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Co-governance of the urban commons during the pandemic of COVID-19

Master Thesis
in the context of "The Erasmus Mundus Master Programme in Public Sector Innovation and e-Governance (PIONEER)"

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Date of Submission:	2021-05-31

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1 Acknowledgements

I give endless thanks to my supervisors, Dr. Evrim Tan and Dr. Alexandros Pazaitis. Thank you, Evrim and Alex, for your hours of patience and dedication to provide me with suggestions for helping me grow as a better scientist.

The blessing and luck of being born from my parents, whose everyday messages and support encouraged me to deliver a thesis that aimed to contribute to societal impact. This same gratefulness is to my aunt Anita who was always caring for me in the distance.

I am grateful for Anna Kaic, and her always good vibe to encourage me maintain a positive attitude even in the most overwhelming days. I was always blessed in having you by my side.

I am very grateful too, for being accepted in the Erasmus Mundus PIONEER program, which undoubtedly changed my life. I am fixed to become a professional on eGovernance and make proud the three universities that gave me lessons, joy, friends, assistance, and care.

I also appreciate the assistance, encouragement, and friendship of Stefan, Pablo, Charlene, Isidora, Kenneth, Georgia, Lisa, Grace, Viktor, Maria Claudia, Sujani, Ines, Ritesh, Sardor, Caro, Bahar, Tim, Julia, Olga, Matthias, Nia, Niño, and Niloy from the third Pioneer cohort.

On this same line, I am grateful for the people in Mexico who watch my videos, and specifically those that are my family and friends, which called me, sent me messages, and wished me blessings and a “soon come back”. I am blessed for having so caring friends such as Jorge Ma, Daniel G, Jacobo C., Dyana T., Edith P., Heroy G., and many more that I have in my heart.

Finally, I would like to thank the interviewees that had the time and good will to attend in time my calls. Likewise, I am grateful to the key informant Maria Francesca De Tullio, for taking the time and dedication to read the thesis and provide her insights on the findings. Her specialized contribution strengthened the research and added weight to facilitate policy-makers and eGovernance practitioners the task of improving the current governance systems.

2 Introduction

Public spaces' purpose is to develop and enhance a community's well-being by facilitating a sense of community belonging, social cohesion, and space to exercise the individual's citizenship rights (Iaione, 2016). However, as pointed out by Iaione in 2005, urban spaces are perceived as "nobody's or local public authority's places, rather than everybody's places" (Iaione, 2016, p. 2).

According to research in Philadelphia, unoccupied and abandoned urban spaces directly impact personal well-being (Kondo et al., 2015), causing community division, mental distress, fear, and physical health problems, among other personal and community-related issues (De Leon & Schilling, 2017).

On the opposite, when public space is collectively regenerated, its exercise improves individual and collective well-being, increasing along the way social capabilities, resilience, and reciprocity (Bellaviti, 2008; Rosemann, Sepúlveda, & Qu, 2009).

Recently, the urban commons have emerged as a socially driven innovation towards public space regeneration and maintenance. Citizens have led these initiatives with public authorities' empowerment (Sergei Zhilin, Bram Klievink, & Martin de Jong, 2019).

On the above paragraph two concepts need to be clarified. On one hand, public space regeneration in this thesis is conceived as the field of public policy that focuses on recovering economic growth, social functions, social inclusion, and environmental quality where it has been lost (Mimi, 2003).

On the other hand, the urban commons are a social system with a defined community, norms, boundaries, and resources respected by outside authorities for protecting, benefiting, and managing common shared resources and collective wealth (Bollier, 2011; Ostrom, 2010). From this general concept, we can narrow down the understanding of urban commons as those engaging with solving urban issues regarding public spaces (Dellenbaugh et al., 2020). For this, the Theoretical Framework section provides a more detailed examination.

As said, the urban space is, in the urban commons case, the resource to protect, manage, and build a culture around it. Usually, urban commons engage in presential activities within their shared resource to manage and govern them. Thus, urban commons make decisions in a non-bureaucratic manner without additional tools than those employed in informal meetings (Dellenbaugh-Losse, Zimmermann, & Vries, 2020).

However, due to COVID-19 restrictions that made entire countries lockdown, face-to-face interactions became impossible to have. Thus, urban commons' governance and management, among all those activities considered as not essential, got suspended (Agostino, Arnaboldi, & Lema, 2021). Fortunately, Information and Communication Technologies (ICT) enabled all sectors to continue their operations online, accelerating

digitalization and moving all sectors towards a digital transformation (Agostino et al., 2021; Gabryelczyk, 2020; McKinsey Digital, 2020).

This pandemics-led digitalization process directly provoked the redefinition of operational processes, putting e-government and e-governance as the required fields for coming up with innovative and resilient solutions (Gabryelczyk, 2020; UN E-Government, 2020).

However, in literature, the study of digitalization processes within the public sector has been, in general, neglected. For example, Mergel, Edelmann, and Haug (2019) reported that this is a knowledge area that still lacks the understanding of which routine processes are being digitalized and how. Agreeing with this, Gabryelcyzk (2020) adds that, especially in today's context, this negligence has been a factor for practitioners to adopt suboptimal process flows just because they are familiar with, rather than choosing tested and reviewed processes.

This research paper aims to bring closer researchers and policymakers to understand digitalization processes by looking at the urban commons for one main reason: its natural polycentric arrangement integrates into its decision-making structure public authorities, citizens, and other stakeholders from the knowledge, social activism, and business sectors (Foster & Iaione, 2015). Therefore, understanding how they interact with each other to make decisions and carry out civic duties might shed light on designing better process flows with multi-stakeholder interactions. For this, a simple but effective research question applies:

> How do urban commons carry out polycentric urban planning and policy-making in times of COVID-19?

This research solves the above question through an exploratory single case study approach. However, it is to mention the limitations of the approach. The focus of this research is to examine only those COVID-19 related solutions that entail some degree of digitalization. This is acknowledged as a limitation of the findings.

Semi-structured interviews are the main instrument of data gathering. The answers are translated into ArchiMate models to facilitate a graphical understanding of the process flows while enabling replication and potential further improvements on those models.

Although in the theoretical framework ArchiMate is explained, here is briefly introduced as an open and independent notation that has been used in eGovernance to support the description, analysis and visualization of organizational processes (Baker, 2020).

It is to highlight that, for providing clarity to the reader, the research design uses three logic models in the form of an urban commons assessment framework, an ICT-enabled policy-making framework, and the modeling of these two with ArchiMate.

The reason to use a complex research design was to update the knowledge on the Italian urban commons context while identifying in detail the polycentric stakeholders, their tasks, and the technology used to perform these. All presented through an Enterprise Architecture model to facilitate eGovernance professionals the task of improving the current systems. A graphic workflow of the research method is available in Figure 6.

The following structure provides clarity on the paper's outline.

Chapter 1: Introduction, Thesis structure, and Aims.

Chapter 2: The literature review. This chapter clarifies the understanding of two main subjects: On one side, the urban commons and its state of the art. Here, the polycentric co-governance in policy making are the lenses of study. On the other hand, the ICT-enabled collaborative governance.

Chapter 3. The Theoretical framework. This section covers the logic models to frame the understanding of policy-making, urban commons, and the modeling language for representing the governance processes.

Chapter 4: Methodology. Outlines the research design, procedures, research perspectives, data collection, ethical considerations, research instruments, research valuation, site and participant selection, and the data analysis approach.

Chapter 5: Findings. Results follow two steps. First, the author explains the urban commons composition, the policy cycle steps, and the stakeholders involved. Second, the author presents the models representing the current governance process following the core layers of ArchiMate divide the findings, i.e., business, application, and technology layers.

Chapter 6: Discussion. A reflection first on each of the layers modeled, and second, of all together.

Chapter 7: Conclusion. A summary of the discussion and call on further research. Annexes.

2.1 Problem Statement

COVID-19 paralyzed entire countries, locking down people in their houses, impacting negatively on mental health. Thus, there is an emergency to re-activate regenerative actions such as those implemented by the urban commons when taking care of urban spaces. In this, the public sector has accelerated the digitalization of its processes (McKinsey Digital, 2020) from the front to the back office (Agostino, Arnaboldi, & Lema, 2021; Gabryelczyk, 2020). However, decision-makers do not have the correct information for taking optimal paths when "upgrading" their interaction services (Gabryelczyk, 2020) due to the scarce scientific evidence on how popular public services

operate digitally (Agostino et al., 2021; Gabryelczyk, 2020; Mergel, Edelmann, & Haug, 2019).

2.2 Research Objectives

The purpose of this thesis is beyond achieving an academic degree. It aims to understand how the complex socio-technical-political construct of urban co-governance performs in real life. Generating scientific research that directly aids the Comune di Torino in their endeavor for social progress is a goal that generates excitement to the author.

This thesis contributes to the novel understanding of:

- Urban commons as polycentric structures.
- Public sector digitalization processes, especially during emergency times such as COVID-19.

2.3 Context

Many countries in the world, before COVID-19, did not have a digitalization framework in place. This was the case of Italy. Which negligence on the national level forced local governments to take their digital measures as they saw fit (Public Services International, 2020). Furthermore, when every city has a different gradient of access to digital infrastructure and staff skills, the ones with more insufficient access to such resources undoubtedly, stay behind (Public Services International, 2020).

As already stated, the strategy of locking down countries and paralyzing any activity involving gatherings prohibited social innovation institutions, such as the urban commons, from working in the public spaces they committed to take care of and regenerate. Additionally, these social institutions hold a degree of autonomy that enables them to establish their norms (within the law), adding pressure to governments on accelerating even further the re-activation of public services through digital means.

The following literature review provides a deeper understanding of this context, enabling the researcher to formulate a research question that fits the research objectives while proposing a solution for the stated problem.

3 Literature Review

This section aims to overview the existing academic knowledge regarding two research concepts: the urban commons and the ICT-enabled collaborative governance.

At the end of this section, the author summarizes the main research assumptions and the theoretical framework to use as research lenses.

3.1 Urban Commons: An evolution of public-owned and public-managed resources

The works of three sets of authors are the basis for covering the urban commons understanding. First, Dellenbaugh-Losse, Zimmermann, and Vries (2020) offer an updated literature review of the urban commons while offering qualitative empirical evidence from different European countries. Also, the work of Dellenbaugh-Losse et al. offered the author a summarized perspective with the most clarity of narrative between all other authors previously explored.
Second, the Heteropolitics research team. On one hand, Kioupkiolis (2020a) present the most extensive literature review on the commons-related schools of thought. On the other hand, Vesco (2020) contributes with field knowledge on Italian cities holding urban commons cases. His inputs on Naples and Turin serve as the context for introducing the case study. They are the most abundant and updated knowledge on Italian urban commons (the focus of this research).

Third, Christian Iaione (2016) and Sheila Foster (2012; Foster & Iaione, 2015) are the leading cognitive entrepreneurs regarding the Italian transformation of cities into commons. Their work and vision settled both the theoretical and practical basis for implementing the Italian urban commons.

3.1.1 Urban Commons: Taxonomy

According to the extensive work of Alexandros Kioupkiolis in Refiguring the Common and the Political (2020), there are three major currents of commons thought. First, from the Nobel prize winner Elinor Ostrom and her works on the ‘commons of knowledge’ and polycentric governance. Second, the ‘new commons’ school where Yochai Benkler, Michael Bauwens, and David Bollier are the main lights focusing on the way communities organize, produce, and consume around digital ‘peer-to-peer’ technologies. Finally, the third strain of thought is the radical vision that does not accept collaboration between market or state entities. Instead, it envisions it as the only solution for the current private and state-led enclosures.

Independently of the school of thought, it is widely accepted that a commons is a three-dimension social institution constituted of collectively used and produced goods and resources (Kioupkiolis, 2020b). These are (1) common resources, which governance, production, management, and use are taken care of in a participative process by those involved, known as (2) commoners (Dellenbaugh-Losse et al., 2020; Iaione, 2015; Vesco,

2020). Furthermore, such commoners employ social practices known as (3) commoning. Commoning promotes, by design, values such as equality, openness, diversity, justice, and sustainability in their everyday practice (Dellenbaugh-Losse et al., 2020; Iaione, 2015; Kioupkiolis, 2020b; Vesco, 2020).

The implications of the commons under study become apparent after conducting a general taxonomy. Here, the urban commons unfold through the Italian context, which this paper focuses on.

As said before, any commons is a three-dimensional construct made of Resources, People (Commoners), and the practice of Commoning as a culture.

Resources are, in general, those non-commodified, tangible, or intangible goods or services used and managed by the commoners (Dellenbaugh-Losse et al., 2020). However, from the perspective of the urban commons, resources specifically refer to "all those urban spaces and services we consider "local commons" or "common spaces and services" (Iaione, 2016, p. 3).
Resources can be classified by their qualities (Dellenbaugh-Losse et al., 2020). Bollier (2009) in 'The Commons: A Neglected Sector of Wealth-Creation' synthetized the Ostrom (2010) findings on resource properties and classified them in three characteristics as their capacity to (1) exclude others from its use and benefit (excludability), (2) to get drained (depletability), and (3) to not allow others to use it simultaneously (rivalrous use).

The first thing to note in the People dimension is the difference between groups interacting with the urban commons. Only those responsible for the production, management, governance, and use of the commons are known as Commoners; everyone else is considered outer community or non-commoner users (Dellenbaugh-Losse et al., 2020).

The People dimension reflected in Table 1. Urban Commons Assessment Framework inspired from The Urban Commons Cookbook by Dellenbaugh-Losse, Zimmermann, and Vries (2020)., has three critical aspects. Two of them were taken from the Urban Commons Cookbook: Size and Custodians. The third was taken from Iaione (2016) as the five critical groups of actors (Quintuple Helix) to facilitate collaboration for both pro-commons policy-making and commons management.

Size matters, as the theory of Dunbar supports. Groups with less than 150 people tend to be more cohesive and with more substantial social capital, enabling more fluid decision-making (Dellenbaugh-Losse et al., 2020). However, digital technologies enable the scalability of human cooperation (Pazaitis, 2020; Riemer, Schellhammer, & Meinert, 2019). Thus, size might not be a relevant factor for fluid decision-making. However, it is vital to consider designing systems that can handle such bandwidth of interactions (Pazaitis, 2020). For this reason, it is essential to distinguish the types of interactions possible to be used by classifying people in roles:

The 5 group of actors presented by Iaione (2016) is an adaptation from the theoretical work of Loet Leydesdorff and H. Etzkowitz (1998). The helix presented by Iaione frames the quintuple helix as: "(1) social innovators, including active citizens, entrepreneurs, digital innovators, urban regenerators, and urban innovators; (2) public authorities; (3) businesses; (4) civil society organizations; and (5) knowledge institutions, including universities, schools, and cultural academies" Iaione (2016, p. 12).

Additionally, Custodians play a vital role within the urban commons domain. Their sense of belonging and long-term residency within high resident-migration areas enable them to nourish relationships with key stakeholders and engage in time-consuming activities such as the governance, management, and care of the commons (Dellenbaugh-Losse et al., 2020).

The importance of identifying these roles lies in system design implications, as each has a different set of rules known in the digital environment as permissions.

Commoning is the last dimension, and as is widely accepted in modern literature. The commons are more the practice of commoning than the resource in regard (Kioupkiolis, 2020a). Commoning refers to the practice of collective and collaborative management, decision-making, production, and usage of the involved resources to sustain a community around essential dimensions of social life and the environment (Dellenbaugh-Losse et al., 2020; Kioupkiolis, 2020a). Within the Commoning dimension, three key aspects are essential to the assessment framework: The Co-Governance layer, Community outreach, and Self-empowerment & Learning.

The "Co" part of governance implies a cooperative and collaborative decision-making process between political representatives, citizens, and other city-related stakeholders (Iaione, 2016). This co-governance layer is different from the one that Dellenbaugh-Losse et al. (2020) present. They state that the governance process lies on a non-public authority (referring to a citizen-led urban commons). However, the cases in Italy are polycentric in the sense that multiple stakeholders engage in cooperative and collaborative governance of the city, thus shaping it and making use of their right to the city (Iaione, 2016; Vesco, 2020).

The second aspect of commoning is Community outreach. Referring to how the commoners carry out communications strategies to expand their influence, enforce their agreements, and share the knowledge created in the process (Dellenbaugh-Losse et al., 2020).

As the community outreach, the Self-empowerment & Learning aspect strengthens the commoners' influence by updating and upgrading their competencies, knowledge, skills, and attitudes (Dellenbaugh-Losse et al., 2020).

Last but not least, the principles for a successful Commoning, gathered through the empirical analysis of Elinor Ostrom (1990), are essential to include because they directly show those must-have governance activities to be modeled.

Beyond the three dimensions of any commons, some other features do not enter within the available definitions. However, they repeat in literature as part of the characteristics or context-related content, and here the author presents them as cross-domains. The Urban Commons Cookbook (2020) groups explain them in an urban-specific context as Entry points and Property Rights, both available in detail within Table 1. Urban Commons Assessment Framework inspired from The Urban Commons Cookbook by Dellenbaugh-Losse, Zimmermann, and Vries (2020).

Entry points show the reasons making an urban commons emerge Charlotte Hess (2008). Naming the entry point of the urban commons in the study provides context for future researchers and policy-makers to find correlations and better comparisons.

Ostrom and Hess (2007) identified seven types of **Property rights** associated with the common property. By describing the property rights of the urban commons of choice, it is possible to clearly understand the boundaries that both commoners and non-commoners have regarding the use, access, and management of their space (Dellenbaugh-Losse et al., 2020).

3.1.2 Urban regeneration

Urban regeneration regards the management and planning of existing urban areas (Smith, 2004). This regenerative approach focuses on solving urban space issues to bring lasting improvements in the economic, physical, social, and environmental conditions (Roberts, 2000).

Until the nineteenth century, urban regeneration was considered a government duty (Mimi, 2003). Currently, local governance has decentralized its funding, decision-making, and agenda setting to other institutional structures (Mimi, 2003).

As pointed out by Mir (cited by Mimi, 2003), regeneration programs must aim to fulfil the people's own social objectives, while enhancing the image of the city.

These two last literature findings give step to polycentric urban commons.

3.1.3 The Italian Urban Commons: A polycentric and Law-supported type

Urban commons, in a general way, are those "resources in the city which the users manage in a non-profit-oriented and prosocial way" (Dellenbaugh-Losse et al., 2020, p. 7). However, this definition needs to be detailed and analyzed to avoid the popular error of

considering an urban commons every citizen-led initiative around public spaces (Dellenbaugh-Losse et al., 2020) and fit this understanding within the Italian context.

Dellenbaugh-Losse et al. (2020) mentioned, the non-profit-oriented and prosocial ways are vital aspects to consider when differentiating an urban commons from other types of public resources co-existing in the city. On these, urbanism and economics refer to 'congestion' as the state where an urban resource holds less offering capacity than the potential demanding for use (Dellenbaugh-Losse et al., 2020). This low capacity is usually treated through a value-exchange approach using the market as a proxy and looking at the citizen as a consumer. Instead, the urban commons empower citizens to co-produce solutions for addressing urban issues through a value-usage approach, where trust and participation are the currency of use (Dellenbaugh-Losse et al., 2020).

Another critical aspect differentiating the commons from similar initiatives is that the community and the management approach for protecting the shared resources are far more critical than the resource on its own (Dellenbaugh-Losse et al., 2020).

In the Italian context, both the Heteropolitics group and the Co-City researchers pay close attention to the politics and social interactions within the city. Vesco (2020) points out that the Italian urban commons result from engaging heterogenic city stakeholders in local politics using the law to institutionalize self-governance.

The Italian self-governance approach is a polycentric one due to the national recognition of citizen rights to take care and regenerate the city (Iaione, 2016). This recognition is detailed by the Bologna Regulation, which legally enables both citizens and organizations to develop and manage urban commons (Iaione, 2016). The Italian Urban Commons have followed the Bologna path, each experimenting their own approaches on polycentric governance (Vesco, 2020).

The definition of a polycentric governance system was decomposed by McGinnis (2016) into three core elements:

> (1) multiple centers of decision-making authority with overlapping jurisdictions (2) which interact through a process of mutual adjustment during which they frequently establish new formal collaborations or informal commitments, and (3) their interactions generate a regularized pattern of overarching social order which captures efficiencies of scale at all levels of aggregation, including providing a secure foundation for democratic self-governance (p. 5)

Foster and Iaione (2015) argue that polycentric governance is about providing public goods and services from independent and interdependent public and private institutions that are active in the city's governance activities. They conceive the act of local governance in between the market and the state through commons institutions. In this combination, they see polycentric governance as an evolved governance system that keeps the public sector as its primary host but not its only regulator.

This evolved governance system is being adopted and experimented in Italy by several cities (Iaione, 2016), which according to Vesco (2020), more than 230 cities have approved regulations to walk on the same path.

These elements make Italy a one-in-a-kind urban commons incubator, where local public spaces become urban commons with official recognition from national and municipal governments. Thus, urban commons can frame their norms for the management and governance of public spaces (Iaione, 2016; Vesco, 2020).

3.1.4 Urban Commons: Polycentric and collaborative urban planning

In general, citizens all over the world have increased their demands to have more open local governments that welcome genuine participation in shaping their city (McBride, Aavik, Toots, Kalvet, & Krimmer, 2019; Z. Khan, D. Ludlow, W. Loibl, & K. Soomro, 2014). This citizen-led pressure brought a wave of adaptations to the political systems turning them into more responsive, innovative, and open in including citizens and other city stakeholders, also known as participatory practices (Z. Khan et al., 2014).

These participatory practices led to an evolution from the top-down to a networked model that includes citizens and other stakeholders into contextual urban planning and policy-making (Z. Khan et al., 2014).

Thus, by using a polycentric lens to look at the Italian urban commons, the author understands the open and collaborative urban planning as a participatory process with multiple authority centers that cross different institutional jurisdictions. These centers learn to improve democracy through their interactions while producing goods or services for the common benefit.

McBride et al. (2019) acknowledge that the elements abovementioned foster the use of new technologies to allow all interested parties to engage in public participation for the common good. Moreover, Z. Khan et al. (2014) point out that, when participatory policy-making adds the use of ICT tools, it enhances the capacity to manage urban challenges both more intelligently and democratically, advancing towards a data-driven digital governance model of democracy (Z. Khan et al., 2014).

In the above context, ICT-enabled urban governance is covered as part of the literature review, supporting the understanding of digital decision-making processes.

3.2 Urban eGovernance

Using ICT technologies to support multi-stakeholder participation in governance activities is a popular topic that technological determinists assume will bring trust and efficiency enhancement (Lember, Brandsen, & Tõnurist, 2019). However, as Veiko Lember et al. (2019) presents in line with McBride et al. (2019), there is a lack of empirical studies showing how both ICT-based processes are institutionally embedded

and how these carry out with the practice of participatory governance. Furthermore, there is no single academic work around digital governance in urban commons.

Fortunately, as McKinsey Digital (2020) reports, within the damage that COVID-19 meant, a series of changes in the use of ICT technologies within all sectors came along, such as remote collaboration, cloud-based services, and data-driven management and governance, which, most likely will stay after the crisis. These changes have accelerated digital interactions in Europe by seven years, taking the continent from 81 to 95 percent on ICT adoption (McKinsey & Company, 2020; McKinsey Digital, 2020).

The above report of McKinsey provides a hint that current traditional public services are or have migrated into digital ones. Thus, an opportunity to research and map the digital governance of urban commons is uniquely found in this paper. eGovernance researchers, thus, have the opportunity to revisit their theoretical assumptions by looking at case studies like this.

In order to proceed on the endeavor of mapping such ICT-based eGovernance processes, this literature review will outline the definition of eGovernance, dive into its urban governance domain, and at the end, present the framework to employ for mapping specific aspects of it.

Governance

Larsson and Grönlund carried out an extensive literature review looking at nighty four eGov papers holding a dynamic and sociotechnical sustainability perspective, including social, economic, environmental, and technical areas. This perspective is in line with the commons' inherent design (Kioupkiolis, 2020b).

Governance "is understood as a dynamic process involving a multitude of actors with a large degree of independence, rather than just focusing on *government*, i.e. the bureaucracy and institutions of the public sector" (Larsson & Grönlund, 2014, p. 137).

In line with Larsson and Grönlund's definition, governance should be the term to use when talking about state and non-state actors participating in public decision-making (Buntinx, Crompvoets, Ho, Timm, & Wayumba, 2018).

In literature, the term eGov often covers both "e-governance" and "e-government" (Larsson & Grönlund, 2014). However, this paper only uses it to the governance perspective discussed below.

eGovernance

eGovernance means the distribution and execution of decision-making related to service and control tasks, to and by state and non-state actors, through electronic communication technologies (Larsson & Grönlund, 2014). However, as Larsson and Grönlund highlight, the leadership of the government is not taken away. The government can monitor and

control that these tasks comply with public values and public requirements such as fairness, accountability, and competence (Dawes, 2009; Larsson & Grönlund, 2014).

However, staying with the above understanding of eGovernance would be simplistic, as eGovernance is a complex socio-technical system for fulfilling the role of government in information management, both fed and constantly adapted by dynamic interactions from external pressures such as social trends and changing technology (Dawes, 2009)

Thus, eGovernance implies the constant adaptation of the political system due to social and technological pressures. The four levels of Pablo and Pan (Pablo & Pan, 2002)come in handy in detailing how eGovernance involves transforming the current decision-making process.

The first level refers to the transformation of the government's business processes into electronically driven. This level implies performing external and internal transformations regarding the simplification and enhancing of government services via online channels that require no more the assistance of public staff, thus being available 24/7 (Pablo & Pan, 2002). Achieving this level turns government into eGovernment, which is required to enable eGovernance.

The following three levels regard only to eGovernance.
The transformation of the foundational principles of governance is the second level. Here, governance opens up for multi-stakeholder participation, makes its processes transparent, and improves communications with all parties involved (Pablo & Pan, 2002).

The third and fourth levels refer to the transformation of interactions among stakeholders through electronic means. The third explicitly addresses a top-down approach, where the government is the central actor interacting with other stakeholders. At the same time, the fourth level refers to a bottom-up approach where citizens and grassroots organizations interact with each other and with other stakeholders (Pablo & Pan, 2002). This last level is what Pablo and Pan refer to as the emergence of the "e-society."

These four levels of Pablo and Pan (2002) are helpful when talking at the local level. On this level, Jiang, Geertman, and Witte (2020) refer to eGovernance as the "smart urban governance." Their perspective refers to eGovernance as the dynamics of bottom-up and top-down interactions that shape both the city and the modes of governance with a social, technological, and hyper-contextual approach.

Urban Governance
Urban governance refers to the negotiations between the state and non-state stakeholders regarding planning, management, and finance to allocate social and material resources (Avis, 2016).

Slack and Côté (2014) give four critical characteristics from the urban scope to underscore:
(1) the critical role urban governance plays in shaping the city at both its physical and cultural aspects, (2) the influence that urban governance directly has on the quality, quantity, and efficiency of local services, (3) the sharing of costs and tasks as a result of iterative negotiations among city stakeholders, and (4) that its urban governance structure impacts on two ways, first by directly enhancing or inhibiting the access of citizens to engage in decision-making, and second by shifting the citizens' perspective on believing to have a government that is genuinely open, transparent, inclusive, responsive, and accountable.

This perspective of urban governance, where multiple stakeholders engage in city-related decision-making, costs and tasks sharing, and a collaborative and cooperative management structure, is what Iaione refers to as the urban co-governance, which is what the urban commons use in Italy (Iaione, 2016). Thus, urban co-governance needs further explanation.

The Italian urban co-governance model

Urban co-governance results from merging two social science trends: co-management of services and co-production of urban commons, and then distilled into four layers that define the co-governance model: shared, collaborative, cooperative, and polycentric (Iaione, 2016). These layers aim to foster the participation and engagement of multiple city stakeholders into shaping the city as a commons, improving social justice, and revitalizing democratic values (Iaione, 2016). Being digital tools is the key to facilitating cooperation and collaboration among all parties involved (City of Naples, 2018). The explanation of these four layers comes below:

The Shared Governance layer is the foundation that needs to be solid to advance into the other layers. Shared governance starts by recognizing citizens as actors with the capacity to engage in improving the city, solving community or neighborhood level problems, mainly regarding urban public and green spaces (Iaione, 2016). Shared governance is legally enabled through the Art. 118 of the Italian Constitution, which states that "groups of "organized citizens" could present operative proposals to implement easily achieved projects that do not place any burden on the public authorities" (Iaione, 2016, p. 423).

The city of Bologna pioneered in bringing down to the local level what the Italian Constitution enabled for shared governance (Iaione, 2016; Vesco, 2020). Bologna implemented the "collaboration pact" as a legal tool along with its formal regulation. Citizens are legally allowed to take care of the urban commons, and the local public administration is legally obliged to provide technical support and assistance (Iaione, 2016).

The Collaborative governance layer is a more active layer regarding the governance of common-pool resources (Iaione, 2016). Most importantly, it means gathering multiple

actors to work together to reach a common goal, that otherwise separately, they would not achieve (Amsler, 2010; Iaione, 2016).

One can distinguish the collaborative governance layer from the shared governance by how and who uses it. The collaborative layer still uses the collaboration pacts. However, it differentiates by putting multiple stakeholders[1] (with multiple interests) within the same structure to build a common ground for reaching a shared cause (Iaione, 2016).

The polycentric governance layer takes the previous two layers into the co-design of the governance itself (Iaione, 2016). It recognizes the distributed networks of collaboration and their actors (in this case, the urban commons) as autonomous of decision-making within their space of action, acting with a common goal of generating public value for the city and their living space.

It is essential to say that this layer encompasses within a system where other networks of collaboration (urban commons) exist, and each competes and cooperates, learns from their interactions, and engages different governmental institutions in their assistance and support (Iaione, 2016). Thus, taking care of the city and tackling neighborhood and city-level challenges does not rest anymore in the government's obligation, capacity, and interest, but of all citizens, public officials, private, civic, and knowledge organizations co-existing in the city (Iaione, 2016). This co-governance approach makes sense when scholars locate the commons, and more specifically, the urban commons in between the market and the state (Bollier, 2009; Dellenbaugh-Losse et al., 2020; Iaione, 2016; Ostrom, 2010), as is the overall city cooperating for making itself.

The cooperative governance layer refers to transforming local public utilities into co-owned, co-produced, and co-delivered services by a cooperative structure where all stakeholders (as citizens) own and manage them (Iaione, 2016). Iaione classifies this layer in between the collaborative and polycentric. However, the author decided to leave it at the end for a more explicit narrative, as this layer includes economic perspectives that the previous layers do not.

Polycentric urban eGovernance

The literature took the reader and the author from governance to eGovernance, to urban governance, to polycentric urban governance. A synthesis of these concepts will clarify the understanding of the polycentric urban eGovernance of the commons.

As said before, there is an increasing demand for the citizenry to participate in decision-making; furthermore, there is an abundance of urban-related digital media data coming from citizens (Saad-Sulonen, 2013). This data holds great value for urban planning and

[1] The categories of stakeholders that the co-governance model recognizes: active citizens or social innovators, public authorities, private companies, civil society organizations, and knowledge institutions Iaione and Cannavò (2015)

governance (Saad-Sulonen, 2012). However, as Saad-Sulonen (2013) has pointed out, collaborative governance has not yet addressed the digital dimension for urban commons.

On this digital dimension, Iaione (2015) comments that citizens have at their disposal several tools for contributing their time and resources to the community. However, among the authors reviewed, he is the only one that talks about the available digital tools. Unfortunately, most of the tools Iaione (2015) presents are not any more online. Moreover, the digital dimension topic within urban commons has is often commented, but not studied.

Thus, a self-made definition of polycentric urban eGoverance of the commons is:

"The use of electronic communication technologies to engage both state and non-state actors into constant negotiations, task distribution, and sharing costs for taking care of the city and tackling local urban challenges, that no single actor could solve by itself. All within a distributed network where each urban commons is autonomous to define their norms and actions."

Conclusion

This literature review started from the research inquiry to understanding how urban commons benefit society from their acts; however, COVID-19 stopped every activity that included gatherings. Thus, the urban commons were challenged to evolve and look for alternative solutions to continue existing. Here is where the author changed direction due to the intrigue of understanding the adoption urban commons had to take for going from physical decision-making to digital governance.

The literature review served to explore and validate the first assumption that COVID-19 pushed governments and city stakeholders to adopt digital strategies. Thus, it opens the opportunity to study digitalization processes within the public sector, more specifically those relating to the governance of the urban commons, as there is currently no single research on this matter.

From this literature review, the author makes the question: How do the urban commons engage in co-governance activities during the covid-19? However, as co-governance implies a broad spectrum of practices, the research question will focus on policy-making and participatory urban planning as a type of activity covered by the urban commons (Iaione, 2016), matching with a common interest topic for eGovernance researchers (Z. Khan et al., 2014). Therefore, the research question is:

> How do urban commons carry out urban planning and policy-making in times of covid-19?

The following theoretical framework guides the endeavor of solving this research question.

3.3 Theoretical framework

Before proceeding to the theoretical framework, it is to note that the author will employ the research translation model of Giles-Corti et al. (2015) to guide the development of a research that can be used for improving current eGovernance systems. The author commits to employ the following four strategies:

(1) Linking the research question to local policy improvement. (2) Have a research method that facilitates the development of policy recommendations. (3) Disseminating findings to policy-makers and practitioners. Finally, (4) Communicate to policy-makers the implications of the findings. The author will fulfill these last two steps by carrying out two presentations regarding its findings, one to policy-makers in Turin and the second to practitioners in Reichenau an der Rax, Austria. Also, it will allow others to take these presentations and continue the advocacy for improving our eGovernance systems.

The Figure 1. Processes, partners, and strategies that differentiate non-policy relevant and policy-relevant research practice. of Giles-Corti et al. (2015) shows the aforementioned logic.

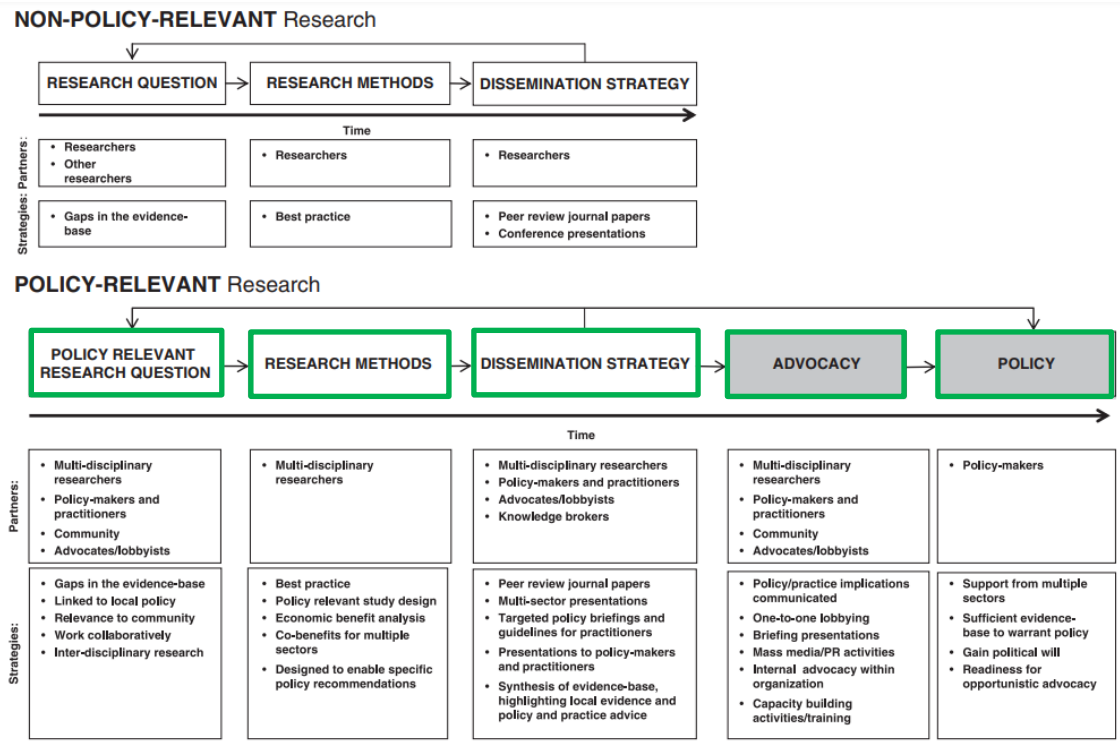


Figure 1. Processes, partners, and strategies that differentiate non-policy relevant and policy-relevant research practice. Reprinted from "Translating active living research into policy and practice" by B. Giles-Corti et al., 2015, *Journal of Public Health Policy Vol. 36*, p. 234

3.3.1 Urban commons: An Assessment Framework

This framework aims to help researchers and policy-makers understand the context of the urban commons under study, enabling comparison and objective criticism to enrich the commons' knowledge field. Simultaneously, the framework also aids the author in understanding the design implications of the actual structure and rules of the urban commons.

The author created this framework mainly from the empirical findings and literature review of Dellenbaugh et al. (2020). Several authors' contributions complement this framework, such as Christian Iaione's (2016) categories of urban resources, collaborative governance layers, and his quintuple helix adaptation from Leydesdorff and Etzkowitz (1998). Iaione's contributions are significant as more than 12 cities use them in turning their cities into commons (LabGov, 2018; Università degli Studi Guglielmo Marconi, 2020). Also, his academic contributions are one of the most important within the urban commons field (Kioupkiolis, 2020b).

Additionally, the contributions of Hess (2008) in identifying the entry points provide clarity on the context of the studied commons, and the combined knowledge of Ostrom and Hess (2007) on property rights helps to identify the restrictions for each type of member and user.

The well-studied Ostrom principles (2010) are a must in every design regarding the commons. Therefore, they are an essential part of the framework as well as the resource's properties, initially defined by Ostrom (1990) and later synthesized by Bollier (2009).

The author created the framework present in Table 1 exclusively for this paper by inspiration from all the scholars mentioned above. However, it might help other researchers in studying urban commons, independently if they are Italian or not. Moreover, the framework includes questions to gather both the contextual understanding of an urban commons and modeling requirements. In this research, the framework has three main uses:

First, as a logical model. The framework aims to classify those urban initiatives present at the city of study. Using the urban commons assessment framework, the author can filter among the available urban commons to find one that provides the richest information. A detailed explanation of the framework as a logical model is present in the Methodology section.

Second, the framework serves as the theoretical lens. This theoretical lens provides clear context regarding the type of resource protected, the properties of the community around it, and both the governance and management approaches used by the commons. Detailing the information will allow further researchers to compare it, criticize it, and enrich the knowledge field.

Third, the questions framed in it enable both the reader and the researcher to engage in a modeling endeavor, adding confirmability, credibility, and validity of the findings.

Lastly, it is important to say that the framework's dimensions and aspects are briefly explained in this paper. For deeper information, check the Urban Commons Cookbook of Dellenbaugh-Losse et al. (2020).

Dimension	Aspect	Framing questions
	Type of urban resource	Is this (1) an abandoned space? (2) an underutilized infrastructure, or does it relate to (3) taking care of public space?
Resources	**Depletability**	Can the resource be 'used up' or not?
	Excludability	Can access be limited or controlled?
	Rivalrous use	Does one user's use take away from others' enjoyment or ability to use the resource? Can two users use the resource at the same time for different uses?
	Club good	Does the resource require a membership to be used?
	Semi-private	Does the resource involve private and shared property rights?
People	**Size**	What is the number of commoners?
	Custodians	Are there some key commoners safeguarding access to resources in a prosocial way?
	Helix	Which of the five helices are involved in the commoning?
Commoning	**Co-Governance layer**	Does it use a Shared, Collaborative, or Polycentric governance layer? Does it use Cooperative strategies?
	Community outreach	Do the commons communicate with commoners, outside-community, and political decision-makers? How?
	Self-empowerment & learning	Do the commons provide opportunities for participants to learn and develop competencies, knowledge, skills, and attitudes? Do the commons share insights and knowledge with the community? How?
	Principle 1	Which are the group boundaries? Are they clearly defined?
	Principle 2	How do the commons align its governance rules with the local needs and conditions?
	Principle 3	How can those affected by the rules participate in modifying the rules?
	Principle 4	How are the agreements made within the urban commons respected by outside authorities?
	Principle 5	How is the members' behavior monitored and controlled?

	Principle 6	How does the sanctioning system apply? Is it graduated?
	Principle 7	How does the dispute resolution mechanism apply? Are they accessible in cost and time to all members?
	Principle 8	What process do regional, national, and international stakeholders need to follow to collaborate with the urban commons?

Cross-domains

Property rights	**Access**	Can anyone enter the physical area and enjoy non-subtractive benefits, or does it requires special access rights?
	Contribution	How is the external community able to contribute to the improvement of the urban commons?
	Extraction	Can anyone extract resource units or products? If yes, which and how?
	Removal	Can anyone remove a previously contributed artifact? How?
	Management/ Participation	What do people require to participate in managerial or operative roles?
	Exclusion	How are rights for access, contribution, extraction, and removal taken, by whom, and how are they transferred?
	Alienation	Is it possible to sell or lease management and exclusion rights? How?
Entry points	**Protection**	Were the urban commons started due to the need to protect the resource from enclosure, privatization, or commodification?
	Inspiration	Was it started from the inspiration of digital p2p mass collaboration?
	Anti-Tragedy	Was it started from the need to avoid an evident tragedy of the commons?
	Education and Commoning	Was it started from the desire to build civic education and commons-like thinking?
	Evolution opportunity	Was it started due to the identification of new or evolving types of commons available to engage with?
	Rediscovery	Was it started from a rediscovery exercise of the potential of the commons?

Table 1. Urban Commons Assessment Framework inspired from The Urban Commons Cookbook by Dellenbaugh-Losse, Zimmermann, and Vries (2020).

3.3.2 ICT-enabled Policy-Making framework

In the context of an urban eGovernance framework, an ICT-enabled policy-making model serves as a guide for identifying three main things: (1) the stages where stakeholders interact with, (2) the tasks they are responsible for, and (3) the technology or infrastructure used.

The framework the author presents is an adaptation that Z. Khan et al. (2014) made previous research on the policy cycle. The value of this policy cycle lies that, on one side, it distinguishes within academic works by being the first model-driven approach created through both empirical and detailed theoretical supports (Javed, Khan, & McClatchey, 2017). Also, it is to mention that it holds a polycentric perspective where multiple stakeholders converge, distributing tasks to co-produce policy-making (Javed et al., 2017).

On the other side, its value resides in considering ICT as an enabler for semi-automating and enhancing the socio-technical interactions of the policy-cycle such as data collection, modeling of scenarios, processing, and analysis of information, as well as communicating results in graphical meanings (Kraemer, Ludlow, & Khan, 2013).
Besides the technical part, this ICT-based policy cycle comes from studying different European cities, among them Bologna (Kraemer et al., 2013). This last fact is important to bear in mind, as Bologna is considered the pioneer among urban commons and polycentric urban governance in Italy (Iaione, 2016; Kioupkiolis, 2020b).

Furthermore, even if Z. Khan et al. (2014) provided the policy-cycle model, they did not provide any other detail. To fill this gap, the author included the list of tasks that Javed et al. (2017) described for each stage. Then the author added a set of questions to facilitate the process of gathering data.

Regarding the use of the framework, Javed et al. (2017) observe that the tasks mentioned above do not have a mandatory chronological order within their stages. Some of them might not even be required, as they depend on contextual agreements. However, the general structure of the model lies in order. For example, the “implementation phase cannot be executed before agenda setting phase” (Javed et al., 2017, p. 71).

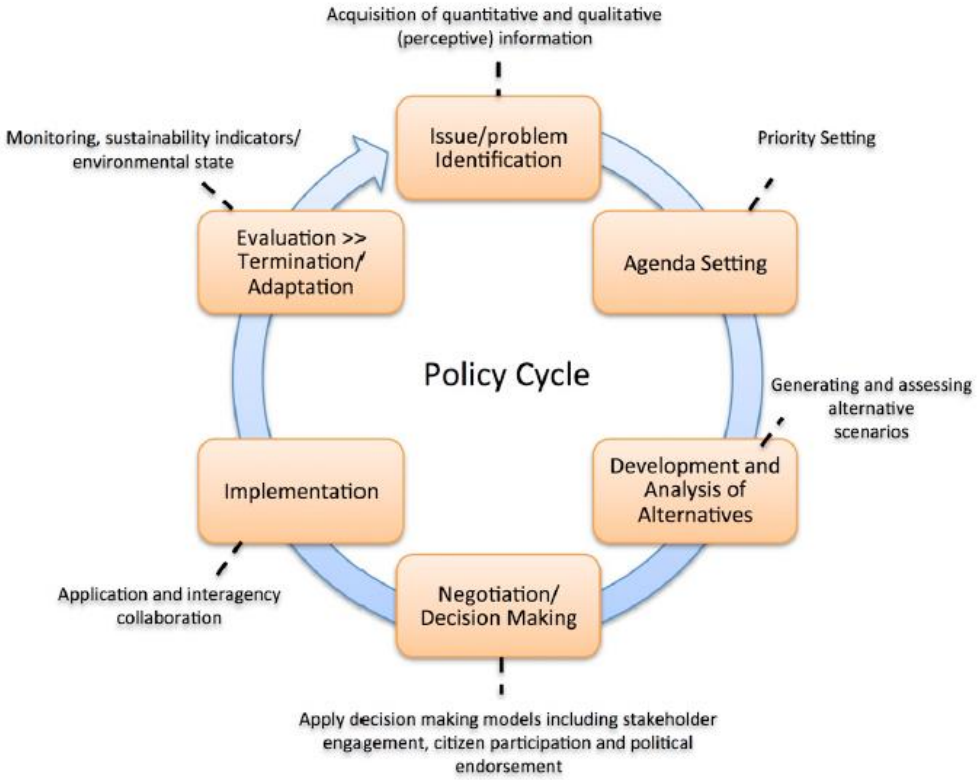


Figure 2. A Generic Policy-Making Cycle. Reprinted from "ICT enabled participatory urban planning and policy development" by Z. Khan, D. Ludlow, W. Loibl, K. Soomro, 2014, Transforming Government: People, Process and Policy, p. 2

Stage All collected from Z. Khan et al. (2014, p. 2)	**Tasks** All collected from Javed et al. (2017, pp. 70–71)	**Framing questions** Original contribution
Issue/Problem identification [Acquisition of quantitative and qualitative information]	Collect domain-specific data: • acquisition of qualitative and quantitative data • review of collected data/reported issue	How do you recognize there is a problem? How do you report it? Which qualitative/quantitative data gathering techniques do you use? Are there any role-based restrictions? Such as capacity to report a problem, permission to gather data, etc.

		Which software/technology do you use for reporting a problem, gathering data, or reviewing it? Who collects this data? Where is it stored?
Agenda setting [Priority setting]	Validation: • evidence gathering for objective or subjective validation • analysis of gathered evidence	What steps do you follow to gather the information to support the problem identification? How do you analyze the evidence? Is there any specific technology/software for this? Who does this? Who collects this data? Where is it stored?
Deployment and analysis of alternatives [Generating and assessing alternative scenarios]	Challenges and opportunities identification: • specification of goals • data collection from diverse sources • collection of opinions from stakeholders • analysis of collected data Determination of solution approaches and strategies	How are the goals decided? What steps are followed? Who participates in this goal setting? Which technology/software do you use for this? From where do you collect information? How is the opinion of other stakeholders collected? Who is asked to participate? How do you analyze the data collected? Is there any specific technology/software for this? Who collects this data? Where is it stored?

	• develop a range of options • analysis of options	How and how decides the strategy follow? Who participates in that decision? How do these stakeholders participate? What technology/software do they use? Where is the data stored?
Negotiation/Decision-making [Apply decision-making models such as stakeholder engagement, citizen participation, and political endorsement]	Formal Consultation • collection of residents' opinions • stakeholders' engagement • assessment of opinions Final Decision and approval • weighing of policy options in the political context Policy Formulation • draft policy based on policy options Design implementation and monitoring plan • actions to be taken for	Once potential solutions are chosen, are these put to formal consultation? If so, what is the process to do so? Which are the stakeholders covered? Whose responsibility is to make the consultation? What channels are used? Which technology/software is used for this? Is the result of decisions guaranteed to happen? How are these enacted? Who enacts them? What are the roles involved? Is the result of decisions transparent and publicly available? Where are they stored? Who stores them? Where are policies drafted? Who drafts them? What technology/software is used for drafting them? Who participates in the design of the implementation and monitoring plan? What process is followed to design it?

	implementation and monitoring	
Implementation [Application and interagency collaboration]	Interagency collaboration • collection of data • selection of relevant implementation body Development of regulation/legislation Collection of data – also called monitoring data • identify critical indicators of monitoring	What software/technology is used for enabling interagency collaboration? How is communication between polycentric stakeholders carried out during the implementation? How do polycentric stakeholders engage in pushing forward the legislation decided? Is any type of ICT used for this? Who and how decide the key indicators monitor?
Evaluation → Termination/Adaptation [Monitoring of indicators]	Monitoring • collect evidence • analyze data collected as per specified indicators • collect views/feedback of users, including citizens • analyze collected views Evaluation	Who collects the evidence for monitoring? Which technologies/software is used for collecting the evidence? Is there any indicator dashboard used for analyzing/viewing data? How do citizens and other stakeholders participate in this monitoring process? Who performs the administrative and judicial evaluation of the results? Who performs the impact evaluation? What technologies/software is used for these?

	• Administrative and judicial evaluation • Impact evaluation	

Table 2. ICT-based policy-making framework detail from Z. Khan et al., 2014 p.2, and Javed et al., 2017, pp. 70-71

The questions mentioned above aim to facilitate modeling the eGovernance process used in urban commons policy-making. For modeling, a language of modeling and a framework to follow are needed.

3.3.3 Modeling the Urban Commons eGovernance through an Enterprise Architecture approach: ArchiMate

There are two major categories of modeling languages for modeling public sector digital transformation: Enterprise Architecture and Goal Modeling languages (Foulidis, 2013). The Enterprise Architecture approach serves to draw on a comprehensive way, for both technical and non-technical stakeholders, the structures and actions that an organization uses to achieve its current objectives while also mapping the changes needed to achieve its desired vision (Baker, 2020). In contrast, the Goal Model approach is practical when designing a process from zero, as it focuses on understanding the "why" and "how else" reasoning for reaching defined goals (Foulidis, 2013; Yu & Mylopoulos, 1998).

The choice of an Enterprise Architecture (EA) modeling approach comes from two reasons. On one side, other researchers such as Baker (2020) and Foulidis (2013) prove EA as a suitable modeling approach for governmental-based systems with a complex combination of centralized and decentralized decision-making. In addition, they argue that EA is suitable for modeling an organization with highly differentiated interests, tasks, and processes that are also interdependent and connected to the outside environment.

On the other side, the future-oriented Master of Science in Public Sector Innovation and e-Governance program prepared the author of this paper with the necessary knowledge to facilitate digital transformation through the EA perspective (PIONEER, 2018).

In Enterprise Architecture (EA), a standard modeling language in academic works and professional practice is ArchiMate. Public sector researchers, as Foulidis (2013) and Baker (2020), point ArchiMate as a suitable language for modeling efficient and detailed models with multiple stakeholders. They argue their choice is due to its flexible and straightforward modeling language with a small set of symbols, facilitating its understanding to multiple types of stakeholders (Baker, 2020; Foulidis, 2013).

3.3.3.1 ArchiMate

A description of ArchiMate is necessary to understand the scope, limitations, and approach the author is taking when modeling, so the reader can reach the same results, thus, adding confirmability, credibility, and validity of the research findings.

To reach this common understanding, the author takes the ArchiMate Core Framework from The Open Group (2019) in Figure 3 and explains it regarding the urban commons and the urban eGovernance perspective.

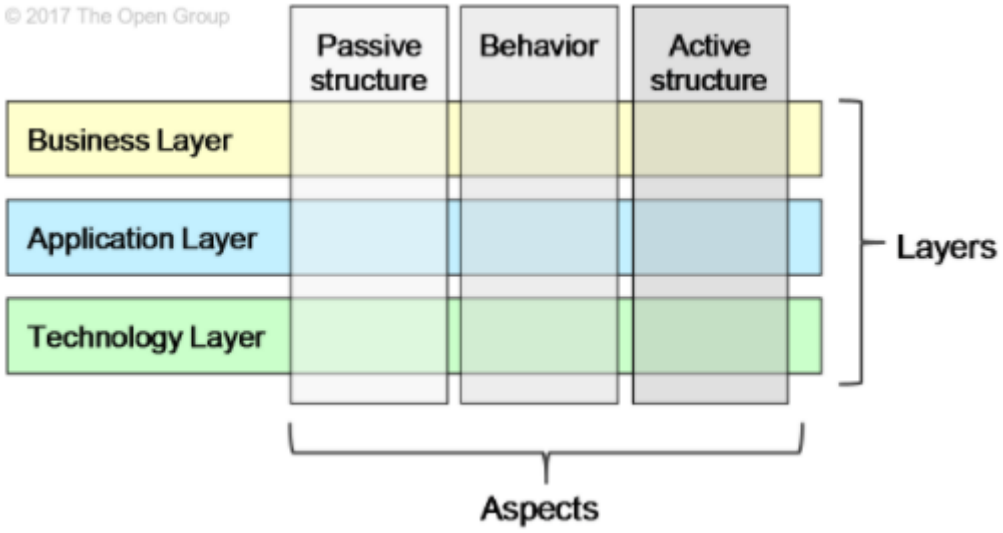


Figure 3. ArchiMate Core Framework

The framework consists of two main dimensions, Layers and Aspects. From the five available layers, three represent the core of ArchiMate: Business, Application, and Technology (The Open Group, 2019). The author omits the Strategy and Implementation & Migration layers as they are out of the scope of this research.

Based on the experience of Baker (2020) and Foulidis (2013), and in this research context, the three core layers are as follows. The Business layer represents the policy-making process performed by the business actors, in this case, the state and non-state entities participating in the governance of the urban commons. The Application layer supports the policy-making process through ICT-based application services. The Technology layer represents the infrastructure services such as computers, communication hardware, and system software to realize the ICT-based applications.

Regarding the aspects, ArchiMate bases its modeling language in “natural language, where a sentence has a subject (active structure), a verb (behavior), and an object (passive structure)” (The Open Group, 2019, Chapter 04). It is to be noted that, while the motivation aspect provides context for understanding the models, the urban commons framework description already fulfills this purpose. Thus, the author chose to model only the core ArchiMate aspects.

As said before, the active structure refers to the subject or entity capable of performing a behavior (The Open Group, 2019). These entities subdivide into internal and external. In this paper, the internal active structure represents the state and non-state actors, components, and devices forming up the Business, Application, and Technology layers of ArchiMate, that engage in urban commons eGovernance. The external active structure represents the interfaces or external views where the interaction happens (The Open Group, 2019). In this paper, external active structures are the websites, apps, or sites that the stakeholders interact with.

The behavior aspect is the verb within the sentence that the actors and entities perform. They are modeled as units of activities representing processes, events, functions, and services to execute (Foulidis, 2013; The Open Group, 2019).

Finally, the passive structure aspect represents the object where the verb is applied; these can be tangible and intangible (The Open Group, 2019). In the context of this research, the passive structure represents the information and data objects collected, as well as the urban resources.

Besides this brief context-based explanation, the author bases its modeling guidelines on ArchiMate® 3.0.1 Specification document by The Open Group (2019).

3.4 Summary

The scope of using ArchiMate to model the urban commons eGovernance focuses strictly on the policy-making process described in Figure 2. A Generic Policy-Making Cycle. Reprinted from “ICT enabled participatory urban planning and policy development” by Z. Khan, D. Ludlow, W. Loibl, K. Soomro, 2014, Transforming Government: People, Process and Policy, p. 2. The modeling scope refers to the three core aspects and the three core layers of ArchiMate, as covering this is enough to provide a well-understanding organization through multiple viewpoints (The Open Group, 2019). The context, rather than being modeled, will be explained by the Urban commons: An Assessment Framework.

The benefits of this approach are several. First, the language model allows a graphic understanding of the processes performed from each of the stakeholders' points of view. Second, it allows understanding who performs what tasks, when, and through which services and technologies; thus, it enables understanding what is needed to run an eGovernance process of similar characteristics. Therefore, researchers and practitioners can see the results as an example model to modify for different contexts. For this reason, the author chose only to include the core modeling language framework.

Lastly, viewing the model while describing the urban commons in a written form adds confirmability, credibility, and validity to the research by the reader analyzing and comparing the results separately.

The limitation of this approach is mainly one. The modeler permanently imprints its style when modeling; thus, different models would result if tried by other researchers. However, this limitation is mitigated by separating the urban commons assessment and policy-making frameworks, so the reader can validate which evidence supports the model.

3.5 Case Study

This case study taps upon two main novel areas. On the one hand, the urban commons research area holds a vast theoretically-based literature, but on the practical side, adoption by cities remains a niche. On the other, as seen before, COVID-19 accelerated the process of digitalization within all sectors, including the public one.

Italy represents the best place to research the novel areas mentioned above for two reasons. Italy is a pioneer in implementing polycentric urban commons (Kioupkiolis, 2020a). Italy also reached 95% in service digitalization (McKinsey Digital, 2020).

Therefore, it is an excellent opportunity to research an Italian city employing a polycentric eGovernance strategy to regenerate and maintain its urban commons. For this, the work of Vesco (2020) suggests that there are three main cities with urban commons active strategies: Bologna, Turin, and Naples. Bologna is the true pioneer and the most advanced in the matter (Iaione, 2016; Kioupkiolis, 2020a; Vesco, 2020). Two hundred thirty municipalities adopted Bologna's original regulation (Vesco, 2020). However, Bologna's model is a top-down approach for managing the urban commons, while Turin and Naples developed a meet-in-the-middle approach (Vesco, 2020). Naples was the first city to move forward with this approach, whereas Turin has been learning and adapting it to its reality (Vesco, 2020).

Turin, however, seems a more interesting city to study as it received a budget from UrbAct to support carrying out a guided process on activating the urban commons (UIA - Urban Innovative Actions, 2018). There are several interesting factors to note: First, Christian Iaione was the scholar in charge of this project; thus, the theory presented in the literature review applies directly to the city's case. Second, the author received direct acceptance from the city of Turin to carry out this research. Third, even if the project of Co-City in Turin ended in 2019 (UIA - Urban Innovative Actions, 2018), UrbAct supported them with another round of budget for continuing the development of the urban commons (URBACT, 2021).

For this paper, the author will analyze and model an urban commons from Turin. Below, the author presents the relevance of Turin within the urban commons and polycentric governance perspective, followed by the methodology to carry out the research agenda.

3.5.1 Turin

Turin was the first capital of the Italian Kingdom. Today is the capital city of Piedmont and one of the leading industrial centers of Italy (Wikipedia, 2021). Turin is a

transformational leader known as “the cradle of Italian liberty” due to the historical, social movements rising from this city (Vesco, 2020; Wikipedia, 2021). Today, Turin is a globally recognized creative hub (UNESCO, 2014).

The city of Turin holds 857,910 people, split up into eight districts called *circoscrizioni* (Istat, 2020).

Turin runs a citizen-based policy framework called “The Neighborhood Houses” since 2006. This initiative prepared the environment for commons-based participation (UIA - Urban Innovative Actions, 2018). Chiara Appendino, Mayor of Turin, shares the vision of using collaborative engagement to regenerate the public urban spaces that are abandoned or underused, which are around 1600 buildings (Urban Innovative Actions, n.d.).

Turin’s commons-based perspective of the city is not starting from zero. The experience of Bologna and, most importantly, Naples gave the city many lessons from which piggyback (Vesco, 2020). Also, regarding the use of ICT, Turin already experienced implementing a digitalization process to facilitate citizen participation (UIA - Urban Innovative Actions, 2018). Moreover, Turin received European funding of 4,125,891.44 euros for deploying during three years a guided commons-based regeneration led by Christian Iaione and Giovanni Ferrero (Urban Innovative Actions, n.d.).

Turin, like Naples, serves as a strong ambassador for spreading the rhetoric of the urban commons and its regeneration practices to other Italian cities and other parts of the world (Vesco, 2020).

Political context

The local administration uses the term common good and the rhetoric of the commons to signalize its proximity to the people (Vesco, 2020). However, there is fragmentation among the groups using the term, as there are three main subgroups: (1) Experienced stakeholders with both local administration and civic participation, (2) Artists holding antagonistic movements to the local administration, (3) Unexperienced young people negotiating for the first time with local public institutions (Vesco, 2020). Also interesting is that the politicians promoting commons-based governance are first-timers in city governance (Vesco, 2020).

Vesco (2020) analyzes the city of Turin through the case study of the Cavallerizza commons, which from his perspective, was the only actual urban commons in the city.

The engagement in governing and managing the commons by these sub-groups shapes the urban commons' understanding, power relations, and political action. These groups shape the urban commons by classing their interests and visions while aiming for the common goal of regenerating a public space historically underused or abandoned (Vesco, 2020).

The experienced, not experienced, and artists fought for the right to regenerate and recover abandoned public spaces. They started by taking decisions through assemblies, and later some decisions became captured by some of the most active members without communicating or consulting with others (Vesco, 2020).

Also, important to say is that, even if the local administration of 2014 was a center-left wing, the plan for managing the commons was a for-profit, which caused the clash between the sub-groups and the local administration, causing the self-organized occupation (Vesco, 2020).

Since the Republican period of 1946, the left-wing has been the majority in political representation, formally converging the communist and socialist parties into a center-left wing of the Democratic left, which has governed the city since 1993 (Vesco, 2020). Ironically, the so-called center-left government was the one carrying extremely neo-liberal policies (Vesco, 2020). The hegemony of the center-left was swiped away in 2016 when the 5 Star Movement party (5SM) won the elections (Vesco, 2020).

The 5SM is required to call into the political context of Turin, as it is the party in function (at the moment of writing) and the one supporting the emergence of the urban commons (Vesco, 2020).

Vesco (2020) does not classify 5SM in a specific political wing side. Instead, he mentions it as a heterogeneous political mix. However, he mentions that many of the actors involved in the commons belong to the left-wing inside the party.

When Vesco (2020) wrote about Turin and the Cavalerizza commons, the Regulation on Urban Commons was approved but not yet applied. He recognizes Co-City as a project different from Cavalerizza, which can embody the urban commons regulation. However, at the moment of his writing, the Co-City project did not yet comply with the commons ideal.

Here, three things are to consider. (1) The Cavalerizza occupation got evicted in 2019 (Vesco, 2020). Thus, there is no possibility to model the eGovernance process taken by two urban commons projects coming from different streams. (2) Vesco focused his ethnographic research on Cavalerizza, which its complexity might not have left room for keeping track of the development of Co-City. Three, Co-City is a project supported from its start by European, National, and Local level institutions, to carry on a transition towards a "1) Collective Governance; 2) Enabling State; 3) Social and Economic Pooling; 4) Experimentalism; 5) Tech Justice" (UIA - Urban Innovative Actions, 2018, p. 11). Thus, Co-City seems more likely to develop resilient mechanisms such as eGovernance to sustain its continuity during the Pandemic.

Social context

Vesco (2020) categorizes social activists into two types. First, those from the "Occupied and Self-managed Social Centers" (CSOAs in Italian), which are closed in their groups,

are homogenous in economic status, ideology, and range of occupation. These characteristics form a barrier to external collaboration and cooperation (Vesco, 2020).

Moreover, those within the urban commons structure are heterogenic regarding their economic status, work occupation, and interests. They converge with the common goal of regenerating the place for the benefit of all (Vesco, 2020).

On the other hand, Co-City classifies the people involved through the quintuple helix approach (UIA - Urban Innovative Actions, 2018). Looking at the type of stakeholders participating in the pacts of collaboration (UIA - Urban Innovative Actions, 2018), it seems that Co-city has an even wider variety of participants than Cavalerizza.

Digitalization

The Cavalerizza commons, studied by Vesco (2020), carried out their decision-making through physical assemblies, using at first ICT solutions, such as Facebook, only for communication purposes.

During the pandemic, when physical meetings were not allowed anymore, the members of Cavalerizza continued their meetings on the online world (Vesco, 2020). Vesco does not deepen on the ways of meeting. However, looking at the Cavalerizza Irreale Facebook page, one can understand that meetings continued through Zoom. Nevertheless, there is no further information on their protocol for making decisions on their Facebook page (Cavallerizza Irreale, 2020) or other sources.

On the other hand, Co-City started with a perspective of "Tech Justice," where digital infrastructure and access to technology are recognized as enablers for carrying out successful urban commons (UIA - Urban Innovative Actions, 2018). In 2018, Co-City got support from the Italian Agency for digital development, which consisted of co-designing social and digital innovation partnerships (UIA - Urban Innovative Actions, 2018). Additionally, the Urban Innovative Actions Initiative (UIAI) supported the digitalization process, raising awareness of digital tools to enable social and digital innovation partnerships within public procurement (UIA - Urban Innovative Actions, 2018). Thus, the chance of Co-City developing an e-Governance style to continue the operation of its urban commons is higher than from any other initiative.

In collaboration with the network of Neighborhood Houses, the University of Turin developed a digital platform for citizen participation called "FirstLife" (UIA - Urban Innovative Actions, 2018).

FirstLife "combine[s] the virtual and physical dimension, involving different types of users in the central areas of the city as well as in the suburbs in this wide action of urban regeneration to fight poverty and social exclusion" (UIA - Urban Innovative Actions, 2018, p. 2). Unfortunately, this platform is currently out of use and out of support. However, a first personal communication with the current Co-City manager, pointed out

that the Co-City urban commons in Turin keep having digital-based meetings. Thus, there is an opportunity to assess and model their process of governing the commons.

Conclusion

Turin is a city of constant transformation. Turin sheds light on other Italian cities and the world by experimenting, failing, learning, and never surrendering to social oppression. Turin is a city of leaders and innovators on social movements. Today, in the XXI century, Turin shows the path to transform the city from a top-down approach to a meet in the middle, where the State is the composition of the people. Thus, the city is shaped by constant negotiations involving all possible stakeholders.

Unfortunately, the COVID-19 interrupted a process of community consolidation where meeting and engaging with others in presential activities is needed to create social networks and trust. However, it seems that the Co-City's early vision of including digital technologies and stakeholder awareness on this subject might have prepared the ground for enabling a transition to digital governance. Also, worth noting is that the experimentalism embedded in the Co-City philosophy might have boosted the learning curve of the involved political actors that Vesco (2020) and Iaione (2018) described, continuing the project development into one of proper urban-commons governance.

Turin and Co-City seem the proper place and project to study and look for an urban commons to assess and model their digital way of governing their commons within this pandemics scenario.
In the next section, the Methodology describes the research design that the author uses to answer the research question of "How do urban commons carry out urban planning and policy-making in times of covid-19?"

4 Methodology

The urban commons research area holds vast theoretically-based literature. However, on the empirical side, adoption by cities remains novel. Today, it is an excellent opportunity to research the eGovernance of the commons within a real-case study. Therefore, this research is an exploratory case study looking to provide real-life lessons to enrich policy-makers, researchers, and citizen activists on alternative ways to make the city.

Yin (2009) uses three factors for identifying if the case study is the best research methodology. First, the research question is a "how" type. Second, the research regards behavioral events, in this case, the current experience citizens live in, shaping the governance of their city. Third, as mentioned, the historical moment in research regards a contemporary situation. These three factors confirm the choice for using the case study as the methodology for this research.

In this section, the research design presents the plan for carrying out the collecting, analysis, and interpreting of observations, which the main objective is to allow both the researcher and the readers to derive inferences from the evidence, theories, and observations collected to answer by their own, the research question (Yin, 2009).

For this, the researcher follows Yin's 2009 edition of a case study rigorous research methodology while enriching it with other scholars' inputs, such as Reiter (2013) for specific approaches.

4.1 Research standpoint, theoretical perspective, and research paradigm

Ontology is the first step of any researcher. Kickstarting questions around "What is reality?". However, it is not the scope or goal of this research to entangle in finding the meanings of eGovernance, polycentric governance systems, or urban commons. The goal is to find how do the urban commons carry out urban planning during this pandemic scenario.

Derived from the ontology starting point, Yin (2009) warns about a common mistake in performing exploratory research: considering human beings as static objects in time, not conscious, and subject to following fix theoretical narratives. Instead, the scientists need to take the words and concepts defined in the theoretical framework as the lenses on field exploration, aiming to note how reality relates to those concepts rather than how these concepts confirm reality (Reiter, 2013)Thus, with the warning of Yin, one can understand that epistemology fits better as a scientific standpoint for case study research.

The epistemological research standpoint is helpful when performing exploratory research on subjective social understandings (Reiter, 2013), such as the governance of the urban commons. The epistemological perspective guides the researcher on two things: On one hand, it facilitates describing the observations using a set of pre-defined concepts that

other researchers and practitioners can understand. On the other hand, the epistemological approach provides the author with the philosophical freedom to not use the theoretical framework as a fixed comprehension. Instead, this approach allows us to begin understanding reality rather than fit reality within theoretical fixed concepts.

In exploratory research, three things are to cover. First, the author admits its impossibility of being neutral when reflecting on the findings. Instead, it opens up its positionality on the subject of study transparently and honestly (Reiter, 2013). The author's choice of theories present in the theoretical framework section is the author's positionality. The theoretical framework provides the filters through which the author looks at reality, and equally important, steers the type of methods to find results.

Second, as Reiter (2013) and Yin (2009) point out in exploratory social science, choosing a case involves analyzing all identified cases to pick the one with the most significant amount of information. The case is strongly supported when it provides a thick narrative of connections between the variables in regard. For this paper, the reasons for choosing Torino as a case study are present in the Case Study section. More detailed information about the chosen urban commons is available in the Findings section.

Third, exploratory research needs to follow a rigorous approach, which, if done well, "promises to achieve a degree of validity that is beyond the wildest dream of any confirmatory research, especially one relying on quantitative methods" (Reiter, 2013, p. 9). Reiter instructs on acknowledging a defined epistemological path that other philosophers have developed (2013).

The only two authors performing a case study research relating to commons, polycentric governance, and urban policy research fields were Joanne Dolley (2019) and Jonas J. Schoenefeld (2018). Both researchers used interpretivism as a theoretical perspective within a case study research design, arguing that both the commons and urban policy cycles are highly contextual and thus require interpretation within that frame. Additionally, Dolley recognizes in her thesis the difficulty that urban research has in providing objective findings, which she solves by following the guide of Byrne to provide confirmability by including the context to make sense of the findings (Dolley, 2019).

Dolley (2019) provides thick descriptions of the participants' experiences through their voices. These thick descriptions enable the reader to interpret the data result of interviews, adding strength to the confirmability of this research's results.

Qualitative research, and more specifically, in-depth interviews, helps gather and produce thick descriptions. Therefore, it is critical to use qualitative research within research regarding complex environments, such as the urban scenario (Dolley, 2019).

Added to this, the author uses enterprise architecture models to provide a graphic understanding of the findings. These models will strengthen the dependability of the

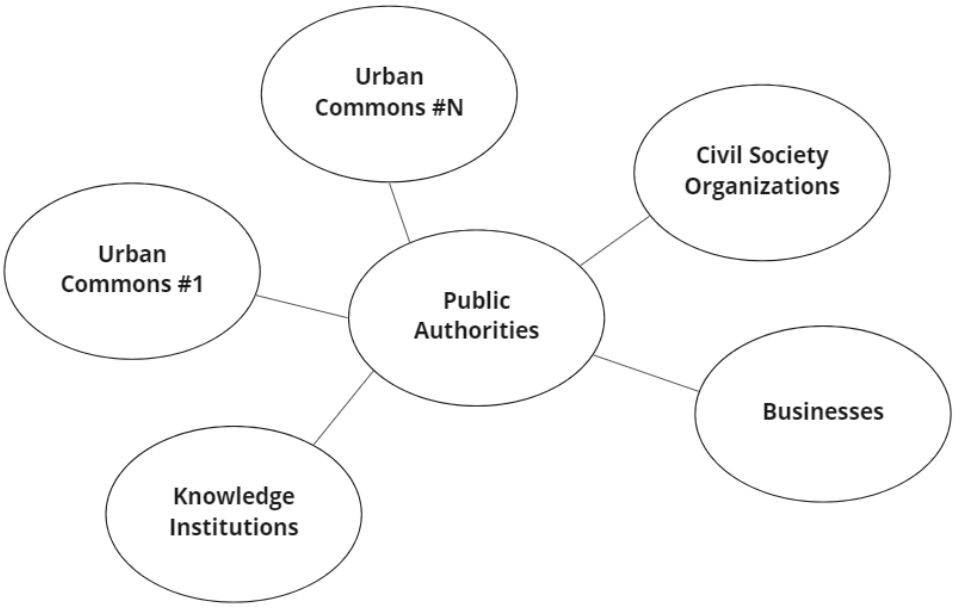
results, allowing other researchers to arrive at the same results even if the interviewees are not the same.

More detailed information unfolds below.

4.2 Case Study Design

To provide strong evidence on a scientific endeavor, many researchers choose a multiple-case study. Instead, this paper's choice follows a single-case study design without fear of failing lack of scientific relevance. This choice supports the critical and revelatory nature of the case involving the city of Turin, as it provides the right circumstances to assess for the first time how an urban commons carries out its governance process during the pandemic of COVID-19. Moreover, the value of this case lies in two main aspects. This urban commons holds a polycentric governance style, and before the pandemic, the multiple city stakeholders engaged in e-participation practices. Therefore, the revelatory nature of Turin's Co-City case enables this research to access knowledge not previously available.

This single case study is an embedded one that considers the polycentric governance structure as its unit of analysis, more specifically, the analysis of those centers that engage in urban planning and policy-making of urban commons at the city level. This specificity subdivides further into two subunits. (1) The centers forming the general polycentric governance structure, i.e., the quintuple helix[2] (see



[2] "(1) social innovators, including active citizens, entrepreneurs, digital innovators, urban regenerators, and urban innovators; (2) public authorities; (3) businesses; (4) civil society organizations; and (5) knowledge institutions, including universities, schools, and cultural academies" (Iaione, 2016, p. 12).

Figure 4) and (2) the centers forming the urban commons subject of collaborative governance, i.e., the social structure protecting a defined urban space (see

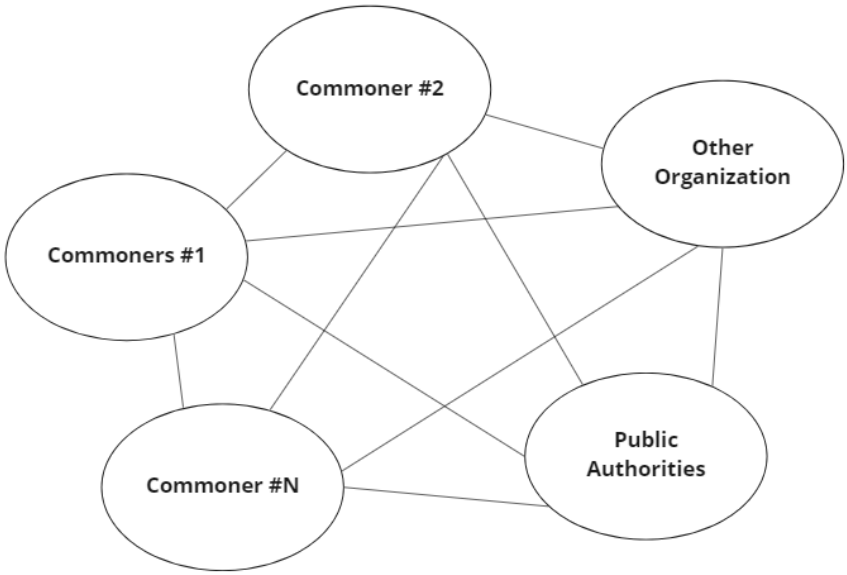


Figure 5).

In this subdivision, a warning of Yin (2009) comes handy while performing inferences about the evidence: The focus of the study is not at the subunit levels. The modeling of the urban planning governance is at the higher level of polycentric governance. Thus, the modeling of its subunits does not require deep detail. The conclusions are regarding the larger unit. The reader and the author need to bear this constantly in mind, as the subunits provide the findings. However, the modeling and interpretation need to aggregate the subunits to reach the city level.

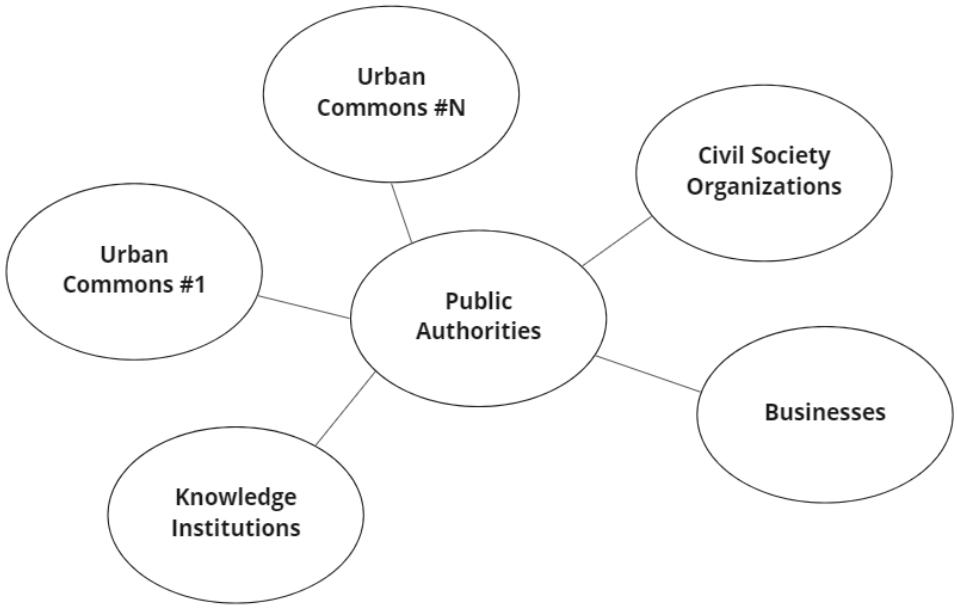


Figure 4 Subunit 1. Centers forming up the Polycentric Governance System as a whole

Figure 4 shows the centers forming the general polycentric governance structure, i.e., the quintuple helix.

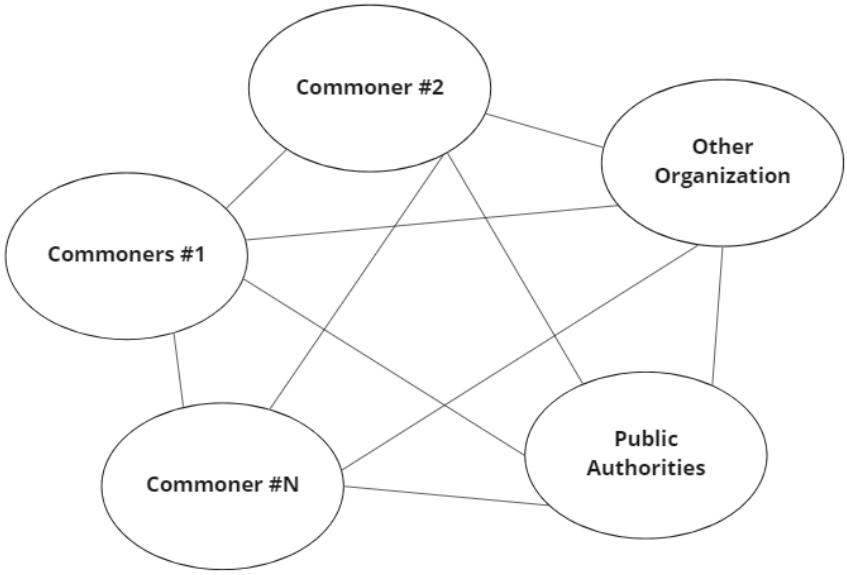


Figure 5 Subunit 2. Centers forming up the polycentric governance of the urban commons

Figure 5 shows the centers forming the urban commons subject of collaborative governance, i.e., the social structure protecting a defined urban space.
After gathering evidence from the unit mentioned above and subunits of analysis, the following steps involve defining an analysis strategy and linking the gathered data to the research propositions.
The analysis strategy in this paper follows the theoretical propositions present in the Theoretical Framework section. Therefore, the author analyzes the data gathered in three main themes: One, polycentric actors involved by the quintuple helix, differentiated in commoners or non-commoners. Two, the urban governance process of policy-making differentiates by the use of digital and non-digital means. Three, the modeling of the policy-making cycle using an enterprise architecture framework.

This research links data to research propositions with only one tactic: Logic models. Although some researchers use several tactics, the author chose to deepen the use of logic models through multiple perspectives using three logic models.
First, the urban commons assessment framework is present in Table 1. This framework has two objectives. On the one hand, it facilitates choosing one urban commons among all those recognized by the city of Turin. On the other, it provides a rich and thick narrative to support the choice of this urban commons as the study subunit.

As above-mentioned, this research aims to choose only one urban commons to study. Thus, the author needs to agilely identify the richest subunit within the sixty six initiatives

classified as urban commons (UIA - Urban Innovative Actions, 2018). This filtering process uses Table 1, filtering its results through three criteria: (i) classify initiatives per type of locally recognized urban commons ("Peripheries and urban cultures," "Underutilized infrastructure for public services," and "Care of public space"); (ii) identify which of these initiatives are still active both as a community and in coordination with the local government; and (iii) filter these active initiatives by the number of polycentric actors involved.

Finally, if there would be a match between choices, the author's criteria for choosing one single urban commons to study is in the function of two variables. First, the number of actor types involved in the co-governance, and second, its proximity to the urban commons theoretical ideal. The author assumes that this would provide the richest data and allow other researchers to use the findings to broaden the field's knowledge.

Coming back to the initial logical models, the author uses the ICT-based policy-making framework in Table 2 to link the data related to the policy-making cycle. The ArchiMate Core Framework in Figure 3 links the data gathered to model it using the Enterprise Architecture modeling language.

The author employs the above logic models as a visual guide to facilitate allocating and interpreting all gathered information (Yin, 2009). Combining these logic models with proper data triangulation, rigorous data management, and analysis procedures enables the research to reach the highest quality standards (Yin, 2009).

The rigor of this research follows the advice of Yin (2009), which suggests that when performing qualitative research, media evidence and direct quotes coming from interviews thicken up the narrative credibility.
On the data analysis side, findings will describe two main themes, both within the COVID-19 pandemic. On the one hand, the governance processes inside an urban commons and, on the other, the overall process of urban planning contemplating all the involved polycentric actors.

Yin's (2009) methodology focuses on attending all evidence twice. First separately from any interpretation, and then with an interpretation that explores all potential explanations.

This paper carries out Yin's approach by presenting the results in three steps, first, presenting the urban commons structure, roles, protected resource, and governance framework. Then, by presenting the policy cycle through each of the stakeholders involved. Finally, the author models all parts in a single model. This process follows the theoretical framework flow, which is represented below in Figure 6. Case Study Design - workflow diagram.

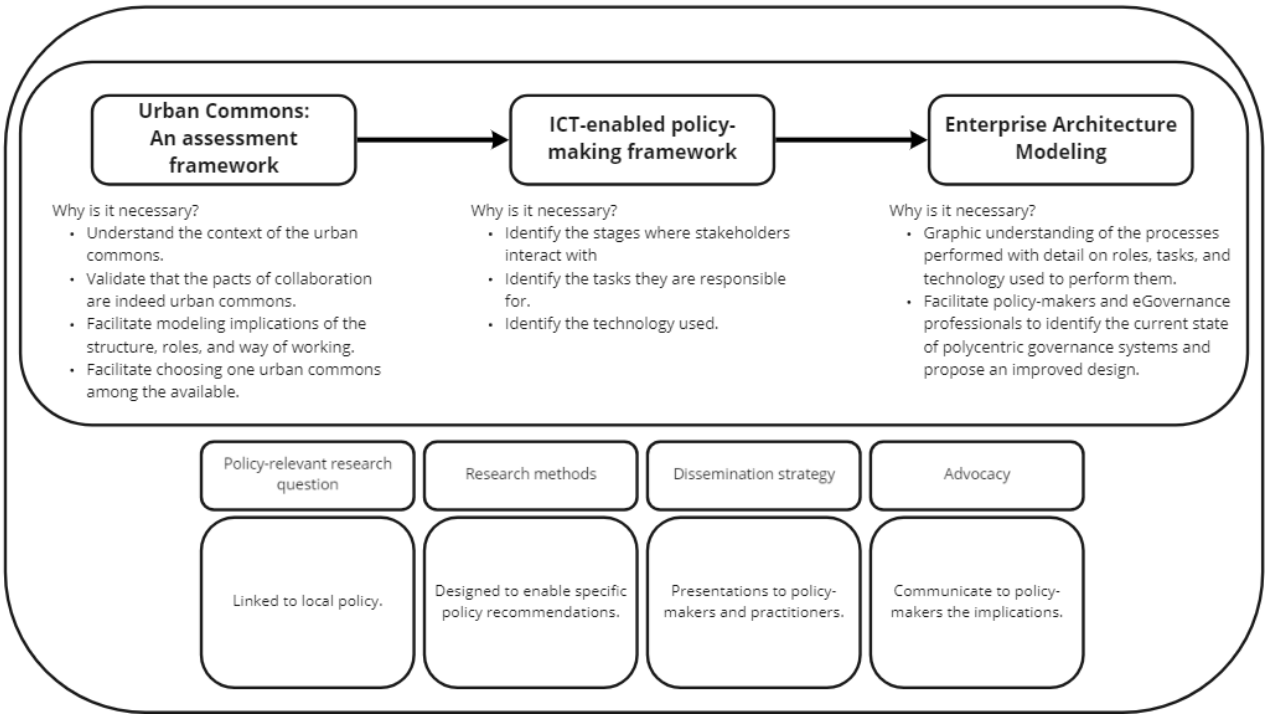


Figure 6. Case Study Design - workflow diagram

The last step on the rigorous research approach of Yin (2009) is the validation of the case study's results using the 'high-quality research design tests.' These tests cover Construct, Internal, and External Validity, as well as Reliability. Each test is explained below:

For Internal Validity, the author uses one single tactic, as already explained, logic models. The author covers External Validity by using a methodological research design and supporting the case with well-defined theories.
Construct Validity tests its strength in two phases. The first phase employs multiple sources of evidence at the data collection and presents these with a chain of evidence. The second phase regards the composition of the case study's report. This report requires validation from at least one key informant.
Finally, Reliability tests the data collection phase. This test contemplates the documentation of the case study process through a case study protocol and the use of a case study database.

4.3 Data Collection

The data from this case study originally planned a collection across three different urban commons types from Turin's District 8, where the author already had a place to move and live the local experience. The design covered a multi-point iterative research through a three-part interview series with participants of the urban commons. However, as the COVID-19 situation worsen, entrance to Italy was denied. A "Red Zone" complicated even further the research design, as gatherings were impossible to perform (Governo Italiano, 2021), thus, invalidating the previous research design.

Yin (2009) warned that almost all case studies would go through a change of research design due to variations in the real-life context.

This new data gathering design involves digital rather than presential interviewing. Researching one single urban commons, the author contemplates all types of stakeholders involved in the governance of the urban commons (see Figure 4). The author interviewed one person representing the stakeholder type for each polycentric actor involved. These people are active participants in the urban planning and co-governance processes.

Regarding the key informant, the author interviewed one expert in polycentric governance that was also expert on the Italian urban commons.

In summary, the author performed a total of six interviews.

The process for collecting data implies three steps. First, the author provides a verbal Information Statement to both participants and the key informant. This statement outlines the research objectives and the Erasmus Mundus/PIONEER program's support. Second, after agreeing to participate, the author explains the rights research participants have. Third, the author informs the interviewees that their anonymity is guaranteed by not recording their names but by a unique code that references the information collected, including the recording of interviews.

For conducting the interviews remotely, Google Meet is the tool of choice. The recording strategy includes capturing the complete screen with video and audio through the computer and one smartphone for backup.

Interviewees were looked through Internet searching. Contacting them was done by the available electronic means (eMail or social media).

All interviews performed hold a verbatim transcription attached in Annex 4. Interview Transcripts.

Additionally, within Annex 2. List of Interviewees, the reader may find the codes of the interviewees and the names of the key informant. The author looked for this key informant through asking within groups of crypto commons and by sending emails to people from related projects, the author communicated directly with three potential key informants, until finally received the participation of one of them.

The interview procedure for the key informant is different from the research interviewees. The key informant’s contact information remains public in this paper. The key informant had access, before performing the interview, to the thesis. Finally, there is a recorded call with semi-structured questions where insights were asked regarding the findings

consistency and congruence. The key informant's insights add construct validity, these are found in Annex 5. Construct Validity

4.3.1 Additional data collection methods

As Yin (2009) recommended, gathering information from multiple sources produces an improved quality of research. The author chose documentation, interviews, and direct observation from the available sources of data collection as they complement each other's weaknesses and form a more robust set of evidence (Yin, 2009).

To cover the documentation source of evidence, the author looked at the pacts of collaboration held by the municipality of Turin. Also, the author looked at the Co-City's published progress reports known as 'Co-City Journals.' And the laws or regulations regarding the subject.
A common problem that Yin (2009) makes good to remember is that information is abundant within the era of information. Therefore, the researcher needs to filter the evidence through its apparent centrality to the research question and units of analysis.

Interviews are one of the essential sources for case study research (Yin, 2009). The interview design was already described at the start of the Data Collection section.

The last tactic is direct field observation. Becoming a neighbor was the original field observation tactic. However, as already mentioned, COVID-19 status in Italy became worse and made the research design change. On this line, Yin (2009) said that collecting first-hand information by becoming an internal observer provides an invaluable perspective for producing an "accurate" picture of the phenomenon. Furthermore, as it is impossible to move to the site locations, the author used a digital direct participation tactic, i.e., becoming a member of the Urban Commons digital group channels (whenever possible). The author took notes on the interaction, and conversations happening there as if he were in the physical space. This tactic includes personal notes and photographic (screenshots) as evidence of the environmental conditions that the commoners are experiencing in their urban regeneration and polycentric governance.

4.4 Research question

The research question is, "How do urban commons carry out urban planning and policy-making in times of covid-19?"

4.5 Conclusion

The urban commons research area holds vast theoretically-based literature. However, on the empirical side, adoption by cities remains novel. Today, it is an excellent opportunity

to research the eGovernance of the commons within a real-case study. Therefore, this research is an exploratory case study looking to provide real-life lessons to enrich policy-makers, researchers, and citizen activists on alternative ways to make the city.

The primary data gathering method is interviewing. However, the author also employed documentation and direct observation to strengthen the research quality.
The main method to expose the findings is modeling through ArchiMate. These results find support by including thick descriptions through verbatim of the interviews, media evidence, and documentation analysis. All together will allow any other researcher to arrive at the same results.

5 Findings

The researcher reviewed official and public documentation that was available online. Within these sources, the Comune di Torino provides information from its 8 Districts, where the researcher looked at the 66 urban commons signed as pacts of collaboration (*patti di collaborazione*). Other public and official documentation reviewed was the Regulation of the Urban Commons (Città di Torino, 2019b) and the Urban Innovative Actions reports on the Co-City project implementation (UIA - Urban Innovative Actions, 2018, 2020, 2021; Urban Innovative Actions, n.d.). After looking at them, the researcher interviewed a public officer from the *Comune di Torino* (Municipality of Turin). The Officer is in charge of monitoring the urban commons, thus directly knowing all the urban commons in Turin. Together, the researcher and the Officer assessed the most active urban commons, operationally and governance-wise.

Filtering urban commons meant looking at those urban commons with regular activities and those that employed a polycentric rather than collaborative or shared governance layer.

Once one urban commons was chosen, its related stakeholders were interviewed; as each of the three assessed urban commons was from a different District, its stakeholders were also different.

This findings section presents two main themes: Assessing the Urban Commons and Identifying the Polycentric eGovernance.

A final note is that all findings are thought and asked within the COVID-19 phenomena. This pandemic started in February 2019 and has not ended. In fact, the author got infected with this virus while writing the thesis. The Findings present the state of the digitalization and polycentric governance coordination from the perspective of both high and low restrictions that Turin held until July 2021.

5.1 Assessing the urban commons

The researcher read all 66 pacts of collaboration. However, from reading these, it was impossible to determine which urban commons were polycentric and active. Understanding the available pacts of collaboration and the Regulation on the Urban Commons made it clear to the researcher that the approach of directly asking the official in charge of registering and monitoring the pacts of collaboration was the best path.

A two-session semi-structured interview was planned and carried out with two goals, **identify the urban commons with the wealthiest opportunity to showcase the polycentric governance results during COVID-19** and **list the stages, tasks, and technologies used in the governance of the urban commons**.

The assessment had three filters, which were read and given to the interviewee:

i. Operational Active. Meaning that its commoners currently run activities.

ii. Governance Active. Meaning that the commoners engage in any kind of governance activity. This filter further identifies urban commons by Shared, Collaborative, or Polycentric governance by stating which actors are involved and how do these engage in the governance of their commons.

For an equal understanding of concepts, definitions were given:

Shared governance means that governance participation enables citizens to make proposals but limits its participation only to that point. Collaborative means that further than proposing, actors are also enabled to work on the operation of the space; Polycentric means that the urban commons are autonomous on decision-making within its space, and those actors involved also engage in the co-design of the space commons self-governance.

iii. Closeness to the Urban Commons ideal. The assessment fills the Resources, Commoning, and People dimensions.

Then, the researcher proceeded to ask: **In your experience, which are the most active urban commons regarding governance and operations-related activities?** "Via Cumiana, Piazza Paravia, and Aiuola Ginzburg" (Commons Officer, 2021a).

From this moment, the researcher and the Commons Officer of the *Comune di Torino* reviewed together these three commons through the assessment framework visible in Table 3. Later, a commons of those three were chosen, and its stakeholders were looked for interviewing. Interviewing these stakeholders enabled confirmation and improved accuracy of the information given by the Commoner Officer.

Although the findings regarding the assessment framework are all presented within one same table, answers are separated by identifying the respondent. In those cases where no source appears, all three parts (Commons Officer, Commoners, and Neighborhood House representative) gave the same answer. Additionally, following the chain of evidence guide, those answers that are supported by another source beyond the interviewee's answer are also mentioned. A final consideration that supports construct validity is that in those cases that the Commons Officer's answer was also supported by the findings within the documentation research, such as the Regulation on the Commons and the Pacts of Collaboration, it was not further inquired to other stakeholders.

Urban Commons Assessment Framework			**Aiuola Ginzburg**	**Piazza Paravia**	**Piazza Cumiana**
Dimension	**Aspect**	**Framing questions**	**Answers**		

	Type of urban resource	Is this (1) an abandoned space? (2) an underutilized infrastructure, or does it relate to (3) taking care of public space?	3 (Commons Officer, 2021a)	3 (Commons Officer, 2021a)	1 (Commons Officer, 2021a; UIA - Urban Innovative Actions, 2020)
Resources	**Depleta-bility**	Can the resource be ‘used up' or not?	No		
	Excluda-bility	Can access be limited or controlled?	No		
	Rivalrous use	Does one user’s use take away from others’ enjoyment or ability to use the resource? Can two users use the resource at the same time for different uses?	No		
	Club good	Does the resource require a membership to be used?	No		
	Semi-private	Does the resource involve private and shared property rights?	Public rights only	Public rights only	Public rights only
People	**Size**	What is the number of people participating in the care and regeneration of the urban commons?	5-6 active (Commons Officer, 2021a).	10-15 (Commons Officer, 2021a) From 4 to 40, but it depends on the activity (Neighborhood House Rep, 2021; Paravia's	“we have not counted the number of participants“ (Commons Officer, 2021b)

				Commoner, 2021).	
	Custodians	Are there some key people safeguarding access to resources in a prosocial way?	Yes. 2-3 (Commons Officer, 2021a).	Between 4 to 6	Around 10 (Commons Officer, 2021b)
	Helix	Which of the five helices are involved in the commoning?	Citizens, 1 NGO, Gov (Commons Officer, 2021a).	Citizens, four NGOs, Gov	"only NGO and public sector" (Commons Officer, 2021b).
Commoning	**Co-Governance layer**	Does it use a Shared, Collaborative, or Polycentric governance layer?	Polycentric (Commons Officer, 2021a)		
	Community outreach	Do the commons communicate with commoners, outside-community, and political decision-makers? How?	Yes. They actively share on Facebook and their website their activities (Commons Officer, 2021a).	Yes. They have a close relationship with the District directly due to their activism. Moreover, they communicate with other people to involve others in their initiative through a Facebook Page (Commons Officer, 2021a).	Was not asked.
	Self-empowerment & learning	Do the commons provide opportunities for participants to learn and develop	Yes. Mainly in sustainability, arts, and citizenship.	Yes, in gardening, minor maintenance, arts, and	Was not asked.

		competencies, knowledge, skills, and attitudes? Do the commons share insights and knowledge with the community? How?	They actively invite the citizenry to participate but have not shared their lessons of urban commoning yet (Commons Officer, 2021a).	citizenship. They aim to involve more people in participating in their commons (Commons Officer, 2021a). When there are festivals of urban commons, we get to know other pacts of collaboration, and there we share our experiences to help each other (Paravia's Commoner, 2021)	
	From this point, answers only reflect the urban commons of Piazza Paravia				
	Principle 1	Which are the group boundaries? Are they clearly defined?	Yes. The Pact of collaboration defines them (Città di Torino, 2019b; Commons Officer, 2021a).		
	Principle 2	How do the commons align its governance rules with the local needs and conditions?	“When we make a decision about an activity to be done, there's a coordination that kind of listens to the needs of the area”. “Almost all initiatives are done after a dialogue. After planning together” (Paravia's Commoner, 2021).		
	Principle 3	Can those people affected by the rules participate in modifying them?	Attending the weekly gatherings, informing the Neighborhood House or directly the Commons Office (Commons Officer, 2021a). “Sometimes if there isn't an event in the square, they come to the Neighborhood House. It has		

			happened rarely, but sometimes we are a bit of a complaint office. Not of the square but of the territory" (Neighborhood House Rep, 2021).
	Principle 4	How are the agreements made within the urban commons respected by outside authorities?	The Pact of Collaboration is supported by the Municipal Law and by the Italian Constitution (Città di Torino, 2019b; Commons Officer, 2021a).
	Principle 5	How is the members' behavior monitored and controlled?	"It's hard, we don't have an absolute rule. We seek mediation, dialogue and listening" (Paravia's Commoner, 2021)
	Principle 6	How does the sanctioning system apply? Is it graduated?	They do not have a sanctioning system, they talk and if people do not like to comply with the group, then they get excluded (Direct observation). "the group was very exclusionary. […] they didn't say it in words but with the body." (Paravia's Commoner, 2021).
	Principle 7	How does the dispute resolution mechanism apply? Are they accessible in cost and time to all members?	The regulation of the urban commons and the pact of collaboration apply. The Council would enter (Città di Torino, 2019b; Commons Officer, 2021a).
	Principle 8	What process do regional, national, and international stakeholders need to follow to collaborate with the urban commons?	Directly through their online channels of communication (Facebook/website) or by contacting the municipality (Commons Officer, 2021a).
Cross-domains			
Property rights	**Access**	Can anyone enter the physical area and enjoy non-subtractive benefits, or does it	Free and Libre Access (Città di Torino, 2019b; Commons Officer, 2021a)

		requires special access rights?	
	Contribution	How is the external community able to contribute to the improvement of the urban commons?	"They can visit us, we have days and times of availability, like happened with you. They contact us and we're available. People propose an idea, we share it, we propose to make it according to our way of participating and sharing, built together" (Paravia's Commoner, 2021).
	Extraction	Can anyone extract resource units or products? If yes, which and how?	"If someone wants to pick a flower, theoretically, it's not that we can forbid him. It's a shame, though" (Paravia's Commoner, 2021)
	Removal	Can anyone remove a previously contributed artifact? How?	Yes (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
	Management/ Participation	Are there requisites to participate in managerial or operative roles?	Availability of time and will (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
	Exclusion	How are rights for access, contribution, extraction, and removal taken? by whom, and how are they transferred?	Conversation between the commoners. Take a decision among them (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
	Alienation	Is it possible to sell or lease management and exclusion rights?	No (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
Entry points	**Protection**	Were the urban commons started due to the need to protect the resource from enclosure,	No (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)

		privatization, or commodification?	
	Inspiration	Was it started from the inspiration of digital p2p mass collaboration?	No (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
	Anti-Tragedy	Was it started from the need to avoid an evident tragedy of the commons?	No (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
	Education and Commoning	Was it started from the desire to build civic education and commons-like thinking?	Yes (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
	Evolution opportunity	Was it started due to the identification of new or evolving types of commons available to engage with?	Yes (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)
	Rediscovery	Was it started from a rediscovery exercise of the potential of the commons?	Yes (Neighborhood House Rep, 2021; Paravia's Commoner, 2021)

Table 3. Assessed Urban Commons

Table 3. Assessed urban commons shows the results and process of narrowing down the search for one urban commons.
Piazza Paravia was the one chosen, as can be seen from Table 3 results. The detail on the reasons why this commons was chosen are in the Discussion.

5.1.1 The urban commons

The Regulation on the Urban Commons defines an urban commons as “the tangible, intangible and digital resources falling within urban assets and services of common

interest, that citizens and the Administration recognize to be functional to the exercise of fundamental rights of human beings, to individual and collective wellbeing" (Città di Torino, 2019b, p. 4).

In this sense, "all pacts of collaboration are urban commons" (Commons Officer, 2021a). Piazza Paravia is an urban commons classified by Turin's government as one "for taking care of public space" (Città di Torino, 2019a; Commons Officer, 2021a). Piazza Paravia commons is located in Piazza Innocenzo Vigliardi Paravia, 9b, 10144 Turin, Italy (See Figure 7). It is usually referred only as Piazza Paravia by all actors interviewed.
This urban commons is the result of three types of actors getting together with the purpose bringing culture to the neighborhood, enhancing socializing opportunities, and improving the quality of life and of the environment (Proposta di collaborazione Piazza Paravia, 2017). These three actors are the Non-Governmental Organizations covering the Neighborhood House from District 4, Ecoborgo Campidoglio, la cooperativa San Donato, and the Distric's four Time Bank, the Citizens, and the Government (Città di Torino, 2019a; Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

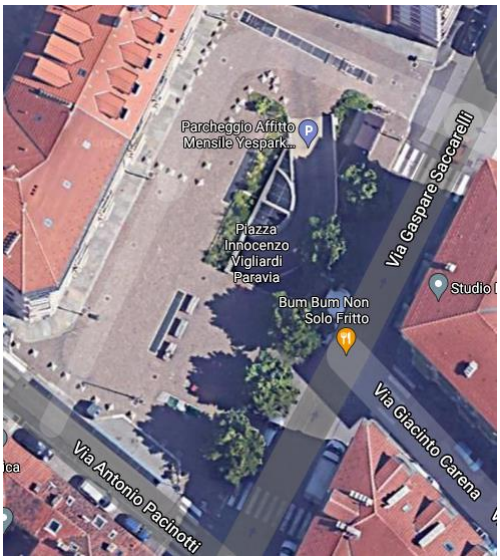


Figure 7. Piazza Paravia location (Google Maps, 2020)

Figure 8. Photo of Piazza Paravia (Google Maps, 2020)

In any commons, there are three essential dimensions, Resources, People, and Commoning. Paravia's dimensions are explained as follows.

Paravia's resources cannot be used up due to being a public space. However, some of its resources can be damaged but easily regenerated, as their commoners narrate (Neighborhood House Rep, 2021; Paravia's Commoner, 2021). For example, its resources could be listed as one large flowerbed, five benches, and around 641m2 of space to engage socially (see Figures 8 and 9).

As it is a public space, access to it cannot be limited or controlled, nor the use of one person limits the ability of others to enjoy it simultaneously. Although it has its physical space limits where for example, only some people can sit simultaneously at the five benches, even those physical limitations have been extended by the commoners bringing their chairs and tables to engage together in their Thursday's Tea Time (see Figure 9).

The tea time or any other activity performed in the space by the commons does not require any type of membership. However, some of the active participants signed a moral commitment with legal implications, known as the pact of collaboration. Further than restricting access or benefiting the signees, the pact of collaboration provides the legal support to manage and make decisions autonomously (Città di Torino, 2019a; District Representative, 2021; Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

The only benefit behind this legal instrument, at the moment, is a tax relief that the commoners are exempt from the activities performed. Otherwise, any other public activity, for-profit or not, needs to pay a municipal fee (Commons Officer, 2021a; Paravia's Commoner, 2021).

Piazza Paravia does not involve private property rights. However, any activity needs to be careful not to obstruct the private property below its floor, where a private parking lot is located (Commons Officer, 2021a).

Even though this urban commons started with thirteen civic subjects that signed the pact of collaboration (Proposta di collaborazione Piazza Paravia, 2017; Città di Torino, 2019a; Commons Officer, 2021a), it engages actively up to 40 people (Paravia's Commoner, 2021). The number of participants varies depending on the activity and the interest of each person.

Moreover, as Dellenbaugh-Losse et al. (2020) point out, there are custodians for the urban type of commons. These custodians are the people who engage more actively in the coordination and management of the commons. The Paravia's custodians are between four to six people, and they belong to different non-governmental organizations (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021), making it a truly polycentric commons.

The centers that compose this urban commons governance are from the NGO sector, the citizenry sector, and in some situations, different levels of government participate, too (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021). The polycentric property introduces the commoning dimension, where it is to highlight its strong and close relation to the District and the Municipal government levels, as demonstrated in the interviews and their publicly available Facebook posts (see Figure 10).

Paravia has the autonomy to act and make decisions (within their scope). This autonomy is clearly defined and guaranteed by its Pact of Collaboration (2019a). In this pact, the rules, roles, and responsibilities of each actor are listed. Thus, the Pact of Collaboration aggregates the normative understanding of Commoning.

Piazza Paravia is an active community in both operation and governance (Commons Officer, 2021a). This community provides skill development opportunities beyond workshop-related events, such as arts, sustainability, and maintenance (Commons Officer, 2021a; Paravia's Commoner, 2021). The skills that commoners develop here are also related to city-making. In the words of one of its commoners:

> Our way of participating and sharing, is to build together. Maybe there's an idea that only one person with more skills could do. But in our opinion there is a "who knows more can teach who knows less" formula and with that there is collective growth. (Paravia's Commoner, 2021)

The above reflects how projects regarding taking care of the public space teach its participants how to shape the city regeneratively.

Additionally, Piazza Paravia has participated in urban commons festivals where they have met with other pacts of collaboration to share experiences, thus, helping each other to broaden the impact of polycentric city-making (Paravia's Commoner, 2021).

In a more detailed description of the urban commons assessment, the property rights domain shows Piazza Paravia as an open commons that encourages its neighbors to participate without falling into bureaucratic traps and to extract in a permission-less way its resources while becoming conscious that over-extraction affects the whole community.

An example of the above is that extracting leaves of a medicinal or cuisine-related plant is fine, but taking out the whole plant is not (Paravia's Commoner, 2021)

Management and participation rights are free and open to anyone willing to contribute their time. Interestingly, the ways these rights can be removed are different. Official management rights can be removed formally from the pact of collaboration by updating it (Commons Officer, 2021a). However, before going into these procedures, the commoners gather to openly discuss the matter (Paravia's Commoner, 2021). Currently, all conflicts have been quickly solved by just talking (Neighborhood House Rep, 2021). On the participation rights side, is different because the space is public, and no one can be excluded from it. Thus, the commons exclude someone ignoring the person (Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

Finally, regarding the assessment framework, Piazza Paravia was created from the desire to build civic education and commons-like thinking (Neighborhood House Rep, 2021; Paravia's Commoner, 2021). Starting it as a commons was an opportunity identified by looking to other commons available in the Italian region, which re-opened to them the potential that the commons historically hold in Italy (Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

On the practical side of Paravia's Commoning, direct observation of their Facebook page activity (https://www.facebook.com/groups/2205425003010522/) allows comparing events and behavior previous, during, and post COVID-19 measures.

There, one can understand how Piazza Paravia started, who are their members, and the types of activities they perform. For example, the Thursday's tea gathering is their main event (see Figure 10), which attracts the community to fulfill the goal of the urban commons: socialize and take care of their public space (Proposta di collaborazione Piazza Paravia, 2017; Città di Torino, 2019a; Commons Officer, 2021a).

Figure 9. Thursday tea at Paravia Commons (Proposta di collaborazione Piazza Paravia, 2017)

However, within the COVID-19 period, it was prohibited to go out of isolation unless it was for important reasons, thus watering the flowers or maintaining the urban commons was not allowed (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021). Commoners started coordinating with online and traditional means of communication such as Whatsapp and phone calls (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021). Their purpose was to water the flowers and monitor the space during their shopping trips (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

The biggest challenge the commoners faced was the complexity of interfaces from coordination and communication technologies, along with people not used to employ more advanced digital tools (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021). This combination provoked to slow and even stop the development of projects related to the care and regeneration of their urban spaces (Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

The remarkable thing is that the community did not stop engaging, as they used the available communication technologies such as phone calls and WhatsApp to keep reporting on each other (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021). Their community behavior can is seen through examples such as celebrating the birthday of their members, where commoners post a photo with a cake and people congratulate (Amici di Piazza Paravia, n.d.).

Once the lockdown was taken off, the custodians relied heavily on digital channels such as Facebook, Instagram, and WhatsApp to gather people again after many were fearing

of getting together (Neighborhood House Rep, 2021), continuing their activities on urban space regeneration (Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

The activity recovery is evidence by several pictures within their Facebook page where they show themselves following COVID-19 protocols while engaging in community activities (Amici di Piazza Paravia, n.d.). Also, some other posts tag civic sector or non-governmental organizations, meaning that they do genuinely engage a wider audience (Amici di Piazza Paravia, n.d.). Thus, Paravia's Facebook page supports what the interviewees said.

Specifically, Figure 10 discovers three visual elements. (1) A gross of people participating, (2) all the NGOs mentioned by the interviewed, and both the district and municipal government levels and, (3) a good level of community reaction by having 25 Likes, 92 people who viewed that post, and two commentaries.

One last note within the documentation research, the new regulation on urban commons talks about a new institution named Commons Foundation, which legal frame facilitates financial and property management of the urban commons (Città di Torino, 2019b). Unfortunately, this legal institution has not been granted to any urban commons yet, but the Piazza Paravia's commoners actively seek to facilitate self-financing mechanisms (Paravia's Commoner, 2021).

Figure 10. Recent actitivies in Paravia (Amici di Piazza Paravia, n.d.)

5.2 Identifying the Polycentric eGovernance

To achieve the second goal of listing the stages, tasks, and technology used in urban commons governance, the researcher applied the ICT-enabled policy-making framework from Table 2 to carry semi-structured interviews.

The people interviewed were a Commons Officer, a Commoner, a Neighborhood House representative, and a District Representative.

Following the chain of evidence principle, documentation and direct observation were used to provide as many sources of evidence as possible to each answer.

This section covers the whole ICT-based urban commons policy-making cycle while detailing the polycentric actors' roles and responsibilities.

5.2.1 Problem identification. Acquisition of quantitative and qualitative information.

1. How and where are problems reported? (web portal, mail, physical place, app or communication channel) What is different during the first waves of COVID-19 than now? Did you have any obstacles to communicating in these times?

In July 2018, Piazza Paravia opened their Facebook page (Amici di Piazza Paravia, n.d.). Thus, even before COVID-19 they had started using digital communication channels. "We have a WhatsApp chat, we have a Facebook page, we have an Instagram channel. We use all these methods of communication. […] Then, they can visit us in person because they know we're there" (Paravia's Commoner, 2021).

The process of reporting a problem within the commons starts by an internal communication.

> "They first report within themselves. They report the problem between each other through WhatsApp or phone calls, from there they decide how to proceed. There is no specific framework of how to report problems. [Also] Most of the people participating are old, they have normal telephone calls". (Commons Officer, 2021a)

People that benefit from the commons, but that are not classified as commoners, report the problems they find directly to the Neighborhood House. Before COVID the way of reporting was directly by going to the Neighborhood House office, but also emails were sent. Now, "they simply send an email. Or call and ask us to monitor it if we haven't already" (Neighborhood House Rep, 2021).

One strategy that helped the urban commons to have smooth communications was "putting everyone in copy" (Neighborhood House Rep, 2021). "So that everyone knows

what's going on because if not everyone says why didn't you tell me" (Paravia's Commoner, 2021).

An important thing to note is that "in total there might be around ten Facebook pages from all the pacts of collaboration" (Commons Officer, 2021a). It can be assumed that the urban commons with these types of digital communication channels are very active and they commit to engage the community (Commons Officer, 2021a).

Likewise, the Neighborhood House, people that want to complain directly to the District went, before COVID-19, to the District's office. "During the first COVID period, especially in the first lock-down phase, the [District's] office was totally closed. Now we are open, but we only receive by appointment. So, actually the physical interactions are very limited" (District Representative, 2021).

In the District, people that report problems do it "mainly by phone, but above all by mail" (District Representative, 2021). And even more, by "WhatsApp, [it] is an almost immediate communication tool" (District Representative, 2021).

The District representative added:

> "Marking an important step of the administration in the future will be to open IT channels" […] "in the sense that if you have problems write in chat and the operator responds […] so it also remains the written exactly from the requests and responses on […] it would be interesting to develop a form of this kind. Certainly via WhatsApp or via classic chat". (District Representative, 2021)

The author did not find any direct observation regarding problem reporting within Paravia's Facebook page. Instead, their page shows actions of care, maintenance, and regeneration (Amici di Piazza Paravia, n.d.). Another direct observation was at the Neighborhood House's web page. Here, services are offered to citizens, but nothing specialized to the urban commons (Casa del Quartiere di San Salvario, n.d.; Più Spazio Quattro, n.d.b). Although, the Neighborhood House has a direct way of contact for any other request not covered explicitly in its website.

2. Which types of qualitative/quantitative data is gathered or reported usually? (photos, videos, statistical data, signatures, etc).

Piazza Paravia collects both qualitative and quantitative data. However, this data gathering is carried out in a fragmented way by the different centers of governance.

For example, the Neighborhood House collects statistical data because they are required to do a social impact assessment (Neighborhood House Rep, 2021).

The commoners take photos. "We do it in the [WhatsApp] chat when we do an activity at least some photos we take at every meeting, and we share it every time. They are inside this chat, and everyone in there see them. Others [the participants from other NGOs], take

photos and post them on their channels, like the Time Bank for example". (Paravia's Commoner, 2021)

The government performs a qualitative and quantitative campaign to monitoring the pacts of collaboration (Commons Officer, 2021a).

The author also found, through direct observation, media evidence in the commons' Facebook page (Amici di Piazza Paravia, n.d.). This qualitative data gathering in the form of photos show the result of their actions (see Figure 11).

Figure 11. Before and after of graffiti removal in Piaza Paravia

Figure 10 is an example of many qualitative evidence of their actions.

3. How are these reports stored? (centralized/decentralized database, physical archive, mix)

Piazza Paravia uses "WhatsApp and Facebook" (Paravia's Commoner, 2021). Thus, they store their data within the services of these digital channels. More specifically, the urban Commons Office reported the use of Google's suite solution for eMails, online meetings, file and calendar sharing with all urban commons (Commons Officer, 2021a).
The District, specified that emails are the official communication channel, and thus, where the reports are stored (District Representative, 2021).

The urban commons specified:

> "We don't do written reports. When we have particular meetings, we do take minutes of the meeting. But there is a naturalness to this thing that is not bureaucratic. Only when we prepare a specific project we send it to the District, we send it to the Commons Office, we share it with the Neighborhood House". (Paravia's Commoner, 2021)

Here, the Neighborhood House takes the role of documenting the gatherings by having "a folder related only to communication. In the sense that each meeting has its own folder" (Neighborhood House Rep, 2021).

4. How are these reports reviewed and analyzed? (On-demand or having dedicated people. If so, who are they, and what authority do they have on making an approval/disapproval decision?)

"We take turns", the Neighborhood House Rep (2021) said. Mainly because the most active commoners might be also "the ones to complain about things that happen" (Paravia's Commoner, 2021).

From the Municipal perspective, it is different depending on the body.
On the one hand, the Commons Office is in charge of carrying the overall monitoring campaign. The data regarding the governance and operation of each urban commons is analyzed by the Municipality to make decisions (Commons Officer, 2021a).

On the other hand, the District body uses an OTRS solution, an open-source code for optimizing assignment and management of mails (District Representative, 2021). Reports are automatically directed to the responsible department, and when the problem is too complex to assign or even when the problem does not require a technical answer but a political one, it is manually sent to the District's President (District Representative, 2021).

It is to highlight that in reports often come in the means of a WhatsApp message. The District representative reviews the message and answers if it can be solved by a simple reply, otherwise, the representative ask the person to send an eMail to officialize the matter (District Representative, 2021).

5.2.2 Agenda setting. Priority setting.

5. How are problems or matters prioritized?

When it is a matter of financing (available funds) and technical feasibility, the District is the first to decide the agenda within their jurisdiction, then the City Council takes the final decision (Commons Officer, 2021a).

When the problem is a matter within the urban commons control, the commoners get together and talk it out. "It's always a dialogue" (Paravia's Commoner, 2021). "There were never any insurmountable conflicts, only conflicts related to nonsense" (Neighborhood House Rep, 2021). When it is a matter of money, they look for "auto financing it" (Paravia's Commoner, 2021). At the moment, the commons are looking "to become self-financing tools with urban sponsorship" (Paravia's Commoner, 2021).

However, when there is a matter requiring technical feasibility, the commons must involve the District to analyze the request and connect the commons with the correct department (Paravia's Commoner, 2021).

Prioritization within the District happens semi-automatic through the OTRS software, connecting directly to the technical department in charge (District Representative, 2021). For example, an urban commons requests to put a new bench, then they send a request for it to the District; through the OTRS, the commoners get assigned a technician that will verify that the chosen bench complies with the municipal regulations and that when put it complies with safety measures (District Representative, 2021).

Nevertheless, there is an obstacle that slows down prioritization (District Representative, 2021). It can take years to create a pact of collaboration (District Representative, 2021). "A process that took three years, we could have done it in four months" (District Representative, 2021).

The reason is that the governance proposal goes from the citizen to the Commons Office, to Technical Board, back to the District, again to the Commons Office, then requirements are processed, such as the fiscal authorization and the insurance policy, to be approved (District Representative, 2021).

6. Which specific technology is used for setting this priority? (Pen and paper, specialized software, a mix)

Two perspectives appear. From the commons:
"In the first period of COVID certainly more virtual. [We used] WhatsApp. And if WhatsApp wasn't enough, they would phone. Because when someone took it wrong the only way was to pick up the phone and talk to them" (Paravia's Commoner, 2021)

"We tend to believe in the relationship vis a vis, in person. It's more effective because it's less misunderstood. If a person responds in a hurry, it can be read as lack of attention, lack of care" (Paravia's Commoner, 2021).

From the Municipality: Verbal discussions using "Google Meets" (Commons Officer, 2021a). The District uses OTRS and eMails to communicate among all District employees (District Representative, 2021).

As part of the direct observations, it was noted that the interviewed did not mentioned any prioritization software or solution.

7. Where is the prioritization of the agenda stored?

If the decision regards a financial or technical requirement, then needs to go through a procurement process, "then the agenda and all decisions […] are stored in the procurement documents" (Commons Officer, 2021a).

Within the District, all conversations' record are stored in emails (District Representative, 2021).

8. Are the results of the prioritization diffused? If so, where? (Web portal, physical place, mix)

Two approaches for diffusion. On one side, the Municipality only diffuses those works that they see meaningful. In word of the Commons Officer (2021a), “It depends on how big is the intervention. If it is a small public work, like repairing a bench, no publicity is done”.

From documentation research, it was found that if there is a modification to the pact of collaboration it should be publicized within the Municipality’s web portal, updating the urban commons web section (Città di Torino, 2019b; Commons Officer, 2021a). For example, the one of Piazza Paravia is http://www.comune.torino.it/benicomuni/patti_collaborazione/patti_attivi/circ_4/index.shtml

Paravía’s approach follows a more active approach. They diffuse their gatherings and agreements to all participants through their WhatsApp group. Also, every time they do an activity, “at least some photos are taken, and are shared every time” (Paravia's Commoner, 2021).

5.2.3 Development and analysis of alternatives. Generating and assessing alternative scenarios.

9. Who defines the requirements for proposal making?

It all depends on the type of proposal. If the proposal is within the scope of the pact of collaboration, then the urban commons make decisions (Commons Officer, 2021a; Paravia's Commoner, 2021). The commoners discuss the proposals brought by anyone of them or by any other citizen in their weekly meetings (Paravia's Commoner, 2021).

However, if the decision regards financial or technical complexities, then, the city council is the body defining the requirements (Commons Officer, 2021a).

The documentation research supports both approaches. On the Municipality decision making, the regulation clarifies that decisions are made after hearing the District’s needs for general policy-making (Città di Torino, 2019b).

10. How are proposals for solving the reported problems generated and issued?

It depends if the proposal requires government intervention or not. If it does, there is first an online meeting between the stakeholders involved. Then the urban commons office requests advice from domain-specific departments using eMail. The eMail holds specific data requests such as a quotation and tech requirements (Commons Officer, 2021a).

The documentation research adds that before arriving to the City Council, both the District's Director responsible for the urban commons and the Technical Board need to review the proposals received and communicate "the study results within 60 days" (Città di Torino, 2019b, p. 12).

The Technical Board also has the faculty to initiate public discussions to gather potential solutions (Città di Torino, 2019b).

If the proposal is within the scope of the urban commons, then "It's always been very simple. With words generally. With a [presential] chat with sharing" (Neighborhood House Rep, 2021).
The commoners use "drawings if there is a need to draw a picture to get the point across. Photographs, pictures of things that are similar, to get everyone to understand what will happen" (Paravia's Commoner, 2021).

However, it is to remark that during the highest restrictions period, the urban commons had no project development activity. The reason was the average age of the people involved (Neighborhood House Rep, 2021). "You can't put them in a chat room. You meet them at the neighbors' dinner. From them, you gather information by writing" (Paravia's Commoner, 2021). After lowering COVID-related restrictions "many were afraid to even meet" (Neighborhood House Rep, 2021).

Fortunately, they gather again, following the hygienic measures. The Paravia's commoners have started working again on improvements for their commons space (Neighborhood House Rep, 2021; Paravia's Commoner, 2021).
Performing direct observation on the Piazza Paravia's Facebook page, no form of dialogue regarding the process of generating proposals was visible. However, it offers a recorded dialogue regarding the Dora River, which crosses several Districts (Amici di Piazza Paravia, n.d.).

11. Who participates in making these proposals? (any citizen, commoners, commons representatives, city council, district representatives, tech board, council of the urban commons)

The regulation on urban commons specifies that any civic subject can make a proposal (Città di Torino, 2019b).

The government side recognizes the pacts of collaboration as the ones committed to care and regenerate. "Most likely proposals will come from the commoners or through the commoners. Citizens can come in contact with the commoners and propose changes" (Commons Officer, 2021a).

The commoners, on the other hand, detail that "when a proposal is not made by [them] and another person who has an idea makes it, it goes to [the Neighborhood House or the

Municipality], they put it in contact with [them] and then maybe [they] build it together in a co-design" (Paravia's Commoner, 2021).

12. Where are these proposals stored? ((des)centralized database, physical archive, mix)

If it was a proposal directed to the municipality, "it's all on eMails" (Commons Officer, 2021a). Otherwise, is in the medium they used to make it (Computer, WhatsApp, Facebook) (Paravia's Commoner, 2021) and if it was a presential chat it is also stored in the archive of the Neighborhood House (Neighborhood House Rep, 2021).

13. Where are the proposals diffused? (Web portal, physical place, mix)

Renewals, modifications, or any updates regarding collaboration pacts are shown in the Municipality's website. However, beyond that, there is "no structured place to make diffusion at the moment. Things are done but they are not publicized" (Commons Officer, 2021a).

Although, the documentation research mentions that "all the proposals, advances, results, and related deeds are published in the section dedicated to the urban commons of the City website." (Città di Torino, 2019b, p. 17).

Direct observation evidenced that the City website only updates regarding the pact of collaboration, but there is no further information displaying the progress of each urban commons. The site https://torinocitylove.firstlife.org/ which the Co-City journal mentions (UIA - Urban Innovative Actions, 2018), is not active nor contains information regarding Piazza Paravia.

From the perspective of the commons, proposals are diffused within both WhatsApp and their public gatherings (Neighborhood House Rep, 2021; Paravia's Commoner, 2021). Only when proposals are implemented are diffused in public communication channels such as Facebook.

14. How are proposals reviewed, and who participates in approving or disapproving proposals? (any citizen, commoners, commons representatives, city council, district representatives, tech board, council of the urban commons).

As all previous questions, it all depends on the type of proposal. If the proposal concerns the intervention of the municipality, then the City Council has the last decision when there is money involved and technical feasibility to check. However, if there is no money nor technical complexities involved, then commoners have the autonomy to act autonomously (within the scope of the pact of collaboration) (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

Although, proposals are sometimes in the middle of both, i.e., there is a technical feasibility to check, but is a basic one that the District can provide with direct authorization (District Representative, 2021).

The documentation research supports the declarations of the Commons Office and of the District Representative. When generating new civic deals, the responsible Director of the urban commons is the one with authority to approve or disapprove these (Città di Torino, 2019b). Once the civic deal turns into a pact of collaboration, the community of reference (urban commons) is autonomous within their scope of agreements (Città di Torino, 2019b). Each Pact of Collaboration holds the "modalities for the adaptation and modifications of the agreed activities and works;" (Art. 8, Title II, Città di Torino, 2019b).

15. Where is this decision made? (closed doors, public, using software)

Commons Office: "If the decision regards money or technical complexities, then the decision follows the procurement proceedings" (Commons Officer, 2021a). Otherwise, it follows the urban commons' specificities of their governance charter (Commons Officer, 2021a).
The governance approach of Piazza Paravia is one of weekly gatherings, where they make decisions openly on the public space (Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

16. Where are the results diffused? (Web portal, physical place, mix)
If it is related to the pact of collaboration document, it is updated on the website, under its commons section. Otherwise, no other portal or place for diffusing this information (Commons Officer, 2021a).

The documentation research on the journals of Co-City show that besides what has been covered by the Regulation on the Urban Commons, the Neighbourhood Houses offers a way for diffusing and connecting people with initiatives (UIA - Urban Innovative Actions, 2021).

5.2.4 Negotiation/Decision making. Apply decision-making models, including stakeholder engagement, citizen participation, and political endorsement.

17. Are the before-mentioned decisions final, or do they go to another body or decision-making process? (if so, which?)

When Municipality takes decisions is because these are "consistent with the principles of [the] Regulation and the social and ecological interest of the proposal" (Città di Torino, 2019b, p. 14), and these have gone through the analysis of technical board and district's hearings; therefore they should have covered all potential perspectives (Commons Officer, 2021a).

The documentation details even further. Every Pact of Collaboration must include a charter on its approach to shared governance. This chapter covers how decisions are taken by defining the governance instruments (direction, cabin, steering committee, etc.) and participation forms (consultations, assemblies, focus groups, etc.) (Città di Torino, 2019b).

If it is regarding the scope of the pact of collaboration, the Amici de Piazza Paravia (the community of reference) is an informal group of citizens supported by Article 110 of the Italian Constitution to allow their autonomous management and governance (Neighborhood House Rep, 2021; Paravia's Commoner, 2021). In this case, if a citizen or group finds that the decisions impact negatively on its person, then he/she can contact either the Neighborhood House, the District, or the Commons Office.

18. Which technology is used for making decisions in this process? (Pen and paper, specialized software, mix)

The Municipality uses eMails and online meetings to interact with other municipal actors (Commons Officer, 2021a).
The urban commons uses presential gatherings and WhatsApp.

A direct observation is that none of the actors interviewed mentioned a specialized software to guarantee safe and easy decision-making.

19. Is the result of decisions guaranteed to happen? (law, regulation, self-governance)

Within the municipal regulation, a written approval by eMail is supported by the law (Commons Officer, 2021a).

Whereas, the Urban commoners acts are supported by their signed Pact of Collaboration, which is supported by the Regulation of Urban Commons as legal instrument to act autonomously (Città di Torino, 2019b).

20. Once a decision is made, who drafts the policies regarding this decision and which technology do they use? (Pen and paper, specialized software, mix)

From the government side. The Municipality hires a private company to draft the technical specifications. Then, a technician from the municipality checks the technical specifications (Commons Officer, 2021a).

From the urban commons side. “Our way of participating and sharing, is to build together. Maybe there's an idea that only one person with more skills could do. But in our opinion there is a "who knows more, can teach who knows less" formula, and with that, there is collective growth” (Paravia's Commoner, 2021).

21. Who participates in the design of the implementation and monitoring plan?

The Municipality through the Commons Office, run twice a year a monitoring campaign. This campaign is made entirely by the Commons Office (District Representative, 2021), and only the District helps reaching the members of the commons (District Representative, 2021), so they can fill the documents received (Paravia's Commoner, 2021).

22. Which technology is used for this? (Pen and paper, specialized software, mix)

On one side, the Commons Office uses a dynamic PDF file (see Annex 1) (Commons Officer, 2021a). On the other side, the Neighborhood House uses an excel file (Neighborhood House Rep, 2021).

5.2.5 Implementation. Application and interagency collaboration.

23. What software/technology is used for enabling collaboration and communication between government and the urban commons stakeholders? (web portal, specialized software, etc.)

Google Meets, Google Drive, Shared Calendar on Google, and WhatsApp groups (Commons Officer, 2021a).

On the commoners side, their main communication channel is WhatsApp (Neighborhood House Rep, 2021; Paravia's Commoner, 2021). “It is faster than emails” (Paravia's Commoner, 2021).

As part of the direct observation and documentation research, it was not found any other software for coordinating collaboration.

5.2.6 Evaluation->Termination / Adaptation. Monitoring.

24. Which technologies/software is used for collecting the monitoring’s evidence?

The Municipality has a centralized solution that is not used even by the public officers due to its incompatibility outside the Municipal computers, specially within the highest restriction period of COVID-19. This “solution” is a non-updated version of Access 2013 (Commons Officer, 2021a). Some officials, municipal employees, and neighborhood houses have created their version to gather the data using an Excel sheet (Commons Officer, 2021a; Neighborhood House Rep, 2021).

The direct observation from the interviews is that it seems that information is gathered privately, through double efforts, and used as an instrument of personal knowledge.

25. Is there any indicator dashboard used for analyzing/viewing data?

The only publicly available information is the one showing on the Municipality's website (Commons Officer, 2021a).

The urban commons of Piazza Paravia does not have any publicly available dashboard, but the Neighborhood House shares the information collected from their monitoring at the end of the year (Neighborhood House Rep, 2021).

26. Who performs the administrative and judicial evaluation of the results?

When the Permanent Council of the Urban Commons is in place, it will verify the evaluations made to all commons (Città di Torino, 2019b). The evaluation documentation should be "available to the whole population through tools such as publication on the website, the organization of press conferences, conferences, dedicated events, and any other form of communication and dissemination of the results" (Città di Torino, 2019b, p. 19).

5.3 Polycentric Actors

From performing documentation research, it was found that the polycentric type of governance is not defined by the Regulation on Urban Commons (Città di Torino, 2019b). It only considers Shared governance and Self-governance types, defining them as:

> "f. Shared governance: regeneration, care and management of an urban commons carried out jointly by civic subjects and the Administration;" with continuity and inclusivity;
>
> g. Self-governance: regeneration, care and management of an urban commons carried out autonomously by civic subjects;" (Città di Torino, 2019b, p. 5)

In this lack of Turin's official definition, the author took the definition created for this research, which short version was given to the interviewees ("an urban commons autonomous on decision making within its commons space, where its actors involved participate in the co-design of the urban commons self-governance").

Continuing with the documentation research, the Regulation on the Urban Commons recognizes two different actors. Civic subjects and the Government (Città di Torino, 2019b).

From the Government, several bodies unfold, such as The City Council, the District Council, the Technical Board, Permanent Council of Urban Commons of the City of Turin, and the Register of Guarantors (Città di Torino, 2019b). Although these last two

bodies are not functional yet, they will be citizens volunteering to the charge but appointed by the City Council (Città di Torino, 2019b; Commons Officer, 2021a).

According to the interviewees, the Co-City Journals, and the pacts of collaboration, another important actor exists, the Neighborhood House (Città di Torino, 2019a; Commons Officer, 2021a; District Representative, 2021; Neighborhood House Rep, 2021; Paravia's Commoner, 2021; UIA - Urban Innovative Actions, 2018).

In summary, three actors from the main polycentric structure of any Turinese urban commons (Città di Torino, 2019a; Commons Officer, 2021a; District Representative, 2021; Neighborhood House Rep, 2021; Paravia's Commoner, 2021; UIA - Urban Innovative Actions, 2018). Here, each is explained in detail with their roles and responsibilities.

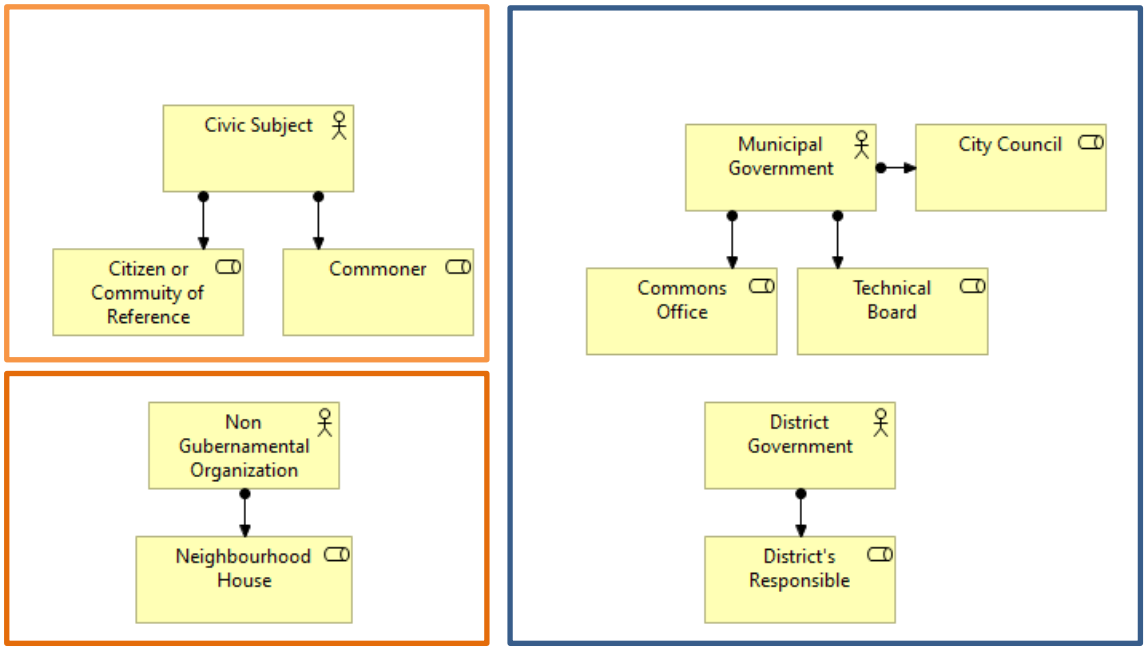


Figure 12. Polycentric actors and their roles

5.3.1 Civic subjects

The responsibility of the civic subjects is limited to what they sign in the pact of collaboration. The types of actions they are able to perform are specified by the regulation on the urban commons (Città di Torino, 2019b). The regulation allows the community of reference to autonomously act without intervention from the central authority if their decisions and acts are within any of the following activities:

a. Cleaning of pavements and walls; small maintenance and repairs; painting; opening and closing of fenced areas; other similar actions to be agreed upon with the competent services;

b. Small green areas (gardens, flower beds, collective gardens, play areas, dog areas, public or subject to public use), for the activities of: ordinary maintenance and green care; irrigation, wetting, fertilizing, weed removal; cleaning; planting of small plants or shrubs; repair of support and delimitation elements; opening and closing of fenced areas; other similar actions to be agreed upon with the competent services;
c. Urban furniture elements (benches, boundaries, bollards, bicycle racks, advertising panels, etc.) and works of public art, for the activities of: ordinary maintenance and repairs; painting; other similar actions to be agreed upon with the competent services;
d. Premises and schoolyards owned by the City, for the activities of: ordinary maintenance and repairs; painting; other similar actions to be agreed upon with the competent services;
e. Other buildings owned by the City, including cemeteries, for the activities of: ordinary maintenance and repairs; painting; other similar actions to be agreed upon with the competent services. (Città di Torino, 2019b, pp. 12–13)

5.3.2 Neighborhood House

The Neighborhood House from District 4 is called Più Spazio Quattro. Più Spazio Quattro works as the main connection between the urban commons and the government (Neighborhood House Rep, 2021). The Neighborhood House is classified as an NGO (Commons Officer, 2021a; Neighborhood House Rep, 2021), although its founding members are a mix of government (the Municipality of Turin and the District 4) and another civic organization called Compagnia di San Paolo (Più Spazio Quattro, n.d.a).

The Neighborhood House's responsibilities (regarding the urban commons) are mainly two. Facilitating communication between the commoners and the required governmental and non-governmental bodies, and accompanying any commoners' initiatives (Commons Officer, 2021a; Neighborhood House Rep, 2021).

5.3.3 The Government

The government actor is divided into several bodies. The Municipality of Turin is the highest authority. The Municipality "acknowledges and facilitates civic subjects' autonomous initiative and prepares any of the necessary measures to pledge its effective exercise" (Città di Torino, 2019b, p. 6).

Another responsibility of the Municipality is to provide the financial resources asked within the pact of collaboration (when applicable and when available) (Città di Torino, 2019a, 2019b). In the case of Piazza Paravia, the Municipality financed putting new benches, installing arches for the parking of bicycles, and adding two fences along the perimeter of the flower beds (Città di Torino, 2019a). However, this is not a path commons usually look for (District Representative, 2021). Requesting financial resources

from the Municipality can take years (District Representative, 2021; Paravia's Commoner, 2021).

The Commons Office (*L'Ufficio Beni Comuni della Città di Torino*) is the Municipal body in charge of coordinating and evaluating that the activities performed by the urban commons comply with the Regulation (Città di Torino, 2019b; Commons Officer, 2021a; Ufficio Beni Comuni della Città di Torino, n.d.). The Commons Office is responsible for communicating the register of Pacts of Collaboration and its updates, along with examining all proposals regarding shared governance (Città di Torino, 2019b; Ufficio Beni Comuni della Città di Torino, n.d.). The Commons Office summons the Technical Board when a new governance proposal is created. Then the Technical Board requires identifying a responsible person within the corresponding District to evaluate the proposal and facilitate the creation of a Collaboration Pact (Città di Torino, 2019b; Commons Officer, 2021a).

The District's representative responsibilities are three (Città di Torino, 2019b; District Representative, 2021). (1) Reviewing that the proposals brought to them are coherent with the pact of collaboration and with the applicable laws. (2) Scaling coherent initiatives with actors that can contribute technical and financial resources to them. (3) Conducting monitoring and evaluation assessments to the governance activities of the urban commons.

Besides these bodies, other commons-specialized bodies, such as the Technical Board, Register of Guarantors, and the Permanent Council of the Urban Commons (Città di Torino, 2019b). However only the Technical Board is operational at the moment of writing (Commons Officer, 2021a).

The Technical Board’s responsibility is performing the preliminary evaluation on new proposals requesting to initiate a pact of collaboration (Città di Torino, 2019b).

5.4 Polycentric eGovernance models

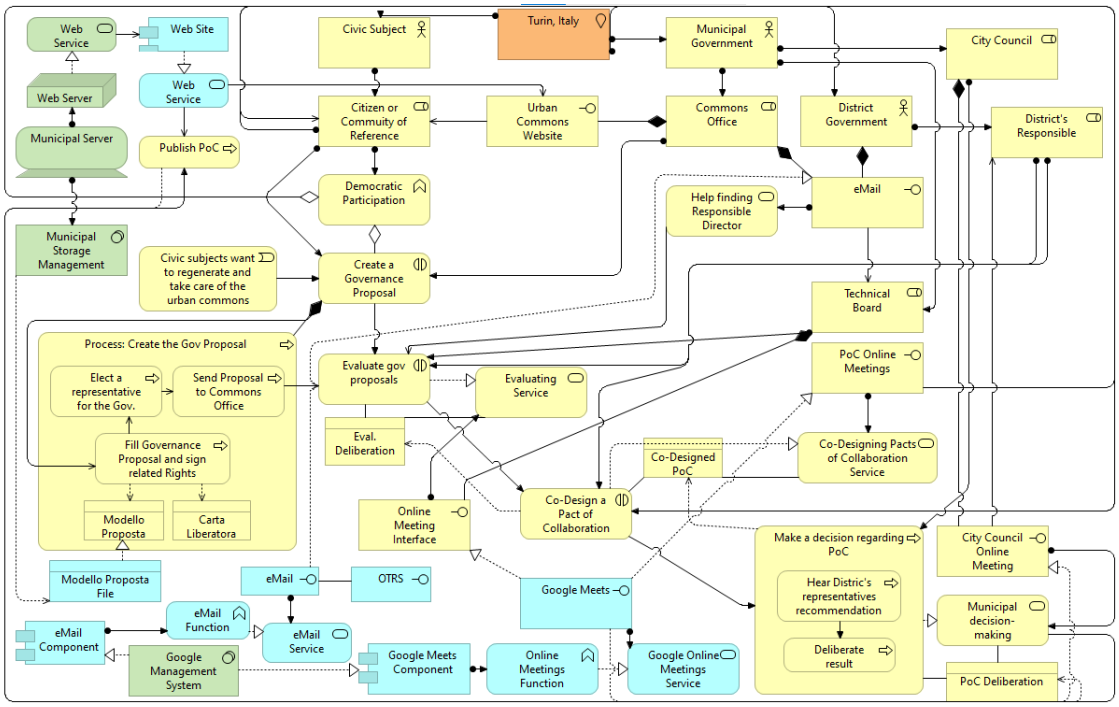


Figure 13. Policy making process of creating an urban commons

The model in Figure 11 shows the process that a civic subject needs to do and wait for to have legal support in taking care and regenerating a public space.

The model shows three layers. Business, Application, and Infrastructure. The model starts with the event of “Civic subjects want to regenerate and take care of the urban commons”. This even triggers the collaboration step to Create a Governance proposal, which is part of the democratic participation rights given by the Italian Constitution and by the Regulation on the Urban Commons (Città di Torino, 2019b; Commons Officer, 2021a).

In this model, there are three main actors, Civic Subjects, Municipal Government, District Government (Città di Torino, 2019b). The Civic subjects are represented by the role of Citizens or community of reference. The Municipal Government by the roles of Commons Office, Technical Board, and City Council. Finally, the District Gvt. is represented by the role of District’s responsible (Città di Torino, 2019b).

Creating a governance proposal is the first step, and it is an act of collaboration between the Citizen and the Commons Office (Città di Torino, 2019b). This collaboration is accessible through the Urban Commons website (Commons Officer, 2021b).

Creating the governance proposal requires three steps (Città di Torino, 2021). First, filling the governance proposal format and sign its related rights. Second, electing a representative for the governance of the commons body. Third, sending the filled proposal to the Commons Office.

Once the proposal is submitted, another collaboration step is triggered. This time, for evaluating the proposal. The evaluating service is provided by both the Technical Board and the District's responsible, and outputs a deliberation of its evaluation (Città di Torino, 2019b; Commons Officer, 2021a).

The evaluation service is carried out by a combination of eMails and online meetings (Commons Officer, 2021a; District Representative, 2021).

When an evaluation outputs a positive deliberation, it triggers the co-designing of the pact of collaboration. This co-design is carried out by the District representative and the citizens or community of reference through online meetings mainly. The output is the Pat of Collaboration.

Once done, this step triggers making a decision by the City Council. This decision is made after hearing the District's recommendations through a google meetings.

As a last note, the application and infrastructure layers shows the ICT services used to realize these business layers. They will not be covered in explanation as the image self-explains this part.

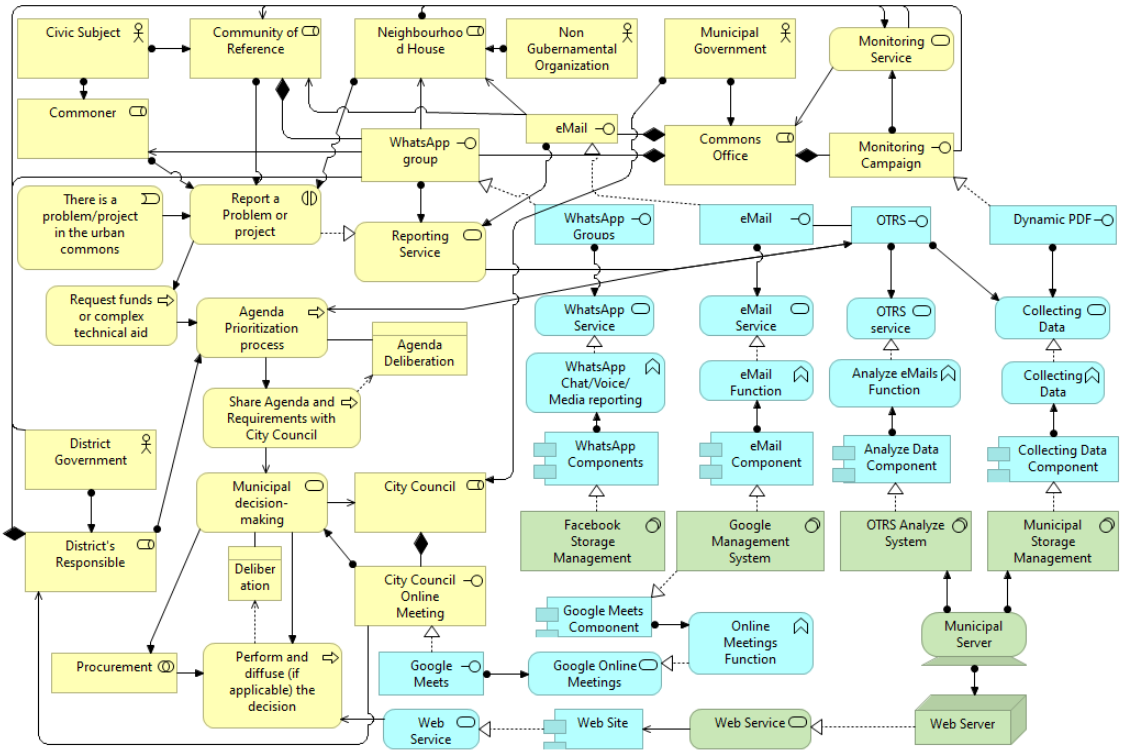


Figure 14. Urban planning process when requiring funds to the Municipality or complex technical feasibility, and policy-making process when requiring to update the Pact of Collaboration

The Business layer starts by describing the four actors in this model. Civic subject, Non Governamental Organization (NGO), Municipal and District Governments.

Civic subjects are separated here into Commoner and the Community of Reference, because the model explains some functionalities that serve one or the other.

The NGO is represented by the role of Neighborhood House, as it is the main NGO participating in every Turin's urban commons. People from other NGOs can be thought within the role of Community of Reference.

The Municipal Government is represented by both the Commons Office and the City Councile roles. The District is represented by the District's Responsible role.

The urban co-planning process and the co-policy-making process start when there is a problem/project in the urban commons. This event triggers the need to report it, and reporting it is done by a collaboration action between the Neighborhood House and the Community of Reference and the commoner who spotted the problem or had the project idea.

Reporting a problem could be considered a service within Enterprise Architecture Modelling, which is accessible through a user interface. In this case, the actors report problems first through WhatsApp. Then, if they see fit, they report it by eMail.

There are two WhatsApp groups. One owned by the Community of Reference (the urban commons), and another owned by the Commons Office. WhatsApp groups serve the individual Commoners, the Neighborhood House, and the District Responsible.

eMail address for reporting problems are owned by the Commons Office, the Neighborhood House, and by the District's Government. eMails serve all actors as they communicate with each other using this channel.

In either case, when a problem requires funds or complex technical aid it triggers an agenda prioritization process. All processes are supported by the Application layer, nontheless the OTRS is a service to remark at this stage. The OTRS automates finding the responsible person within the District to attend the requests of help.

As in this case, the problem or project requires complex aid, the technical or financial evaluation from the District is created and shared with the City Council.

The City Council will make a decision by online meeting with the District's responsible to deliberate. The Deliberation will then be diffused. However, not all decisions are diffused. Only those that are meaningful to the city.

It was understood that Procurement-related processes will be always diffused.

In this model the Application and Infrastructure layers are also present. These two layers present the supporting services for accessing the WhatsApp, eMail, OTRS, and Data collecting services.

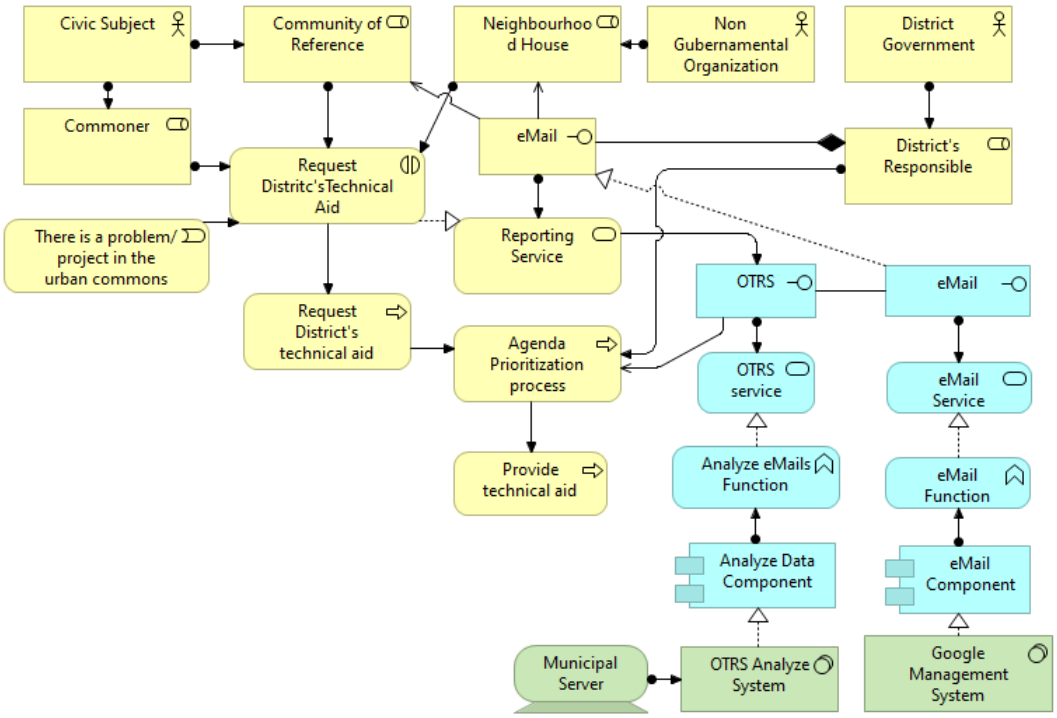


Figure 15. Urban planning process when requiring the District's competence in technical feasibility

The business layer shows three actors. Civic subject, Non Governamental Organization, and the District Government.

Here, the process of urban co-planning starts when there is a problem or project in the urban commons, and it requires the District's technical aid.

This technical aid request is a collaboration between the roles of the Neighborhood House, the Community of Reference, and the Commoner that brought to discussion the project or problem.

To report this problem or project, the Community of Reference or the Neighborhood House send an eMail to the District's Responsible person. This request of aid triggers the agenda prioritization process, which is supported by the Application layer, more specifically by the OTRS, as seen in the previous model.

When the responsible person within the District receives the eMail assigning him or her the task to provide technical aid, they do and the process is finished.

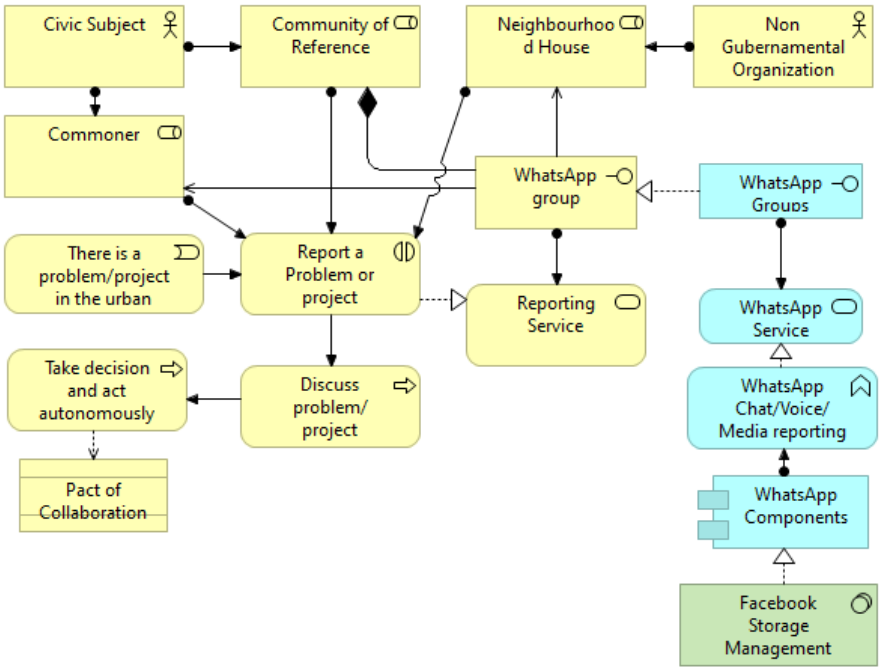


Figure 16. Autonomous polycentric governance and management

This model presents only two actors as is the autonomous action and decision-making of the urban commons. The process starts the same as the above models, by an event that triggers the need to report a problem or propose a project.

The first thing is to report this need through the Urban Commons' WhatsApp group. There the problem is discussed, and then they, the Community of Reference and the Neighborhood House, take autonomous action on what they agreed, as this is their right according to the Pact of Collaboration.

6 Discussion

The aim of this thesis was to understand the polycentric urban planning and policy-making processes that the urban commons of Turin employ during the COVID-19 pandemic. Learning from the urban commons regulations and frameworks, from the interviewees' experiences, the Co-City journals, and from direct observation to their digital channels, allowed the author to understand that the eGovernance reality is far from ideal.

Fortunately, understanding and modeling how each polycentric actor interacts with each other, specifically when making decisions and carrying out civic duties opens to policy-makers and eGovernance professionals opportunities to improve current process flows with professional software and more suitable digital coordination approaches.

The author answers to the research question: How do urban commons carry out polycentric urban planning and policy-making in times of COVID-19? By delivering to the reader a way of understanding the polycentric interactions that the urban commons have, through a qualitative case study research design that carries a thick narrative.

This approach allows the reader to not only understand objective models, but the context of why those processes are carried like this.

The author hopes that the narrative, extracted mainly from the voice of the critical stakeholders in the urban commons of Piazza Paravia, supported by documentation, direct observation findings, and construct validity coming from an urban commons specialist, can help eGovernance practitioners to offer custom solutions to the Italian cities pioneering in polycentric eGovernance.

In this section, the reader will solve the research question by analyzing the findings according to the research methodology. A quick summary of it will help the reader understand this section better.

6.1 Analysis approach

This research is exploratory case-study research with an epistemological perspective. Within this perspective, it is necessary to recognize that the theoretical framework provides specific filters through which the findings are looked at.

In this case, the research was looked at using three theoretical filters or lenses. The urban commons assessment framework guided the first perspective. This lens aggregated the knowledge of Dellenbaugh-Losse et al., 2020, Iaione, 2016, Hess, 2008, and Ostrom & Hess, 2007, allowing the researcher to recognize and validate that indeed, the citizen initiatives from Turin are real case urban commons. From these, one urban commons was chosen to study.

The second lens is the one that frames the policy cycle through an ICT fashion, providing an opportunity to clearly identify the digital means used in the processes of policy-making and urban planning within the COVID-19 times.

The third lens is the one of a process modeler. Specifically, the lenses used when modeling Enterprise Architecture (EA). This third lens guided the analysis of the results to see the stakeholder helixes as actors, categorizing them through roles. Furthermore, the EA perspective demanded the researcher to understand policy-making as a process with organic, digital, and infrastructure layers.

It is to highlight that besides lenses, the researcher used a compass. The policy-relevant research guidelines did not let the author lose aim when conducting questions and analyzing the findings. These guidelines reminded the author of the importance of using this research's effort to provide an opportunity for policy-makers to improve the current systems.

6.2 Urban Commons selection analysis

This exploratory case study research aims to research only one urban commons from Turin, Italy. In the case study section, it was explained the reason why Turin was chosen among other cities. In this section, Reiter's (2013) and Yin's (2009) advice is followed to reason the choosing of Piazza Paravia as the one with the most significant amount of information.

Before choosing one urban commons, it was essential to understand the types existing beyond the documentation research. The assessment of the urban commons brought to light the existence of two approaches, on the one hand, citizen-led polycentric coordination, and on the other hand, Government-led polycentric coordination. On this, three urban commons reflected these two approaches as their regular operation: Piazza Paravia and Aiuola Ginzburg, regarding citizen-led polycentric coordination; and Via Cumiana 15, regarding the Government-led polycentric coordination (Commons Officer, 2021a).

Fortunately, the interviewed Commons Officer is directly involved in the weekly meetings with the Via Cumiana commons. Therefore, a preliminary interview and then a two-round in-depth interview allowed understanding the way government-led coordination operates. The government-led coordination process applies to any urban commons making a proposal with technical complexities and financial requirements. Therefore, modeling it within any other urban commons fulfills the need for understanding this specific approach.

That said, Piazza Paravia and Aiuola Ginzburg are urban commons that work, manage, and make decisions autonomously without requiring the intervention of the central authority. This type of commons represents the model that most of the urban commons in Turin are walking.

From these two commons, Piazza Paravia was the one with the largest number of polycentric actors involved, while having active digital communications channels, and a strong relationship with both NGOs and different levels of government (Commons Officer, 2021).

It is to highlight that, before discarding one urban commons over the other, the researcher asked more about the context and history behind each pact of collaboration and looked at the digital channels of both urban commons to see their present reality. From there, Piazza Paravia was the only one with a digital communication channel specially focused on the urban commons. Furthermore, Piazza Paravia achieved truly polycentric coordination by integrating into its management and governance several non-governmental organizations, citizens, and a strong relationship with both the District and the Municipal level government (Amici di Piazza Paravia, n.d.; Commons Officer, 2021a; District Representative, 2021; Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

Additionally, Piazza Paravia filled almost all the urban commons assessment dimensions (see Table 3. Assessed Urban Commons).

These reasons confirm the suggestion from the Commons Officer that Piazza Paravia is the best example to study (Commons Officer, 2021a).

6.3 Polycentric urban planning and policy-making

Once understanding the urban commons, the reader and the researcher are closer to answering the research question. The natural next step is understanding the polycentric cycles that urban commons engage in.

Following the advice of Yin (2009) to look into other researchers' proven paths, the researcher heavily relied on the interviewees' voices to provide thick descriptions. Thus, enabling the reader to interpret the data result of interviews, adding strength to the confirmability of this research's results (Dolley, 2019).

Additionally, the author provided enterprise architecture models to facilitate a graphic understanding of the policy-making and urban planning processes. These models will strengthen the dependability of the results.

Concretely, from the identified polycentric governances approaches, four processes were found.

The citizen-led polycentric coordination approach unfolds the process that Piazza Paravia's urban commons employs when not needing intervention from the government (Figure 16). It is an agile and straightforward process where commoners from the different decision-making centers (NGOs and citizens) share both problems and project ideas through WhatsApp or within their weekly gatherings (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

They do not require permission to act, as they have the autonomy to do so within the scope of the signed Pact of Collaboration (Città di Torino, 2019a).

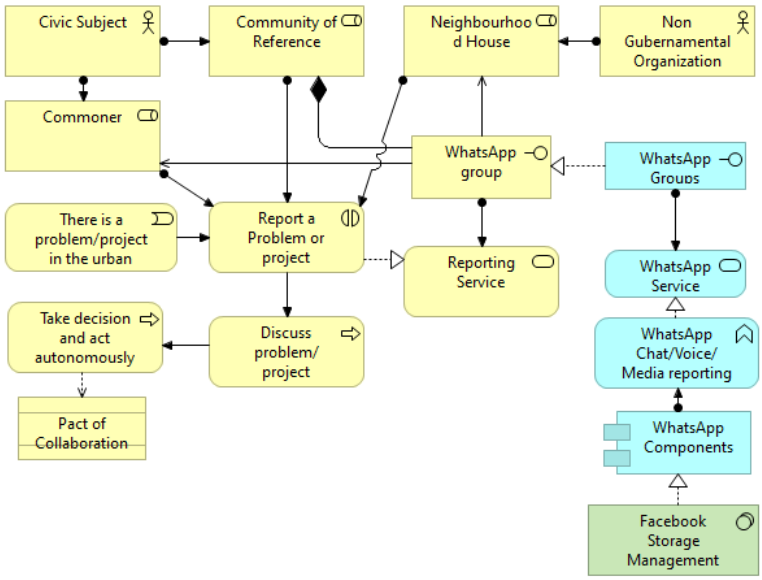


Figure 16. Autonomous polycentric governance and management

Sometimes, their autonomy on decision-making faces some limitations on their autonomy to act; however, the limitation is only a trigger to connect the District government (Figure 15). The District's responsibility is to make sure that the actions of the commoners are congruent with public standards (Città di Torino, 2019b; District Representative, 2021). A process made agile by employing an OTRS solution that automizes mailing directly to the technical department in charge of facilitating the commoner's request (District Representative, 2021).

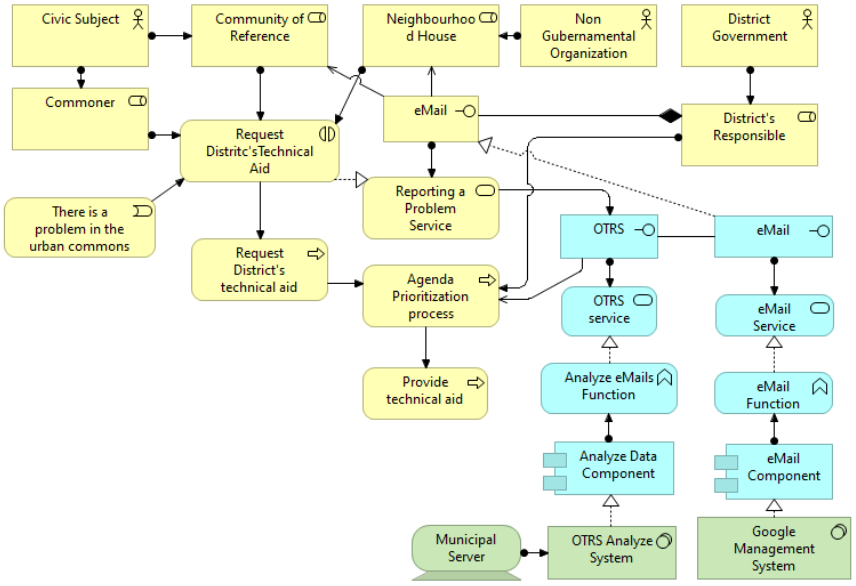


Figure 15. Urban planning process when requiring the District's competence in technical feasibility

On the government-led polycentric coordination. Two other processes unfolded.

The first one is the policy-making process of creating an urban commons (Figure 13). A polycentric process born from the democratic function that the Italian Constitution provides to any civic subject, either an individual or a group, to request legal permission to take care and regenerate a public space (Città di Torino, 2019b).

This urban commons creation process uses digital means for facilitating the entire process of turning a citizen petition into a pact of collaboration. This request is facilitated through a website and two digital documents to fill and sign. Additionally, the digital process connects government bodies between each other through Google's mail and online meeting services. Both digital services are closed source, locking the data with the provider.

The only open source digital means is the OTRS solution that the Districts use to assign the incoming mails.

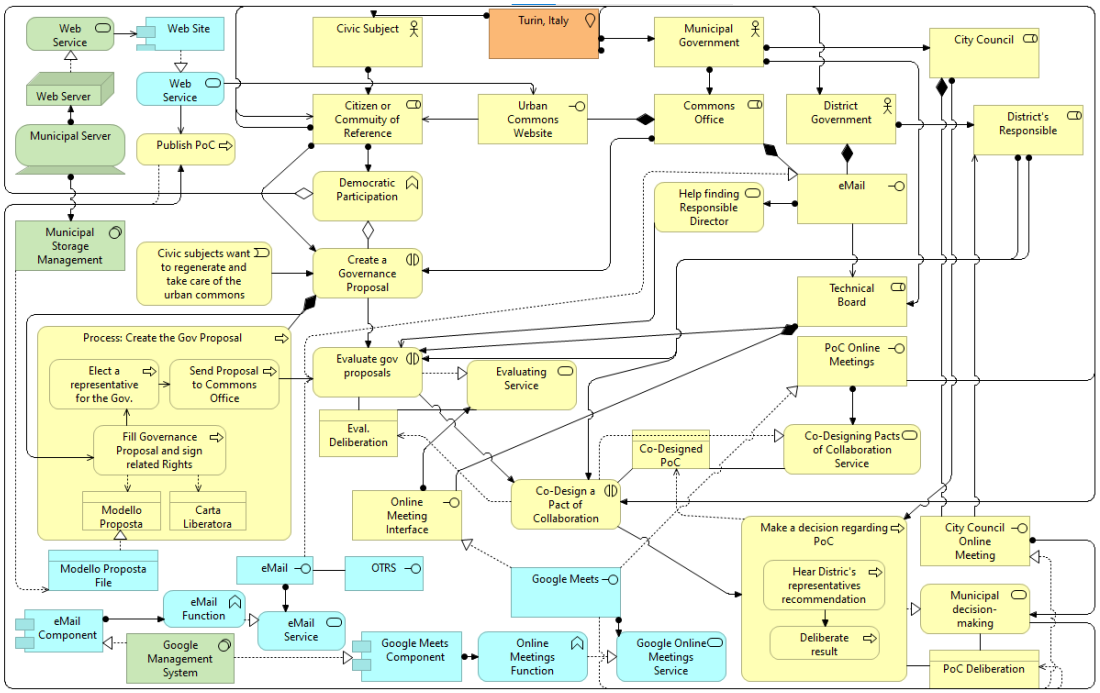


Figure 13. Policy making process of creating an urban commons

The last process, is one of urban planning. This is triggered in those situations requiring funds to the Municipality or a complex technical feasibility. This last process also applies to policy-making steps when requiring to update the Pact of Collaboration.

The main difference between Figure 14 and Figure 15 is that the District includes the Municipality in the decision-making. This process can be immediately identified as more complex and is the one that both the commoners and the District representative commented as slow and bureaucratic (District Representative, 2021; Paravia's Commoner, 2021).

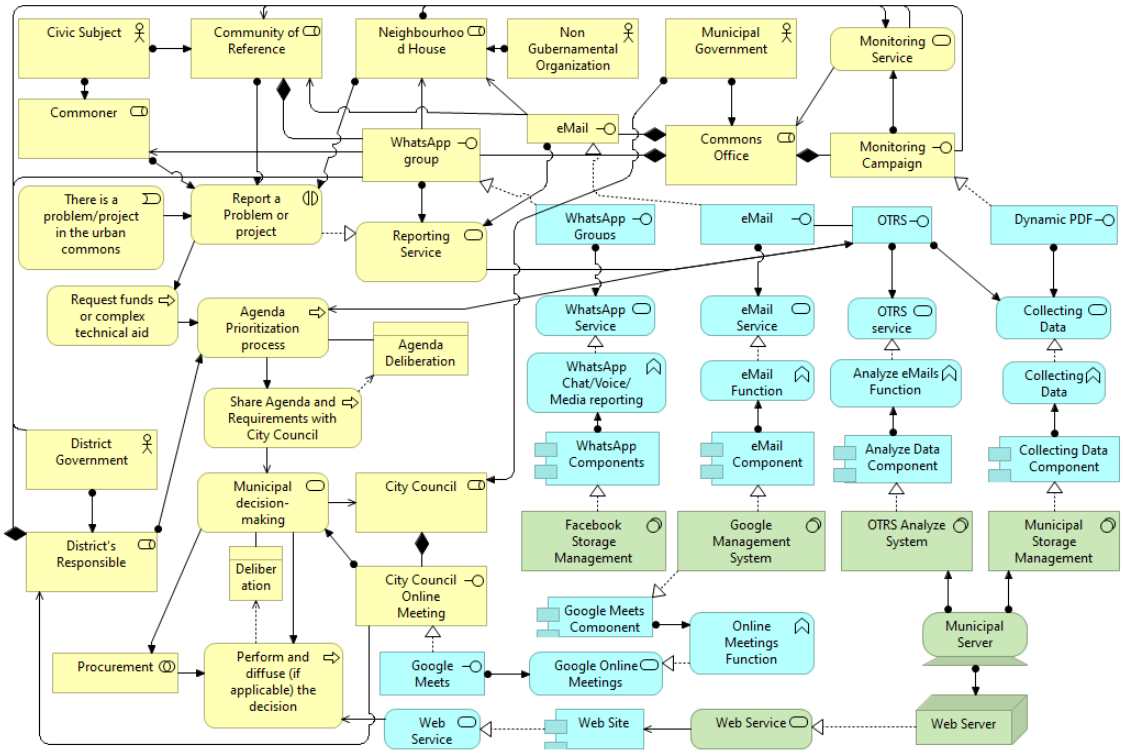


Figure 14. Urban planning process when requiring funds to the Municipality or complex technical feasibility, and policy-making process when requiring to update the Pact of Collaboration

The author can safely say that these models achieve to answer the research question of "How do urban commons carry out polycentric urban planning and policy-making in times of COVID-19?"

Concretely, even if the pandemic of COVID-19 has different phases, these models fit both in the digitalized and the mixed ways of communicating and approaching the polycentric governance of the urban commons. Also, they provide a point of view from the internal governance processes a polycentric urban commons employs; and the overall processes of urban planning and policy-making the polycentric actors engage in when interacting with each other.

It is to acknowledge the evident focus on digitalization processes, their application and infrastructure used. This can be considered a limitation to the findings, and simultaneously, a narrowed approach to where eGovernance professionals can use to understand this specific domain in public service delivery.

Also, it can be confirmed, from looking to these models and from reading the thick descriptions offered in each step of the ICT-based cycle, that the use of WhatsApp and eMails are what Gabryelcyzk (2020) pointed out as the public sector negligence on

adopting suboptimal solutions when digitalizing their process flows, just because they are already familiar with these.

The same applies to what Dellenbaugh-Losse, Zimmermann, & Vries, (2020) said about the urban commons using no additional tools than the ones employed in informal meetings.

Both of these findings open the possibilities for eGovernance professionals to experiment on applying more advanced solutions such as Slack, Discord, Workplace, ClickUp, Miro, Teams, or even developing custom solutions for the specifics needs that the polycentric stakeholders have.

This paper carries out Yin's approach by presenting and analyzing the results in three steps. First, dissecting the urban commons structure, roles, resources, and employed ways of governance. Then, by presenting the policy cycle through each of the stakeholders' perspectives. Finally, the author models all parts in single models and explains them in this section.

The research quality tests are covered regarding Internal Validity by supporting the use of the logic models as a single tactic. The author covers External Validity by using a methodological research design with well-defined theories.

Lastly, the Construct Validity test is covered in two phases. First, by employing multiple sources of evidence at the data collection and presenting these with a chain of evidence.

The second phase regards the presentation of the case study's report to a Key Informant. The Key Informant reviewed the consistency and congruence of the findings from her experience on the legal, polycentric, and local knowledge aspects of Turin's and Italy's urban commons.

Finally, the Reliability test is evidenced in Annex 3 by sharing all the sources looked at when performing this research.

7 Conclusions and future work

This research work evidences what several scholars on digitalization point out, the public sector's negligence of proper digitalization processes.

Fortunately, the environment is optimal for improving. On the one hand, Turin and hundreds of cities are pioneers on polycentric governance experimenting. On the other hand, public authorities have recognized that digital processes are a must to officialize. Thus, is the ideal opportunity for eGovernance professionals to offer solutions on optimizing public service delivery with empathy to the citizens and efficient resource usage.

This thesis helps eGovernance professionals in understanding the current digital processes and ways of coordinating that both the active citizens and the public authorities of Turin use to collaborate on taking care of the city.

From the overall research, the author found two polycentric governance approaches. From these approaches, four ICT-based processes were found, including in these, urban planning and policy-making cycles.

On one hand, the governance approaches are citizen-led polycentric coordination, and on the other hand, government-led polycentric coordination.

The citizen-led polycentric coordination approach unfolds the process that Piazza Paravia's urban commons employs when not needing intervention from the government. This is an agile and straightforward process where commoners from the different decision-making centers (NGOs and citizens) share both problems and project ideas through WhatsApp or through their weekly gatherings (Commons Officer, 2021a; Neighborhood House Rep, 2021; Paravia's Commoner, 2021).

They do not require permission to act, as they have the autonomy to do so within the scope of their signed Pact of Collaboration (Città di Torino, 2019a). Although this permission-less has limits. The limits are a way of triggering the participation of other centers of decision; still, in this approach, the District's responsible technical personnel are summoned when the act of the commons requires verification that public standards are followed.

In cases where financial resources or the technical analysis is beyond the District's competence, the government-led polycentric coordination is the governance approach to go. This approach unfolds a policy-making cycle and a mix of urban planning and policy-making processes.

Regarding the models. Figure 12 shows the polycentric actors and their roles.

Figure 13 is the policy-making cycle regarding proposing, evaluating, recognizing, and supporting the autonomous operation of an urban commons. It goes through the entire process representing the actors and roles involved and the application and infrastructure technologies used to carry it.

Figure 14 is when a direct intervention of the Municipality is requested due to the technical complexity or because the budget is higher than what the Districts have, then it ends by triggering a procurement process.

Figure 15 is the urban planning cycle followed when requiring a change to the urban commons' environment. This model is focused on the process that emerges when requesting financial or technical aid from the District.

Finally, if one critically asks, what do we learn from the analysis of the urban commons in Turin in times of Covid-19? The experience of researching this urban commons lets the reader understand the eGovernance state of the art of Turin through the eyes that public service delivery has on urban commons. One can add that, the capacity of both the public service and of the polycentric groups is highly limited by the technology they use, which as seen in the narration and models, the eGovernance of the commons is based on WhatsApp, eMail, and on some occasions, online meetings. The most advanced solution the co-governance of urban commons has is offered by the Districts through automation of managing and assigning responsibility to the incoming mails.

Proper governance and coordination mechanisms are needed, which interfaces need to be user-friendly for the oldest of our people. This will enable to not stop social activism even in the most difficult times.

Another lesson learned from looking to the EA models and to the interviewees' experiences, is that beyond the technology upgrades, the polycentric governance system needs to become leaner and agile, as having waiting times of years can discourage many social activists.

The above statements do not look to be judgmental but an eye-opener. The opportunities for eGovernance professionals are abundant, and COVID-19 has shown that our institutions need more advanced solutions that are easy to use by all citizens, independently of their age and technical knowledge.

A call to action would be to do the second part of the EA architecture modeling where the desired state is modeled, thus, the public administration can set defined objectives to become agile and resilient.

In the current state, Turin has not invested in professional technology and eGovernance training, thus the city holds an opportunity to invest in digital transformation by learning from these models and designing a path to the future.

8 References

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Annexes

Annex 1. Monitoring campaign's document

Dynamic PDF file: https://drive.google.com/file/d/1c4jSyaNLvjFxpjo1neECZUEkGzAdMmGq/view?usp=sharing

Annex 2. List of Interviewees

Table 4. Summary of interviews conducted

Interviewee	Type of Interview	Quantity
Commons Office	Pilot	1
Commons Office	Semi-structured	2
Piazza Paravia Commoner	Semi-structured	1
District Representative	Semi-structured	1
Neighborhood House Representative	Semi-structured	1
Dr. Maria Francesca De Tullio	Key Informant	1

Annex 3. Reliability test

Literature and resources used: https://drive.google.com/drive/folders/1PUHwzGuXCYpGoO7aUWbJeSquDDLDqHy4?usp=sharing

Assessment of urban commons: https://docs.google.com/spreadsheets/d/1ntjr__eKdka72HtaVwOgoxPKGcGUpxP45n2hVj04pgs/edit?usp=sharing

Guiding questions for interviewing: https://docs.google.com/document/d/1uilK5sdOoRB-BFBKTgXLD1g5ED1fkwMgnA0lbY_AdkA/edit?usp=sharing

Annex 4. Interview Transcripts

The transcripts and video interviews are found in the following folder, which permission to access was only granted to supervisors of the thesis.

https://docs.google.com/document/d/1WZebmZlCtnXnBMXnENNI5V_20qBXiPunhcj1BvGGR7Y/edit?usp=sharing

Annex 5. Construct Validity

The Key Informant for providing construct validity was Maria Francesca De Tullio. She is a post-doc researcher in constitutional law at the University of Naples Federico II (with a research stay at the Université Paris 2 Panthéon Assas, CERSA, funded by the Erasmus+ Program of the European Union). Maria Francesca was post-doc researcher in cultural policies at the Commons Culture Quest Office - University of Antwerp within the project Cultural and Creative Spaces and Cities, funded by the Creative Europe Program of the European Union. She authored the monography Substantial Equality and New Dimensions of Political Participation. She is a member of the "Constitutions in the Age of the Internet" research group of the International Association of Constitutional Law (I.A.C.L.). Her main research areas are political representation and participatory democracy, counter-terrorism and legal states of emergency, communication surveillance, competition law on the Internet, the collective dimension of privacy in the era of big data. Moreover, she is acquiring specific competences by acting as juridical expert in the dialogue on commons between grassroots movements and administration in different cities of Italy.

Her video-insights are found in the following folder, which permission to access was only granted to supervisors of the thesis.

Folder with Key Informant's insights: https://drive.google.com/drive/folders/1pA0AfRLZuIPxaaxgCzVtiYUXDX4fDBAb?usp=sharing

Author's Declaration of Originality

I here declare that, to the best of my knowledge and belief, this Master Thesis titled: ¨ Co-governance of the urban commons during the pandemics of COVID-19¨ is my own work. I confirm that each significant contribution to and quotation in this thesis that originates from the work or works of others is indicated by proper use of citation and references.

Madrid, Spain.

Author: Humberto Besso Oberto Huerta
July 25, 2021

This thesis is written in English and is ninety nine (99) pages long, including six (6) chapters and five (5) annexes.

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