Sarriegi

Title: Barriers that hamper the efficiency of public private partnerships (PPPs) in critical infrastructure protection

Conference: European Safety and Reliability Conference (ESREL 2016)

Place and date of the Conference: Glasgow, United Kingdom. September 2016.

Authors: Patricia Maraña, Josune Hernantes, Leire Labaka & Jose Mari Sarriegi

Title: Crisis Scorecard: How to reduce impacts increasing resilience and awareness

Conference: The International Emergency Management Society Annual Conference

Place and date of the Conference: Rome, Italy. September 2015.

P1.2 Journal Publications

Authors: Patricia Maraña, Marta Iturriza, Leire Labaka, & Jose Mari Sarriegi.

Title: Hiri erresilientziaren eraikitze prozesua hobetzeko erakunde publiko, konpainia pribatu eta pertsonen arteko elkarlan markoa

Journal: Aldiri Arkitektura eta abar (Latindex)

Year: 2017 **Volume:** 33 **Pages: 18-21**

Authors: Patricia Maraña, Leire Labaka, & Jose Mari Sarriegi.

Title: A framework for public private people partnership in the city resilience building process

Journal: Safety Science (JCR Q1)

Year: 2018 **Volume:** 110 **Pages: 39-50**

Authors: Patricia Maraña, Leire Labaka & Jose Mari Sarriegi.

Title: We need them all: development of a public private people partnership to support a city resilience building process

Journal: Technological forecasting & social change (JCR Q1)

Year: 2018 **Volume:** Under Review **Pages:**

Authors: Patricia Maraña, Leire Labaka & Jose Mari Sarriegi.

Title: Public private people partnership (4P) roadmap for city resilience

Journal: Cities (JCR Q1)

Year: 2018 **Volume:** Under Review **Pages:**

P1.3 Book Chapters

Authors: Patricia Maraña, Leire Labaka & Jose Mari Sarriegi

Chapter Title: Maintenance in Critical Infrastructures: the need for public private parnerships

Book Title: Optimum decision making in asset management

Editors: IGI Global

Year: 2017 **Place:** Hershey, United States **Pages:** 62-821

Authors: Patricia Maraña, Leire Labaka & Jose Mari Sarriegi

Chapter Title: Crisis balanced scorecard: A useful tool to anticipate unexpected crises

Book Title: Crisis management: a leadership perspective

Editors: Paweł Kępka

Year: 2014 **Place:** New York, United States **Pages:** 51-61

P.2 Other papers of the author of this PhD thesis

P2.1 Conference Publications

Authors: Cinta Lomba, Jose Mari Sarriegi, Patricia Maraña & Leire Labaka.
Title: Working together towards Critical Infrastructure (CI) resilience
Conference: European Safety and Reliability Conference (ESREL 2018)
Place and date of the Conference: Trondheim, Norway. June 2018.

Authors: Marta Iturriza, Patricia Maraña & Jose Mari Sarriegi
Title: Smart Mature Resilience hirien erresillientzia garatuz
Conference: II. Ikergazte nazioarteko ikerketa euskaraz.
Place and date of the Conference: Pamplona, Spain. May 2017.

Authors: Jose J. Gonzalez, Magnuns Bang, Colin Eden, Raquel Gimenez, Josune Hernantes, Susan Howick, Patricia Maraña, Igor Pyrko, Jaziar Radianti, Amy Rankin & Jose Mari Sarriegi.
Title: Stalking Resilience: Cities as vertebrae in society's resilience backbone.
Conference: International Conference on Information Technology in Disaster Risk Reduction (ITDRR 2016)
Place and date of the Conference: Sofia, Bulgaria. Novembrer 2016.

P2.2 Journal Publications

Authors: Josune Hernantes, Patricia Maraña, Raquel Gimenez, Jose Mari Sarriegi & Leire Labaka.

Title: Towards resilient cities: a maturity model for operationalizing resilience

Journal: Cities (JCR Q1)

Year: 2018 **Volume:** In press **Pages:**

Authors: Leire Labaka, Patricia Maraña, Raquel Gimenez & Josune Hernantes.

Title: Defining the roadmap towards city resilience

Journal: Technological forecasting & social change (JCR Q1)

Year: 2018 **Volume:** Under Review **Pages:**

Authors: Patricia Maraña, Colin Eden, Henrik Eriksson, Clara Grimes, Josune Hernantes, Susan Howick, Leire Labaka, Vasileios Latinos, Rene Lindner, Tim A. Majchrzak, Igor Pyrko, Jaziar Radianti, Amy Rankin, Mihoko Sakurai, Jose Mari Sarriegi & Nicolas Serrano

Title: Towards a resilience management guideline: Cities as starting point for societal resilience.

Journal: Sustainable Cities and Society (JCR Q1)

Year: 2018 **Volume:** Under Review **Pages:**