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# Policy Analytics for Collaborative Networks:

the role of stakeholders in the Italian Digital Civilian Service

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## Abstract

Nowadays, the world is becoming more and more digital and people without the possibility to access technologies, or without the necessary skills to use them are left behind. *Digital Inequalities* afflict several countries, including Italy, which features among the worst European players in terms of human capital. To counteract this situation, Italian Government issued the Digital Civilian Service policy, with the aim of increasing citizens' digital competences through facilitation and educational activities carried by volunteers of Universal Civilian Service (SCU) organizations. Being SCU organizations traditionally more grounded in the community than policymakers and knowing their targets' needs, policymakers have designed the policy, leaving to them some degrees of freedom to implement location- and target-based interventions. As a result, stakeholders contributed to policy implementation with a constructivist perspective, defining their 'values' in terms of targets, geographical coverage, digital skills taught and additional objectives. This constructivism is at the basis of Policy Analytics approach, whose literature is still scarce. Therefore, we mapped all the stakeholders of our reference case (i.e., Digital Civilian Service policy) and we ran a Social Network Analysis, to identify how the network varies depending on the 'values' identified, and which are the most central (i.e., influential) and peripheral players in terms of centrality measures (i.e., number of relationships among these actors). The results helped us to give contribution to the existing literature. First, it was possible to enrich existing frameworks on stakeholders' roles during the policy implementation phase, by adding new categories identified through the centrality measures of our policy network. Second, we showed an example of how values are involved in policymaking, providing practical guidelines to carry out a value-driven Social Network Analysis. Third, by identifying the most influential players in the network, we provided recommendations to policymakers for a better implementation of the Digital Civilian Service.

**Keywords:** policy analytics, policy networks, social network analysis, digital inequalities, digital skills.



## Abstract in italiano

In un mondo sempre più digitale, le persone che non hanno accesso alle tecnologie o non hanno le competenze per utilizzarle vengono progressivamente emarginate dalla società. Le disuguaglianze digitali colpiscono molti Paesi, tra cui l'Italia, fra i peggiori a livello Europeo per sviluppo del suo capitale umano. Il Governo ha emanato la policy del Servizio Civile Digitale allo scopo di aumentare le competenze digitali dei cittadini attraverso interventi di facilitazione ed educazione digitale, gestiti dalle tradizionali organizzazioni di Servizio Civile Universale (SCU). Essendo queste organizzazioni a stretto contatto con il territorio, i politici hanno disegnato la policy lasciando loro gradi di libertà nell'implementazione di interventi specifici per target e geografia. In questo modo, gli stakeholders hanno contribuito all'implementazione della policy con un approccio costruttivista, definendo i loro valori rispetto a target, copertura geografica, competenze digitali e obiettivi secondari. Questo approccio costruttivista è alle basi del Policy Analytics, la cui letteratura è ancora scarsa. Quindi abbiamo mappato tutti gli stakeholders del Servizio Civile Digitale e abbiamo svolto una analisi della loro rete per identificare come essa cambia in base ai valori definiti e quali sono i suoi player centrali (influenti) e quelli periferici in base alle misure di centralità (definite sul numero di relazioni tra gli attori). I risultati ci hanno aiutato a contribuire alla letteratura esistente. Per prima cosa è stato possibile arricchire frameworks già esistenti riguardanti i ruoli degli attori nella fase di implementazione della policy, aggiungendo nuove categorie di attori in base alle misure di centralità identificate nel nostro policy network. In secondo luogo, abbiamo mostrato un esempio di come i valori siano coinvolti nei processi di policymaking, fornendo guide pratiche alla realizzazione di analisi di rete, focalizzate attorno al concetto di valore. Infine, avendo identificato quali sono gli attori più influenti a livello di rete, abbiamo fornito raccomandazioni ai politici su come implementare meglio il Servizio Civile Digitale.

**Parole chiave:** policy analytics, reti di politiche pubbliche, analisi delle reti, disuguaglianze digitali, competenze digitali.



# Contents

<b>Abstract</b> .....	<b>i</b>
<b>Abstract in italiano</b> .....	<b>iii</b>
<b>Contents</b> .....	<b>v</b>
<b>1 Introduction</b> .....	<b>1</b>
1.1. Digital competences in Europe and in Italy .....	1
1.1.1. Policies for Digital Competences Improvement .....	3
1.2. Digital Civilian Service.....	4
1.2.1. Objectives and Targets.....	4
1.2.2. Interventions .....	5
1.2.3. Stakeholders and Key Activities .....	5
1.3. Aim of this Work.....	6
<b>2 Literature Review</b> .....	<b>9</b>
2.1. Methodology of the literature review .....	10
2.1.1. Search Terms .....	10
2.1.2. Inclusion and Exclusion Criteria .....	11
2.1.3. Study Selection.....	12
2.1.4. Insights on the Papers.....	13
2.2. State of the Art: Policy Analytics .....	16
2.2.1. Policy Cycle .....	17
2.2.2. Evidence-based Policy-Making .....	17
2.2.3. Policy Analytics .....	19
2.2.4. Stakeholders Involvement in Collaborative Policy Networks.....	22
2.3. State of the Art: Digital Inequalities .....	28
2.3.1 Defining Digital Inequality .....	28
2.3.2 Defining Digital Competences.....	29
2.4. State of the Art: Second-level Divide Policies .....	32
2.4.1. General Population .....	35
2.4.2. Elderly .....	38
2.4.3. Women .....	42
2.4.4. Young People .....	44
2.4.5. People with Disabilities .....	47

2.4.6.	Migrants .....	48
2.4.7.	eFacilitators.....	49
2.4.8.	Stakeholders' Networks.....	52
2.4.9.	Main Findings .....	59
<b>3</b>	<b>Knowledge Gaps and Research Questions .....</b>	<b>63</b>
3.1.	Knowledge gaps .....	63
3.2.	Research Questions .....	66
<b>4</b>	<b>Data and Methodology.....</b>	<b>69</b>
4.1.	Data .....	69
4.2.	Methodology .....	70
4.2.1.	Modelling the Digital Civilian Service Policy Network.....	72
4.2.2.	Social Network Analysis Measures.....	81
<b>5</b>	<b>Results .....</b>	<b>83</b>
5.1.1.	Network Level Analysis .....	83
5.1.2.	Node Level Analysis .....	87
5.1.3.	Dyad Level Analysis .....	91
5.2.	Research Question 2.....	95
5.2.1.	Target Analysis .....	96
5.2.2.	Geographical Analysis .....	98
5.2.3.	Digital Competences Analysis.....	99
5.2.4.	Priorities and specific objectives.....	100
5.3.	Main Results.....	105
<b>6</b>	<b>Discussion.....</b>	<b>107</b>
6.1.	Research Question 1 .....	107
6.2.	Research Question 2.....	108
6.3.	Contributions .....	109
6.3.1.	Theoretical Contributions.....	109
6.3.2.	Policy Implications .....	117
6.3.3.	Managerial Contributions .....	118
<b>7</b>	<b>Conclusions .....</b>	<b>121</b>
7.1.	Limitations.....	122
7.2.	Future agenda .....	122
<b>8</b>	<b>Bibliography.....</b>	<b>125</b>
<b>A</b>	<b>Appendix Second-level Divide Policy .....</b>	<b>135</b>
<b>B</b>	<b>Appendix Dyad Level Analysis.....</b>	<b>141</b>
	<b>List of Figures .....</b>	<b>145</b>



<b>List of Tables .....</b>	<b>147</b>
<b>List of Graphs .....</b>	<b>149</b>
<b>Acknowledgments.....</b>	<b>151</b>



# 1 Introduction

The term '*Digital Inequalities*' is commonly defined as '*the socio-economic disparities inside the online population*' (Stiakakis et al., 2010) to encompass multiple factors and dimensions, such as "*the social, cultural, political, and economic inequalities*" (Mutsvairo and Ragnedda, 2019).

The focal point of the concept evolved over time from inequalities in access to inequalities in use, and the attention was gradually focused towards the gap between those with and without the *competences* to leverage upon ICTs, the so-called '*second-level divide*'.

This term is fundamental to capture the scope of our work and will be discussed deeply in Chapter 2. Indeed, we will focus on the networks that have been mobilised to reduce digital competences divide, contextualising it in the current state of the art research in Policy Analytics.

## 1.1. Digital competences in Europe and in Italy

*Digital Inequalities* are very strong in Italy both at country and at regional level, leading Italy to be less competitive than other large European countries in a world that is becoming more and more digital and with jobs that require digital skills to be accomplished.

Depicting a digital picture of Europe and Italy leads to quantify Italian Digital Inequalities and highlights the reasons why it is a compelling priority to develop strategies to cope with them. In fact, not only Italy is positioned behind all the other large European countries, but also the share of individuals with at least basic digital skills is less than half, leading to a serious risk of digital exclusion for citizens.

To better understand and tackle this phenomenon, since 2014 the European Commission has monitored the progress of Member States on their digital performance through the Digital Economy and Society Index (DESI), identifying priority dimensions both at country and European level, to guide policy decisions. The index is structured around four equally important dimensions, namely *Human Capital*, *Connectivity*, *Integration of digital technologies* and *Digital public services*.

The European digitalisation process in the past years has been uneven among the Member States, with few frontrunners and a substantial group of states clustered

around the European average. Italy ranks 18<sup>th</sup> out of 27 and is positioned behind all the other large European countries, except for Poland. Despite the progress made in recent years over some dimensions, Italy displays a chronic and structural deficiency in the *Human Capital* dimension, as highlighted in Table 1.

	Italy			EU
	DESI 2020	DESI 2021	DESI 2022	DESI 2022
<b>1a1 At least basic digital skills</b> % individuals	NA	NA	46% 2021	54% 2021
<b>1a2 Above basic digital skills</b> % individuals	NA	NA	23% 2021	26% 2021
<b>1a3 At least basic digital content creation skills</b> % individuals	NA	NA	58% 2021	66% 2021
<b>1b1 ICT specialists</b> % individuals in employment aged 15-74	3.5% 2019	3.6% 2020	3.8% 2021	4.5% 2021
<b>1b2 Female ICT specialists</b> % ICT specialists	15% 2019	16% 2020	16% 2021	19% 2021
<b>1b3 Enterprises providing ICT training</b> % enterprises	19% 2019	15% 2020	15% 2021	20% 2021
<b>1b4 ICT graduates</b> % graduates	1.3% 2019	1.3% 2020	1.4% 2021	3.9% 2022

Table 1: Determinants of Human Capital Dimension (Source: DESI 2022)

In particular, considering the age range from 16 to 74 years old, Italy is among the eight Member States where the share of individuals with at least basic digital skills is less than half. This deficiency is diffused in Europe, that still shows levels of digital skills far distant with respect to the target of at least 80% of citizens with basic digital skills by 2030. Only few Member States like the Netherlands and Finland approach it with 79% in 2021.

However, for the specific focus of our thesis, it is necessary to precise that the digital skills indicators of Table 1 are a biased proxy of digital competence. In fact, in the Eurostat framework, they are calculated on the basis of the number of online *activities* that citizens *declare* to have performed in the last 3 months. Such activities are mapped into the five areas of the European framework that defines citizens' digital competences (DigComp 2.2) – Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Safety, and Problem Solving –, but it is questionable to assume that individuals declaring to perform certain activities over the Internet actually possess the corresponding skills.

Even if in the other dimensions of the DESI Italy scores higher than or closer to the European average, there is still a lot of work to be done to reduce the risk of digital exclusion for the citizens, especially in this fast-changing context where more and more services are shifted online.

### 1.1.1. Policies for Digital Competences Improvement

To cope with the digital divide that threatens the digital transformation, many digital policies have been developed both at the European and at the Italian level over the last few years. EUR 127 billion are dedicated to digital reforms and investments in National Recovery and Resilience Plans. In particular, the largest European Recovery and Resilience Plan is the Italian one, which devotes 25% of the total investment to the digital transition. In the period 2021-2027, the Digital Europe Programme will complement these investments with additional funding to support the digital transformation.

Furthermore, the *'2030 Digital Compass: the European Way for the Digital Decade'* (European Commission, 2021) aims at equipping at least 80% of adults with basic digital skills by 2030, attracting also talents from all over the globe. According to the European Skills Agenda, these are the prerequisites for an active participation of citizens in the Digital decade and for the attainment of quality jobs and career advancements.

These policy objectives have been translated into numerous digital skills initiatives. They aim on one side at training young and students on advanced digital technologies (e.g., EU Code Week, Digital Opportunity Traineeship), while, on the other side, they mobilise national and European coalitions to enable citizens' digital inclusion with a wide range of actions, targeting the labour force, ICT professionals, the educational sector, but also marginalised social categories.

At the national level, Italy is now engaged in digital skills policy, implementing on one side initiatives for the upskilling and reskilling of the workforce, the promotion of the increase of the number of ICT specialist and the development of the digital literacy of the general population, and on the other side reforms of the education and vocational training system.

111 initiatives are active under the comprehensive National Strategy for Digital Skills and its operational plan adopted in December 2020, with milestones and targets to be reached by 2025. Moreover, over 260 initiatives are part of the *'Repubblica Digitale'* initiative, led by the Italian Coalition for Digital Skills and Jobs. In 2021, it reached over 2 million students and 90 000 teachers, 240 000 workers and 1.6 million other people. The *'Digital Civilian Service'* is one of the key initiatives and involves young volunteers to provide facilitation services and promote digital literacy to the general population, as will be better explained in the next paragraph.

At the end of January 2022, the fund *'Fondo per la Repubblica Digitale'* was established by the government to support initiatives on digital skills and train 2 million citizens for 2022-2026, with a budget of EUR 350 million. This fund finances experimental projects and scales up only those proving to be effective in increasing digital skills.

## 1.2. Digital Civilian Service

Digital Civilian Service (SCD) is the key initiative of *'Repubblica Digitale'*. The policy is co-owned by two governmental departments: on December 9, 2020, the Digital Transformation Department (i.e., *'Dipartimento per la Trasformazione Digitale'*, DTD) and the Department for Youths Policies and Universal Civilian Service (i.e., *'Dipartimento per le politiche giovanili e il servizio civile universale'*, DPG) agreed on the policy to promote initiatives aimed at increasing citizens' digital skills.

To clearly explain the main characteristics of this policy, first we present the objectives and its two categories of targets, then we describe the main approaches actuated and, finally, the typologies of stakeholders involved in the interventions as well as their roles and relationships during the implementation phase.

### 1.2.1. Objectives and Targets

The policy is placed in the context of the *'Agenda 2030 for Sustainable Development'* by the United Nations, pursuing two objectives:

- *Objective 4*: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- *Objective 10*: Reduce inequality within and among countries.

The peculiarity of this policy is that it sees as beneficiaries not only about one million citizens belonging to disadvantaged categories, such as elderly, women in difficult conditions, poor families, disabled people, migrants, or adults living in poverty or searching for a job, but also targets directly approximately 9700 volunteers as recipients of training and field experience in digital civil service projects, in the role of *'eFacilitators'*.

While the high-level objective of the policy is well-established – the increase of digital competences for disadvantaged categories of population and for eFacilitators – the adopted approach is not totally top down but leaves the involved organizations a certain degree of freedom to define their own priorities and structure the intervention accordingly. This is due on one side to the newness of the topic in the policy history, that leads to adopt experimental solutions rather than clearly established implementation directions, and on the other side to the location-based characteristic of digital inclusion policies, highly dependent on the community of reference.

### 1.2.2. Interventions

SCD projects envisage two typologies of intervention:

- *Digital Facilitation*: services provided by public or private entities that offer individual support to online services users, either through digital assistance points already operating in the organisation, also itinerant, or through services created from scratch as a support of the already implemented user assistance activities. This one-stop procedure consists of moments of individualised support and coaching to citizen that need help concerning a certain digital issue, to lead them to an autonomous use of digital services.
- *Digital Education*: services provided by public or private entities that work proactively to take care of the diffusion of the “*digital culture*” and to develop the community basic and/or advanced digital skills through targeted teaching activities.

### 1.2.3. Stakeholders and Key Activities

To accomplish these objectives, the policy involves several actors. Traditional Universal Civilian Service (SCU) organizations enrolled in the Universal Civilian Service Register, alone or in partnership, can propose a program (i.e., a collection of at least two projects) aimed at enhancing citizens’ digital skills. These organizations might target different population categories, based on their mission and on the local needs, and might stipulate partnerships with private companies, public agencies, local firms, NPOs and other stakeholders to better deliver their service. Each organizations coordinates several *eFacilitators*, which are the key figure of this policy acting as intermediaries to help socially disadvantaged groups approach the digital world, by supporting them in developing the digital skills they need.

Therefore, proponent institutions are required to provide in each form they submit to respond to the policy call project information such as the target, the typology of intervention offered, the digital skills aimed at being developed, the network of stakeholders involved, and the number of eFacilitators required.

Each program must employ at least 12 volunteers, reaching a maximum of 20 volunteers for local or regional programs, or a maximum of 40 volunteers for inter-regional or national programs, with a minimum of 4 volunteers for each project.

Each SCU organisation is offered a Capacity Building path on digital topics, run online through webinars, by the two departments with the support of the national public training agency (Formez PA) and of the Digital Agenda Observatory of Milan Polytechnic university centre. The main topics covered are DigComp 2.2 digital skills, Project Management aspects and Policy Impact Evaluation.

eFacilitators are trained both at central and local level. At central level, they are offered a general training concerning civilian service topics by the DPG. At local level, instead,

they are offered by the organisation they belong to, and sometimes also by its partners, a specific formation on the digital topics required by the project they are assigned to.

As of today, two SCD calls have been launched. The Pilot call was launched in May 2021 to experiment the policy, gather data, and improve it for the second round. This call was financed and coordinated by the DPG with national funds and the support of DTD. After the submission of the programs, the two governmental departments, together with the Digital Agenda Observatory, evaluated them to find out who were the most eligible for funding. The second call, instead, was launched in January 2022, financed with EU NextGen funds, and co-steered by DPG and DTD.

The pilot call could select programs with a maximum of 1000 young volunteers, while the second call could select additional 2400 young volunteers, with the objective of reaching a total of 9700 volunteers in the three-year period. However, the second call did not reach the target; therefore, all the programs discarded in the pilot call were admitted in the second call to increase the number of volunteers hired.

The main dimensions to describe the two calls are summarised in Table 2.

Dimension	Pilot	PNRR
Number of programs	76	62
Number of projects	184	146
Number of SCU organizations *	97	86
Number of volunteers	1678 **	1638

Table 2: Main Dimensions of Pilot and PNRR Digital Civilian Service Calls

\* Considering also co-programming SCU organizations

\*\* This number reflects the repechage of the programs initially discarded in the Pilot call

### 1.3. Aim of this Work

The aim of this work is, on one side, to provide meaningful insights for policymakers for the Italian Digital Civilian Service policy through the lenses of the ‘*Policy Analytics*’ approach and of the literature on ‘*Collaborative Policy Networks*’, and, on the other side, to progress on those topics and extract generalisable knowledge starting from such a highly complex real case example.

Therefore, in Chapter 2 we carry out a comprehensive literature review on the topics of Policy Analytics and Digital Inequalities:

- Section 2.1 starts with the methodology followed for the literature search



- Section 2.2 concerns the state of art of Policy Analytics and focuses also on the most relevant frameworks used to map and classify stakeholders in policy analysis
- Section 2.3 instead relates to the state of art concerning Digital Inequalities, highlighting first its evolution over time, and then focusing in particular on the second-level divide and on digital competences
- Section 2.4 systematically analyses policies aimed at bridging the second-level divide, stressing the relevant stakeholders involved and their importance from a Policy Analytics viewpoint.

Chapter 3 highlights the relevant knowledge gaps identified in our literature review and translates them into the main research questions we aim at answering:

*RQ1: How is a real collaborative policy network composed?*

*RQ2: Which values stakeholders bring in a policy network?*

Chapter 4 presents the data collected used for carrying out our research and shows the methodology followed to structure them in an actionable way, suitable for the Social Network Analysis tool. We also clarify the assumptions used to map stakeholders involved in the Digital Civilian Service implementation phase, and their relationships to build the collaborative network.

Chapter 5, instead, describes the results of our analysis in terms of network topology and centrality measures and considers a transversal dimension composed by stakeholders' priorities, that leads to the identification of 'value regions' in the network.

Chapter 6 declines the results obtained around theoretical, managerial and policy implications contributions.

Lastly, Chapter 7 presents our conclusions, with the key messages of our study, the limitations in carrying out our empirical analysis and the agenda for future research.



## 2 Literature Review

In order to embark on a fruitful policy analysis, we first define what we mean as public policy. In particular, in this thesis we refer to the definition proposed by Tsoukias et al. (2013). According to the authors, a public policy is characterised by:

1. *Use of Public Resources*. Policies are considered as “irreversible allocations of resources”, the majority of which, both tangibles or intangibles, are provided by the government or other public institutions to target predefined beneficiaries;
2. *Multiple Stakeholders*. Policies consider concerns, objectives, and expectations of multiple stakeholders, such as citizens, groups, or organizations, given the participative nature of the policy cycle;
3. *Long-time Horizon*. The effects and consequences of a policy usually are visible only a long time after the cycle occurred and can hold for even longer periods;
4. *Legitimation and Accountability*. The policy making process, the actions within it and the outcomes search for legitimation, either by law or according to tradition, moral standards, best practices. This is usually achieved by increasing the level of participation in the policy cycle and by providing transparency for the decision process, explanations, and justifications of the outcomes;
5. *Deliberation*. Policy cycles include deliberation moments where decisions are formalised and become irreversible.

In particular, we focus our attention on the second aspect. Indeed, stakeholders, with their concerns, objectives, and expectations, are the key figure around which our work is structured. This is coherent with our choice to present the research through the lenses of Policy Analytics approach (Section 2.2) in order to provide one of the first attempts to utilise it in a different context with respect to the environmental field, to which it traditionally belongs to, and in an unusual policy cycle phase – the implementation one.

To be clear, we start by the definition of stakeholder by Freeman (1984): “any group or individual who can affect or is affected by the achievement of the organisation’s objectives” and consider its translation in the world of policymaking by Helbig et al. (2015), as “those who can affect or may be affected by a policy”.

## 2.1. Methodology of the literature review

Our systematic literature search was carried out following the ‘*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*’ (PRISMA) protocol (Moher, Liberati, Tetzlaff and Altman, 2009), to ensure the replicability of the analysis. For this literature review, our perimeter is focused on public policies that have as main objective the development of “digital skills for all”, tackling the digital divide from the Policy Analytics viewpoint.

In particular, Scopus database was used between May and September 2022 to elaborate a two-query strategy: one query for the methodological approach, centred on Policy Analytics (Section 2.2), and one query to collect documents on the domain under exam, digital inequalities (Sections 2.3 and 2.4).

### 2.1.1. Search Terms

Considering the fact that Policy Analytics is a quite recent topic as it was first introduced in 2013, the query with only ‘*Policy Analytics*’ as keyword generated only 62 results, highlighting how literature is still scarce on it. Therefore, a second query is utilised, focused on frameworks dealing with stakeholders and their roles, as well as their interactions as network, as they represent the key figures in any Policy Analytics exercise. The resulting query for section 2.2 is:

*stakeholder\* AND framework\* AND ("social network analysis" OR "policy network")*

As for the literature search on digital inequalities, the book “*The Digital Divide*” by Jan van Dijk (2020) was taken as a starting point to identify relevant keywords. The resulting query, focusing in particular on digital inequalities in citizens’ digital competences, i.e. the second-level digital divide, is:

*("digital divide" OR "internet divide" OR "digital \*clusion" OR "digital inequalit\*")*

*AND*

*((digital OR internet OR ict OR computer OR "information and communication technolog\*") W/5*

*(competenc\* OR skill\* OR knowledge OR attitud\* OR \*literac\* OR divide OR \*clusion OR \*equalit\*))*

*AND*

*(polic\* OR program\* OR project\* OR initiative\* OR "case stud\*")*

*AND NOT*

*(industr\* OR firm\* OR business\* OR corporation\* OR compan\* OR enterprise\* OR SME\* OR manufactur\* OR factory OR factories OR plant\* OR innovation\* OR*

*marketing OR "sharing econom\*" OR "sharing platform\*" OR "machine learning" OR "IoT" OR "Internet of things" OR cloud OR robotic\* OR "big data" OR "smart cit\*" OR health\* OR medic\* OR clinic\* OR psycholog\* OR pedagogic\* OR emotion\* OR energy OR electronic\* OR radio\* OR ecolog\* OR sustainab\* OR environment\* OR biolog\* OR agricultur\* OR forestry OR power OR insuranc\* OR transport\* OR tourism)*

The first part of the query captures the evolution in the definition of the phenomenon. The '*Digital Divide*' term was used less and less in publishing after 2004 since it sounded too divisive, and the literature started preferring the label '*digital inclusion*' (Rappoport et al. 2009). Both expressions, however, refer to a dichotomous social split between people in a divided society, to represent the contrast between those that are included (*haves*) and those who are excluded (*have-nots*) from the digital society. More recently, the concept has evolved towards *digital inequality*, meaning that there is no dichotomous division but rather a continuous spectrum of inequalities, stratified over different dimensions.

The second part of the query reflects the focus on competences, using the synonyms that are widely adopted in literature - skills, knowledge, attitudes, literacy - even if they have slightly different meanings, as will be highlighted in paragraph 2.3.2.

The third part refers to all the main denominations used for the policy interventions that were applied in the literature discourse.

Finally, the last part is introduced to exclude those papers including policies that target businesses or specific sectors, such as healthcare, manufacturing, tourism, etc.

Further restrictions are applied to filter out irrelevant results:

1. Articles must be in English.
2. For Section 2.3 and 2.4, the subject area must be Social Sciences, Computer Science, Business, Management and Accounting, Decision Sciences, or Economics, Econometrics and Finance. On the contrary, the filter was not applied for Section 2.2. since most of Policy Analytics exercises and Social Network Analysis are carried out in the environmental policies field.
3. All paper must be published in press, not under review.

### 2.1.2. Inclusion and Exclusion Criteria

The focus on policy requires us to add further inclusion and exclusion criteria:

1. Papers must address a public policy promoted by governments or other public institutions, coherently with the 5 features defined by Tsoukias et al. (2013).
2. The development of digital competences should feature among the policy objectives, independently from the type of intervention implemented.
3. Sectorial policies, intended as frameworks for the long- and/or medium-term, which have been adopted by a government as a plan of actions for a particular

area of the economy or society (OECD, 2006), such as health, education, labour, were excluded. For example, when dealing with young people, most of the programs examined in literature are conveyed within the school perimeter and, since they fall into the category of education policy, are considered out of scope.

4. Policies in low-income countries – as defined by the World Bank – were excluded from the literature review perimeter.

### 2.1.3. Study Selection

With the first query concerning Section 2.2, 62 results were found, while with the second query on stakeholders 198 results were identified. Among the 12 papers remained after the title screening, we selected only 9 papers from the first query, and we complemented them with 3 papers from other sources and 5 papers found through snowball practice. Instead, for the second query of Section 2.2, we identified only 4 relevant papers among the 20 papers remained after the title screening, complemented with 6 papers from other sources and 2 papers from the snowball practice. In total 29 papers were discussed. Figure 1 summarises the procedure followed.

In Sections 2.3, *'The Digital Divide'* by Jan van Dijk (2020) was used and was complemented with 12 papers found through snowball practice, starting from the book itself, and 2 papers from other sources.

Lastly, concerning Section 2.4, the search query resulted in the identification of 1574 papers. After the title screening, only 344 papers remained. With the abstract screening, other 140 papers were excluded, leading to 204 articles.

Then, a full text screening was applied to eliminate those papers with policies dealing with the first-level digital divide only (e.g., broadband, infrastructure or devices provisions, or training to foster broadband adoption without mentioning anything concerning digital competence as policy objective), and sectorial policies (e.g., increase of ICT skills in schools thanks to devices provision, mandatory ICT courses, etc).

To the remaining 32 papers, 12 papers from other sources were added, leading the count to 44 papers analyzed in our conceptual review. These 44 papers deal with a policy targeting the second-level digital divide; to them 26 articles (3 from the query, 5 from other sources and 17 from the snowball practice) were added. However, none of them deals with a policy, but they provide useful insights about various policy targets, to enrich our review and better evaluate the policies described. We named them *'context papers'*. Figure 2 illustrates.

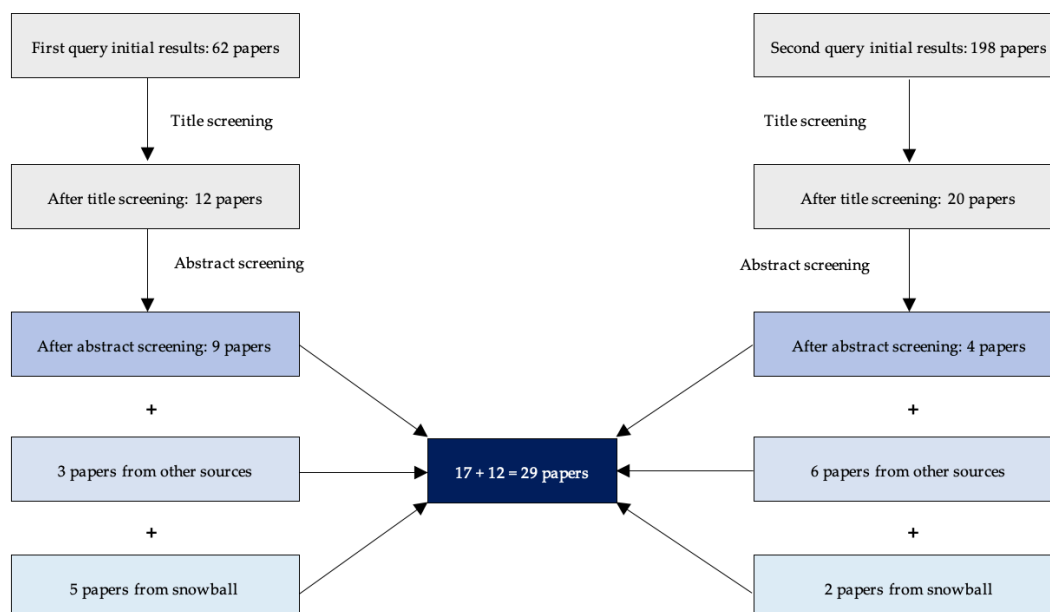


Figure 1: Prisma Model Section 2.2– State of the Art: Policy Analytics

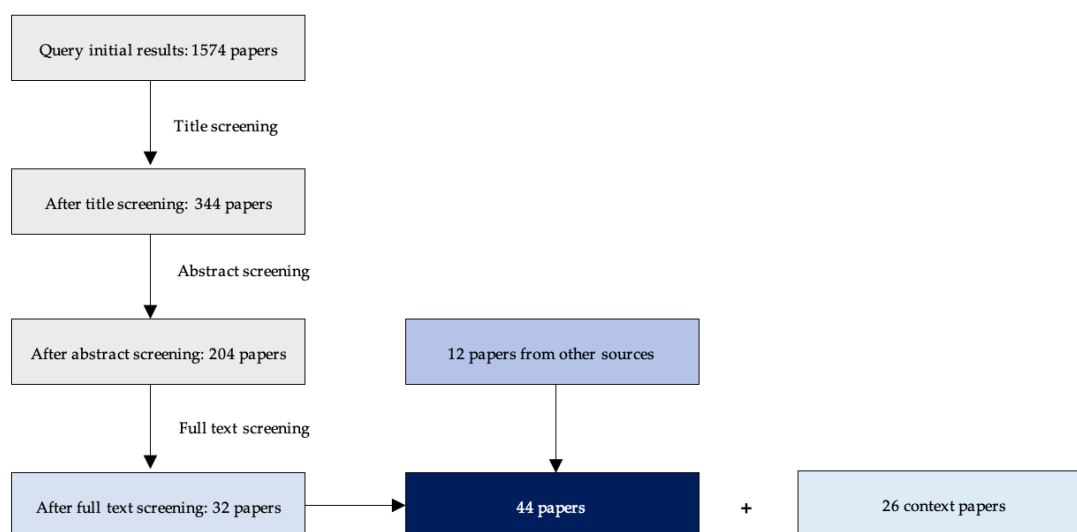


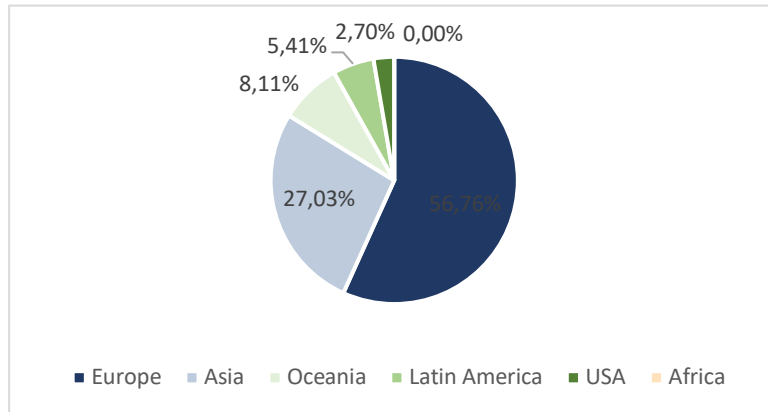
Figure 2: Prisma Model Section 2.4 – State of the Art: Second-level Divide Policies

#### 2.1.4. Insights on the Papers

In this paragraph, we want to focus more on the papers dealing with second-level divide policies in Section 2.4. In fact, they can be analysed according to two dimensions of interest:

- *Geography of the Policy*: representation of several high-income countries, to find comparable insights with Italy during the literature review.
- *Targets*: evaluation of the quality and numerousness of the papers against common beneficiaries categories for second-level divide policies, such as women, people with disabilities, migrants, etc., to analyse if they are equally represented and quality-wise homogeneous.

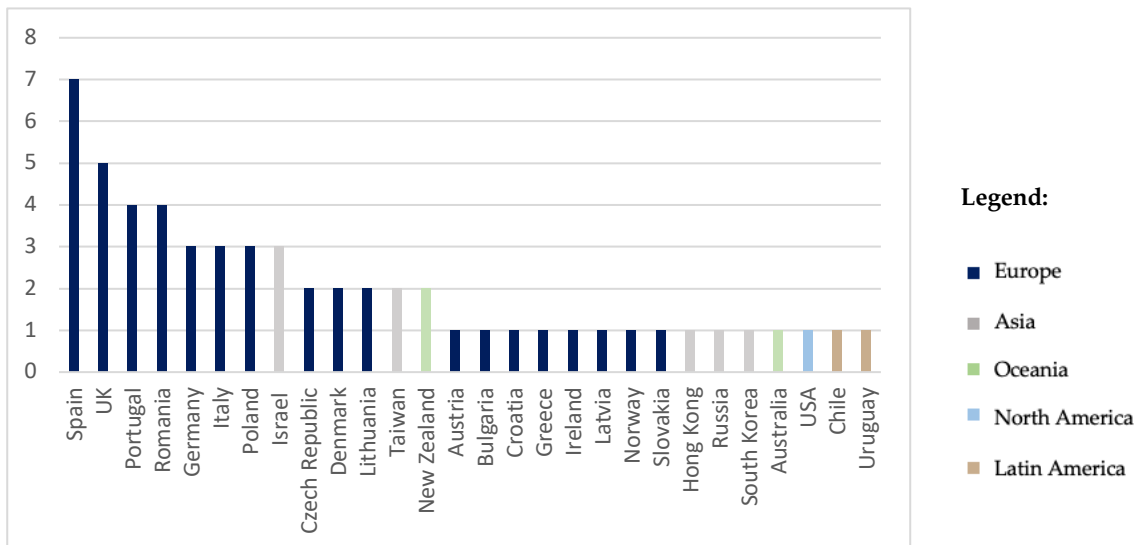
The 44 papers identified deal with 36 different policies (some policies are described by more papers). Some policies were issued at supra-national level, for instance by European Union and covering all its countries, or by United Nations with a global perspective. Except for one global policy without a case limited to one continent, the other 37 policies were geographically limited to a country or few multiple countries in the same continent. Therefore, we can better distribute the case studies from a geographic viewpoint as in Graph 1, noticing that most of the countries considered are the European ones (56.76%) and the Asian developed countries (27.03%).



Graph 1: Geographical Coverage of the Case Studies

It is also possible to go at country level for 35 policies; the last policy did not define neither a country nor few multiple countries as case studies, but is at global level, without specific applications.

Graph 2 counts the high-income countries in which the policies analysed were implemented: they are more than 35 since, as said, some policies covered more countries.



Graph 2: Countries Involvement in the Case Studies



The policies considered come mainly from the following nations: Spain, UK, Portugal and Romania in Europe, Israel and Taiwan in Asia, and New Zealand in Oceania. Moreover, other important countries such as Germany, Denmark, Italy, USA, and Australia were part of our literature too.

Then, we evaluated the quality of these papers as the average of their citations on Scopus and Semantic Scholar, since 10 out of 44 articles were not present in both databases, while 38 are available on Scopus, and 39 are available on Semantic Scholar. The average number of citations was 14.13 on Scopus and 17.28 on Semantic Scholar respectively, with an average of 15.71 quotes.

These figures seem low, but are high when dealing with second-level divide policies topic. Indeed, most of the papers do not reach 10 citations (84.21% of the papers on Scopus and 82.05% on Semantic Scholar respectively). Therefore, we must specify that a low number of citations does not necessarily mean low quality; rather that the topic of this thesis is not widely discussed in the literature.

If we look at the standard deviations – 28.67 quotes on Scopus and 36.73 quotes on Semantic Scholar – we can notice their high value. This is given by the fact that the same five papers overcome the standard deviation threshold on both the databases. In particular, the most cited papers on Scopus reach 59, 96 and 145 mentions, while the three most cited papers on Semantic Scholar reach 56, 138 and 190 mentions. The two papers mostly cited are the same in both the databases.

We can decline the quality of the papers based on the target the policies described want to reach, keeping in mind that some papers cover multiple targets. Papers' quality per target is represented in Table 3.

Target	Scopus Quality	Scopus Standard Deviation	Semantic Scholar Quality	Semantic Scholar Standard Deviation
General Population	6.64	10.06	7.75	11.09
Elderly	25.85	45.91	31.62	60.48
Women	9.5	13.13	18.75	25.18
Young People	6.63	6.86	7.9	9.15
People with Disabilities	2.33	2.52	1.67	1.53
Migrants	3.67	3.21	5.0	6.08
Facilitators	24.25	23.46	12.83	12.53

Table 3: Papers' Quality per Target

The average number of citations – corresponding to 15.71 – in this case is not representative, due to the high standard deviation. Indeed, some targets are very far below the average quotes and some others are far above, representing the fact that only some papers regarding these targets are very influential in terms of citations. Moreover, based on the average number of citations, it is clear how some categories are underrepresented – people with disabilities and migrants. Therefore, we completed the discussion with ‘*context papers*’, whose quality per target is in Table 4.

Target	Number of Papers	Scopus Quality	Scopus Standard Deviation	Semantic Scholar Quality	Semantic Scholar Standard Deviation
General Population	0	0	0	0	0
Elderly	13	374.42	561.0	545.36	834.95
Women	8	223.33	282.16	198.88	257.18
Young People	3	39.5	121.67	44.55	193.42
People with Disabilities	1	10	0	6	0
Migrants	1	159	0	183	0
eFacilitators	0	0	0	0	0

Table 4: Context Papers Quality

Overall, the quality of these 25 context papers is 207.5 on Scopus and 355.08 on Semantic Scholar, with an average of 198.8 quotes for the two databases. The standard deviation is very high, highlighting the fact that some of them are widely discussed by scholars, proving their quality by authority. In particular, it is 397.36 on the first database and 591.39 on the second one. Therefore, complementing the discussion concerning Section 2.4 (i.e., second-level divide policies) with these papers clearly enriched our work with very interesting insights.

## 2.2. State of the Art: Policy Analytics

In this section, we aim to present the two main competing approaches in the policymaking context – Evidence-Based Policy-Making (EBPM) and Policy Analytics.

The first is born on the roots of evidence-based medicine and evidence-based practice, and then extended to policy making as an approach to improve the effectiveness of the policy process based on previous knowledge, given an established objective to

accomplish. The second instead adds new determinants of policymaking, that becomes not only data-driven, but also value-driven.

In particular, we define their main characteristics and limitations, and we compare them around five main dimensions, namely philosophy, data, dynamics, stakeholders and analysis. This allows to give a comprehensive view of the context and to explain the theory over which we will ground our research.

### 2.2.1. Policy Cycle

Policymaking is formalised as a “*sequence of stages structuring policy problems and their resolution through choices made by policy makers*” (Daniell et al., 2016).

To go more in details, the so-called ‘*policy cycle*’ is typically depicted with five phases (Howlett et al., 2009), (De Marchi et al., 2014), (Daniell et al., 2016):

1. *Agenda Setting*: setting priorities among public issues that require policy action or modification of previously issued policies.
2. *Policy Formulation/Analysis*: formulation of policy alternatives to better understand the problem, collecting evidence, in order to understand the objectives and interests of citizens and of the other relevant stakeholders involved.
3. *Decision-making*: selection of the best policy alternative.
4. *Implementation*: “*process of interaction between the setting of goals and the activities and actions that followed towards achieving those goals*” (Yaro et al., 2017). In this phase, the policy must be operationalised, so government starts to mobilise the necessary public resources at this purpose, and regulatory agencies enter the field.
5. *Monitoring/Evaluation*: evaluation of policy effects, to identify whether the policy should be changed, or new problems need to be put as priorities.

For the purpose of our thesis, it is worth also mentioning the conceptualisation of the ‘*policy cycle*’ reported by Meinard et al. (2022), based on (Lasswell, 1956), which details such continuous process in eight phases: “*issue identification, policy objectives definition, policy design, policy testing, policy refinement, policy implementation, policy monitoring and evaluation, and policy readjustment*”.

### 2.2.2. Evidence-based Policy-Making

According to De Marchi et al. (2014), the first adoption of an evidence-based approach in the public policy context dates back to 1994 in UK, when the Labour party termed itself as ‘*New Labour*’ under the slogan “*What counts is what works*”.

This marked a new era where accountability increased its relevance in the field of policy and two forms of evidence gained momentum:

- The first one refers to the measurement of results and of the effectiveness of the performance of the government.
- The second one refers to a learning process and continuous improvement based on the knowledge on how well policy works under different circumstances.

In practice, by studying and analysing policy processes, it is possible to gather new evidence for future policies construction.

EBPM concept is in fact based on positivism, adapting the philosophy to use knowledge as rational and logical reasoning and the scientific method in order to improve policymaking. In this sense, the scope of EBPM is to help and “*inform the policy process, rather than aiming directly to affect the eventual goals of the policy*” (Sutcliffe et al., 2005). Therefore, given a certain objective, EBPM roots its choices on efficiency and, under such a perspective, policy problems become “*technical questions, resolvable by the systematic application of technical expertise*” (Goodin et al., 2006).

A formal definition of EBPM is given by Davies (1999), as “*the approach that helps people make well informed decisions about policies, programmes and projects by putting the best available evidence from research at the heart of policy development and implementation*”. Davies (2004) complements it by adding that EBPM basically consists of “*the integration of experience, judgement and expertise with the best available external evidence from systematic research*”.

While it is clear the definition of Evidence-Based Policy-Making, boundaries become blurred concerning the definition of ‘*evidence*’. This happens because, according to MacKillop et al. (2022), “*what counts as evidence is politically and socially contested*” and “*actors may contest what is meant by ‘evidence’*” offering different interpretations upon the same evidence. In particular, the authors define evidence as data and facts with “*quality, accuracy, credibility, and objectivity*” characteristics.

Given the multiple nature and sources of evidence, MacKillop et al. (2022) highlight how different kind of actors involved in policymaking may have different attitudes and judgement concerning the reliability of an information source, how to interpret it and if it is important policy evidence to be considered to take decisions. Indeed, there are some scholars, called ‘*EBPM Idealists*’, considering evidence always as the real representation of facts (positivist view), as opposed to ‘*Pragmatists*’, considering that nothing is objective, since every time policy evidence is constructed through multiple channels (constructivist view), and every deduction involves subjective judgement. ‘*Politicians*’, instead, want evidence before deciding and so they need to know the data they are searching for, therefore their decisions may not be completely impartial: evidence is frequently sought for *after* a solution has been envisaged. Lastly, ‘*Inclusive Actors*’ consider evidence anything that can provide insight on the policy, no matter its original source.

De Marchi et al. (2014) also points to the *nature* of the evidence, distinguishing between hard/objective and soft/subjective evidence: the former includes quantitative data

collected by researchers from experiments, governmental agencies, interviews or questionnaire-base surveys; the latter, instead, includes *“photographs, literary texts, official files, autobiographical material like diaries and letters, the files of a newspaper and ethnographic and particular observer accounts”*.

In this regard, another limit of EBPM is the prioritisation of knowledge sources, since it tends to privilege only a limited range of evidence responding to the *‘conventional scientific methods’*. According to Davies (2004), in policymaking *“privileging any one type of research evidence or research methodology, is generally inappropriate”*. In fact, defining a hierarchy of knowledge means deeming some sources more trustful than others, and this generally is not neutral.

Moreover, traditional data collection is a time-consuming process and, according to Longo et al. (2018a), *“largely relies on respondents to cooperate with researchers, raising challenges such as low response rates and respondent bias”*, generating delays between the time when evidence is needed and the time when evidence is produced.

Finally, the EBPM approach is based on the cause-effect principle, viewing the social outcomes of the policy as predetermined by certain mechanisms in the context in which the policy is implemented. Therefore, once the mechanism and the context are widely known, it is possible to easily foresee the outcomes of the policy. This mirrors once again the positivist school of thought, which is opposed to constructivism, for which reality is more complex and therefore policies must be socially constructed, since the evidence needed to take a decision and achieve important social outcomes is not known until it is produced. *“In doing so, decision analysts need to use existing information (facts, science, grounded knowledge, best practices etc.), need to constructively model values, opinions and likelihoods for the stakeholders”* (De Marchi et al., 2014).

### 2.2.3. Policy Analytics

Tsoukias et al. (2013) defines *‘Policy Analytics’* as an approach to *“support policy makers in a way that is meaningful (in a sense of being relevant and adding value to the process), operational (in a sense of being practically feasible) and legitimating (in the sense of ensuring transparency and accountability), by drawing on a wide range of existing data and knowledge (including factual information, scientific knowledge, and expert knowledge in its many forms) and combining this with a constructive approach to surfacing, modelling and understanding the opinions, values and judgments of the range of relevant stakeholders”*.

Evidence is just one of several factors that act as determinants of policymaking. Hence, according to Policy Analytics, policymaking is not only a data-driven process – as in EBPM – but also a *value*-driven process, highly dependent on the policy alternatives and the stakeholders considered. In fact, stakeholders involved in policymaking are the bearers of *knowledge*, such as ground experience of the local context and communities where they operate, *technical expertise* and *judgements* that can be integrated and add significance in the policy making process.

In the Policy Analytics perspective, value-driven analysis is carried out both on existing data and on a “*massive amounts of continually updated, real-time data from multiple sources*”, as stated by Longo et al. (2018a). Policy Analytics, contrarily to EBPM, can proactively support policymaking without the delays that typically affect research evidence, thanks to the availability of several tools. Therefore, it is then possible to develop and test several hypotheses, reducing uncertainty throughout the whole process and engaging all stakeholders transparently.

Basically, the term ‘*Policy Analytics*’ stands for the application of data analytics techniques on the policymaking process, where with the term analytics, we mean statistics, data mining, business intelligence, knowledge engineering and extraction, decision support systems, and predictive modelling (De Marchi et al., 2014).

According to Gil-Garcia et al. (2018), five main tools fall under the Policy Analytics umbrella:

1. *Computer Simulation*: evaluation of possible problems and impacts of different policy alternatives in a safe environment, run by a mathematical model on a computer program.
2. *Social Network Analysis*: study of the actors involved in the policymaking process and their relationships.
3. *Geographic Information Systems*: association of geographic reference to each data to carry out analysis, to explain events, predict outcomes, and plan strategies.
4. *Statistical Analysis*: techniques, such as data segmentation and clustering, classification and regression analysis, anomaly detection, and predictive modelling.
5. *Machine Learning* techniques: design of accurate prediction algorithms to exploit large amounts of data.

In particular, according to De Marchi et al. (2014), “*Policy Analytics aims to support relevant stakeholders engaged at any stage of a policy cycle, with the aim of facilitating meaningful and informative hindsight, insight and foresight*”, in order to:

- Better understand needs and issues linked to policy objectives.
- Better predict the potential consequences of actions.
- Better predict potential unexpected outcomes of decisions.
- Better justify decisions and strategies in front of their beneficiaries.
- Design better policies to target beneficiaries.
- Improve participation of stakeholders in the policymaking process.

Given these premises, Tsoukias et al. (2013) enriched the EBPM of Lasswell (1956) by adding the role of value-driven analysis in its phases. In Table 5 is reproduced the work Tsoukias et al. (2013) made to evaluate the parallel between business analytics and Policy Analytics. As Policy Analytics can support each step in the policy cycle, in the same way business analytics can provide support in a private sector context.

Steps in the policy cycle	Business Analytics	Policy Analytics
<b>Issue identification</b>	Definition of issue by the analyst	Analyst understands perspectives from different stakeholders
<b>Defining policy objectives</b>	Data-driven definition of attributes	Value-, cultural- and stakeholder-driven definition of objectives
<b>Policy design</b>	Data-driven design of alternative policies	Innovative and value-driven design of alternative policies
<b>Policy testing</b>	Data-based testing and learning (data mining, predictive analysis)	Multiple tests to assess potential impacts (surveys, data mining, prospective analysis)
<b>Policy finalisation</b>	Sensitivity analysis of the results, given the input parameters	Robust analysis of the results, given broad issues and multiple values being considered
<b>Policy implementation</b>	Implementation is typically straightforward, given the issue considered	Analysis helps implementation, mapping resistances and side effects of the policies
<b>Policy monitoring and evaluation</b>	Evaluation conducted against the success criterion initially set	Multiple and contested success criteria; evaluation is value and stakeholder based
<b>Policy readjustment and innovation</b>	Innovation is data-driven and thus reactive	Innovation is value-driven and thus proactive

Table 5: The Role of Policy Analytics in the Policy Cycle (Source: Tsoukias et al., 2013)

Table 6 synthesises the main differences between EBPM and Policy Analytics.

However, Policy Analytics has some limitations, as highlighted by Longo et al. (2018b). Indeed, even with multiple and powerful analytics it is impossible to capture all the social, economic, and behavioural complexities of the context around the policy. Moreover, some analytics may be biased in some direction. For example, *'digitally invisible'* stakeholders could be underrepresented because they do not use or interact much with technologies.

The main shortcoming of Policy Analytics lies in its operationalisation. It is not an actionable framework, yet, but more an approach based on the constructivist idea of the policy cycle as a process of continuous *"surfacing, modelling and understanding the opinions, values and judgments of the range of relevant stakeholders"* (Tsoukias et al., 2013). Little insight has been provided about how to move from the data-driven logic of EBPM to a both data- and value-driven logic. It is therefore necessary to develop instruments and procedures to optimise stakeholders' interactions, to let them bring their values at the attention of policymakers in all the phases of the policy cycle.

Lastly, there are also technical problems concerning the presence of big data sets (Longo et al., 2018b):

- Data acquisition and data privacy protection since much of the really valuable data are not disclosed.
- Data integration and standardisation, given the multiple nature and sources of data.

Dimensions	Evidence-based Policymaking	Policy Analytics
<b>Philosophy</b>	<ul style="list-style-type: none"> <li>• Positivism</li> </ul>	<ul style="list-style-type: none"> <li>• Constructivism</li> </ul>
<b>Data</b>	<ul style="list-style-type: none"> <li>• Limited and prioritised sources of data derived from traditional scientific methods High degree of control and finalisation on data generation</li> <li>• Data are mainly quantitative</li> <li>• Data are used to guide specific stages of the <i>policy cycle</i></li> </ul>	<ul style="list-style-type: none"> <li>• Multiple sources of data</li> <li>• Multiple typologies of data (both qualitative and quantitative, structured and unstructured)</li> <li>• Data are continuously collected from each stage of the <i>policy cycle</i> and are used to inform all the stages</li> </ul>
<b>Dynamics</b>	<ul style="list-style-type: none"> <li>• Process control</li> <li>• Cause-effect pattern</li> </ul>	<ul style="list-style-type: none"> <li>• Serendipity</li> </ul>
<b>Stakeholders</b>	<ul style="list-style-type: none"> <li>• Clear definition of who exerts policy making role</li> <li>• High relevance of the interaction between policymakers and analysts</li> </ul>	<ul style="list-style-type: none"> <li>• Not well-defined boundaries of who exerts policy making role</li> <li>• Each stakeholder impacts on the process with own data and analytical tools</li> <li>• Multiple analysts, both internal and external to policymakers</li> <li>• Continuous participation and interactions with policymakers in all the policy cycle phases</li> </ul>
<b>Analysis</b>	<ul style="list-style-type: none"> <li>• Data-driven</li> <li>• Hypotheses to test are defined a priori</li> </ul>	<ul style="list-style-type: none"> <li>• Data-driven and value-driven</li> <li>• Hypotheses to test are updated in an iterative process</li> </ul>

Table 6: Differences between Evidence-based Policymaking and Policy Analytics

#### 2.2.4. Stakeholders Involvement in Collaborative Policy Networks

The Digital Civilian Service can be classified as a complex problem, due to its high level of uncertainty. In fact, while the high-level objective of the policy seems to be well-established – the increase of digital competences for disadvantaged categories of population and for eFacilitators – in the particular context in which it is structured, the approach is not totally top down and defined a priori, but a certain degree of entropy is instead voluntarily searched in the implementation phase. This is due to the newness of the topic in the policy history, where the high level of innovation encourages organizations to adopt experimental solutions rather than clearly established



implementation directions. Moreover, the digital inclusion policies are intrinsically location-based and need to be contextualised and linked to the digital inclusion setting. In this sense, only stakeholders with ground experience of the local context and communities where they operate have clear insights on how to maximise the efficiency of their intervention.

Given this premise, it can be clearly identified that the Digital Civilian Service policy is reflected in the definition of complexity given by Bennet and Bennet (2008): “*decision problems are complex if they cannot be understood in simple analytic or logical ways, since they may contain several interconnected sub-problems with conflictual interests*”. When dealing with such kind of entangled problems, stakeholder participation in the entire policy cycle enables to suggest solutions to face them with contributions from different knowledge domains and disciplinary areas.

In such settings, the policy cycle has increasingly evolved towards a multi-actor and multi-objective process, where each actor has an individual goal, not always correlated to the collective one defined by the governmental policy.

Considering its focus on stakeholders, Policy Analytics is particularly useful to analyse policies in the ‘*new public management*’ era (Rezazade Mehrizi et al., 2009), where policy design and implementation are often managed by outsourcing service delivery to private actors or NPOs. The network approach looks at *horizontal* relationships among stakeholders for the development of public policies (deLeon et al., 2009), moving away from hierarchical view of policymaking. Such approach, with rich formal and informal links and information flows among actors, may increase policy effectiveness, as well as the actors’ credibility in committing towards reaching the policy goal. deLeon et al. (2009) refer to this phenomenon as the emergence of ‘*collaborative policy networks*’ since the actors involved must collaborate to reach a common objective without sacrificing their personal interests.

The authors also define 7 characteristics that collaborative policy networks must have:

1. *Representation and Diversity*: representation of various parties, with different interests, needs, perspectives, etc., since diversity of actors is regarded as the major strength of collaborative policy networks.
2. *Reciprocity*: reciprocal exchanges of tangible and intangible resources among the actors in the network to better accomplish the policy goal.
3. *Horizontal Power Structure*: de-centralization of the network, indicating that most of the members are equally interconnected, increasing their cooperation to reach the collective goal. Contrarily, in a vertical/hierarchical power structure, the network is more centralized and so only few actors hold central and powerful positions.
4. *Embeddedness*: actors make choices based on their past interactions, so they are more inclined to establish connections with whom they can trust.

5. *Trust and Formality*: formal relationships, established by contractual agreements, regulatory guidelines or procedures, and informal ones increase the trust among network actors.
6. *Participatory Decision-Making*: representation during the policymaking process of both major and minor interests and needs of all the stakeholders involved.
7. *Collaborative Leadership*: shared leadership to represent actors' equality. Rather than leaders chosen because of their financial power or legitimacy, leaders are selected based on the number and types of stakeholders they relate to in the network.

Several of such points concern stakeholders, therefore it is worth deepening this aspect by analysing four frameworks developed in literature to classify their typologies and relationships. We present the most relevant ones and underline their main limitations.

The first framework is provided by Dente (2014) to identify five categories of actors involved in collaborative policymaking:

1. *Political Actors*: in a democratic society, they are legitimate to act since they represent citizens, having achieved significant popular consensus through the election process, so they take decisions to solve societal problems and allocate public money at this purpose.
2. *Bureaucrats*: actors that have formal competences to intervene in the decisional process and who have been assigned a specific responsibility by law.
3. *Actors with Special Interests*: they base their claim of intervention on the fact that the selected policy alternative influences directly their interests.
4. *Actors with General Interests*: even without any political or legal legitimation, they participate in the policymaking process to represent those subjects that cannot defend themselves, such as environmentalists, animal rights organizations, consumer protection organizations, etc.
5. *Experts*: they participate in the policymaking process having the necessary knowledge to understand the problem and formulate alternatives to tackle it.

Concerning stakeholder relationships, Arnstein's Scale is one of the most famous schemas. It was initially proposed in 1969 to depict the citizens involvement in planning processes and classify their interactions with powerholders and authorities. In particular, relationships are mapped according to the participation level and the number of people involved. Proceeding from the bottom to the top of the pyramid in Figure 3, the relationships entail a greater extent of control over decisions and involve a smaller number of stakeholder representatives (Dell'Ovo et al., 2020).

The hierarchy consists of six levels:

- *Provision of Information*: participation by informing citizens about their responsibilities and possible policy options.
- *Public Hearing*: collection of citizens' opinion with questionnaires and surveys.

- *Consultation*: consultation of actors having a specific knowledge on a problem to better characterise and tackle it.
- *Collaboration*: partnership between citizens and stakeholders in higher positions of power.
- *Delegation*: negotiation between citizens and public officials, when there is a specific decision problem whose solution should be decided by citizens' authority.
- *Self-management*: control over specific topics by the most powerful stakeholders, but they are still being able to negotiate with external parties.

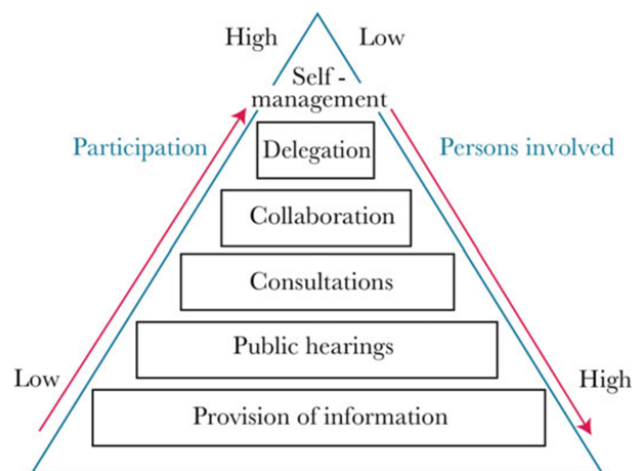


Figure 3: Arnstein's Scale (Source: Dell'Ovo et al., 2020)

Upon these two frameworks, Dell'Ovo et al. (2020) built a second framework reported in Figure 4. Although very general, the key idea of Dell'Ovo et al. (2020) is that each step of the policy cycle finds its focal point on a different set of stakeholders and interactions. Moreover, it applies the Arnstein's Scale of citizen participation to map interactions among a different set of stakeholders, reinterpreting the initial definition.

This framework is the first attempt to achieve a comprehensive view of three dimensions: actors, relationships, and policy cycle phases.

In fact, not all the categories of stakeholders take part in all the phases of policy cycle. The Intelligence phase is the only one that requires the intervention of all the five typologies in order to state the objectives (Dente 2014), while the other phases selectively require specific competences; therefore, the number of categories involved decreases. For example, in the decision phase only political actor are engaged, even if they must consult all the other stakeholders to reach consensus, otherwise the pyramid risks to collapse.

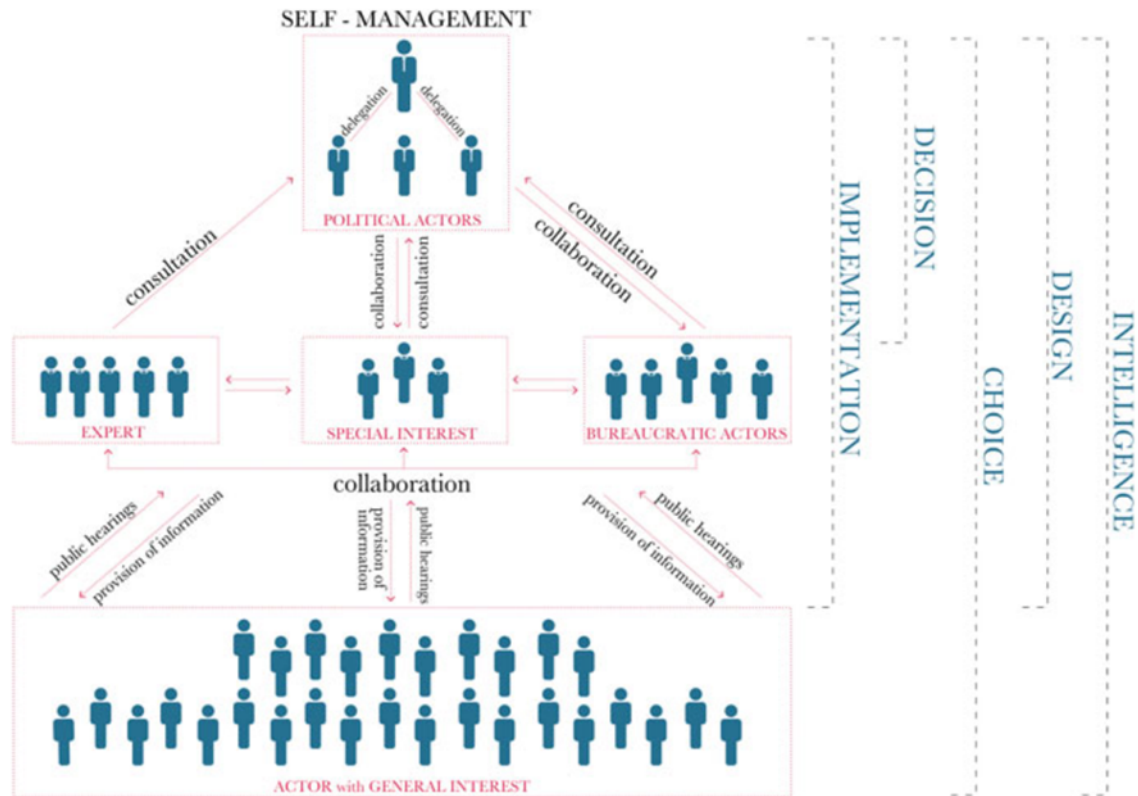


Figure 4: Stakeholders' Participation in Policymaking Process (Source: Dell'Ovo et al., 2020)

Though this framework is quite relevant since it well abstracts the three dimensions, it has some limitations when it comes to applicability to a practical case. In fact, the stakeholders' categories are high level, and the typologies of relationships map only the degree of engagement in each phase of the policy cycle and does not extend the boundaries to typical flows that characterise the different interactions.

The last framework analysed is the one from Bullock et al. (2021), built on Dente's (2014) framework. By looking at the healthcare policy domain, they responded to the necessity of increasing the level of detail for operationalisation purposes of Dente's categories of stakeholders, specifying actors sub-types and providing a general definition of their role (Table 7). This framework focuses on the policy implementation phase, therefore actors with general interests are not represented – coherently with Dell'Ovo et al. (2020).

Actor	Subtype	Definition
<b>Political Actors</b>	Politicians	Represent citizens and create laws and policies
	Other Elected Officials	Similar to elected politicians, but with a mandate limited to a particular policy domain or geographic jurisdiction
<b>Bureaucratic Actors</b>	Executive Departments	Departments or ministries who specialise in a unique area of government responsibility
	Boards and Agencies of Government	Bodies appointed by government dealing exclusively with one particular sub-field of responsibility in which the demand for public services is especially high
	Self-Governing Regulatory Agencies	Regulation bodies, developing guidelines and monitoring the respect of the standards adopted
	Judicial System	Formal system that applies laws in the name of the state to resolve disputes
<b>Actors with Special Interests</b>	Implementing Agencies	Organizations responsible for implementing the laws or policies developed; locations where most of the implementation takes place
	Street-Level Bureaucrats	Agencies whose workers interact with and have wide discretion over the dispensation of benefits
	Insurers	Organizations that manage risks, providing a coverage against them to a group of individuals
	Donors/Foundations	Organizations that raise and allocate funds based on a specific mandate that they identify
	Government Corporations	Organizations or businesses that are run independently from government but are still ultimately accountable to them
	Unions	Associations of workers created to promote and protect their interests in the workplace
<b>Experts</b>	Scientists/Researchers	Individuals that systematically gather, analyse, and use research and other evidence through processes, such as theorising, synthesising, and hypothesis testing, to gain and share understanding and knowledge
	Field or Practice Leaders/Champions	Individuals that act as champions for an innovation and its implementation
	Patients or Persons with Lived Experience and Families/Carers	Individuals who bring personal knowledge or experience of a problem, condition, or service and who are the intended beneficiaries or ultimate targets of implementation, like families or caregivers
	Innovation Developers and Disseminators	Organizations or individuals who have developed a process, program, or product to be implemented
	Intermediaries and Technical Assistance Providers	Organizations or individuals that work in-between policymakers, funders, and front-line implementers, to facilitate the effective implementation
<b>Other</b>	Media	Individuals and organizations that communicate information through a variety of channels

Table 7: Types of Policy Actors identified in Implementation (Source: Bullock et al., 2021)

Among these actors, it is worth to better explain the role of implementing agencies and street level bureaucrats since it may be complicated to understand their shades of meaning. Implementing agencies plan, coordinate and monitor at the central level,

while street-level bureaucrats, who have been assigned by implementing agencies the duty of putting in practice the intervention, directly provide the service to beneficiaries and report useful information to their superiors.

## 2.3. State of the Art: Digital Inequalities

The concept of Digital Inequalities is the result of the evolution over time of the concept of Digital Divide, to better represent dynamics of exclusion and inequality. Discussing digital inequalities in all their determinants is out of the scope of this thesis; therefore, we provide only some highlights, focusing our attention on digital competences.

### 2.3.1 Defining Digital Inequality

The term '*Digital Divide*' was coined in 1995 and since then it has produced a wide range of definitions, controversies, and misunderstandings. However, it is worth mentioning that the concept is originally and persistently plural (Gunkel et al., 2003), grouping heterogeneous social, economic, and technological disparities under the term '*divide*'.

The literature discourse has identified three phases, each one with a different focal point.

In 1995, digital divide was defined as the contraposition of *attitudes* in the use of technology: pessimism *vs* euphoria (Moore, 1995). One year later, USA President Gore chose to focus instead on educational opportunities, i.e., the "*different chances for students to access and use personal computers at school*". It was only in 2004 that the NTIA (National Telecommunications and Information Administration) linked the digital divide to '*haves*' and '*have nots*', with a popular definition of the phenomenon as "*the divide between those with access to new technologies and those without*".

Hence the initial phase was characterised by a strong focus on *physical access* to ICTs (*first-level divide*). Despite the quick diffusion of devices and connectivity among the population between 1995 and 2004, a socio-economic gap was observed between and within communities worldwide.

With the increase of Internet usage, it was felt that the dichotomous approach contrasting haves and have-nots failed to appreciate the multidimensionality of the phenomenon (Warschauer, 2002). This digital divide was evolving to digital inequality, defined as the socio-economic disparities inside the online population (Stiakakis et al., 2010).

Therefore, new factors and variables were included in the analysis (Brandtzæg et al., 2011). van Dijk (2005) stated that access is influenced "*by the availability of material, cultural, social and mental resources and by personal factors such as gender, intelligence, ability, ethnicity, age and health*". Wilson (2006) made studies on Internet access, stating

that the main factors influencing it were “*physical, financial, cognitive access, production, design, content, institutional and political access*”.

The attention on the relevant differences in Internet and devices *usage* and on the gap between those with and without the *skills* to leverage upon ICTs is the so-called ‘*second-level divide*’ as commented by Attewell in 2001 (van Dijk, 2020). Indeed, in the following years several studies began to look at the digital competences at the basis of Internet experience and several frameworks were developed to classify them.

Lastly, in a third moment, scholars observed that the positive gains derived from ICTs are not commonly experienced by all the users (Howard et al., 2010). This led in 2010 to coin the term ‘*third-level digital divide*’ (Robles Morales et al., 2010), representing the perpetuation of existing social inequalities resulting from digital skills exploitation. Therefore, a stream of research concerning digital divide is currently focusing on “*the capacities to transform the digital benefits, resulting from a satisfactory use of ICTs, into social benefits*”, to enable the general public to improve its quality of life, made of personal, social, professional, and economic achievements (Ragnedda, 2017).

Considering the scope of the Digital Civilian Service, a deeper analysis on the definition and frameworks related to digital competences allows to capture the shades of meaning of the different terms used in this field and to prepare the ground to fully understand and examine comparable policies aimed at developing digital competences of disadvantaged groups.

### 2.3.2 Defining Digital Competences

In the last fifteen years several frameworks have been proposed to define – and infrequently to measure – digital literacy, digital competences, digital skills.

First, it is important to clarify that in this work the most appropriate word to use is *competences* since it is the most general term and combines the multi-faceted conceptualisation of current digital divide research. It means “*having the capacity to evaluate knowledge appropriately and apply it pragmatically*”. This reference is used in the ‘*Council Recommendation of 22 May 2018 on the Key Competences for Lifelong Learning*’ (European Commission, 2018), the document taken as reference for the Digital Civilian Service and for the DigComp 2.2 that will be later explained, where competences are presented as a “*combination of knowledge, skills and attitudes*”.

These three components are defined as:

- *Knowledge*: the body of facts, principles, theories, and practices that is related to a field of work or study and means the outcome of the assimilation of information through learning (European Commission, 2018).
- *Skills*: it corresponds to the application of knowledge to complete a task or solve a problem in a real setting, and, in the context of digital divide, it “*consist of medium- and content-related elements; and involves engaging with and creating digital*”

*content*" (van Deursen et al., 2017). According to van Dijk (2020), "*skills concentrate on what users can actually do with and within digital media*".

- *Attitudes*: motivations of performance, aspirations, and reasons for (not) using the Internet. Attitudes may be *cognitive* (knowledge about digital media), *emotional* (experiences or feelings) or *normative* (judgements) (van Dijk, 2020).

The concept of skills requires a further specification, and, in this regard, van Dijk and van Deursen (2014) proposed a '*Six Digital Skills General Framework*', distinguishing between medium-related and content-related skills. In particular, "*this distinction is sequential and conditional: without sufficient medium-related skills, content-related skills cannot be accomplished*".

Medium-related skills are necessary for the usage of digital media. They can be:

- Operational skills, i.e., being able to operate digital media.
- Formal skills, i.e., understanding all the formal structures of digital media, without losing the sense of orientation.

Content-related skills are instead:

- Information skills, i.e., "*the ability to search, select and evaluate information online*".
- Communication skills, i.e., the ability to interact and collaborate with others through digital media.
- Content-creating skills, i.e., the ability to use software in order to produce or re-elaborate texts, images, videos, multimedia.
- Strategic skills, i.e., the ability to leverage upon the other skills to reach a personal or professional goal, either online or offline.

Outside the academia, the reference framework for citizens' digital competence in Europe is the DigComp 2.2, or in full '*The Digital Competence Framework for Citizens*', developed by Joint Research Centre (JRC) of the European Commission.

The DigComp 2.2 framework is currently composed of five competence areas – very similar to those suggested by van Dijk and van Deursen (2014), with the addition of *safety skills* – and twenty-one competences (Table 8), each one encompassing eight proficiency levels.



Digital Competence Area	Digital Competences
Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content
Communication and collaboration	2.1 Interacting through digital technologies 2.2 Sharing information and content through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity
Digital content creation	3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licenses 3.4 Programming
Safety	4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment
Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps

Table 8: The DigComp Conceptual Reference Model (Source: DigComp 2.2)

This framework has a high importance in our study since it is the reference against which the Universal Civilian Service organizations are required to map their interventions. In particular, it has a two-fold role: it represents which modules are privileged in the training of the volunteers and which competences the eFacilitators could have certified at the end of their service – and indirectly, it is an indication of the priorities that stakeholders identify to properly design the intervention on the disadvantaged groups chosen as target.

Once the major definitions and frameworks have been presented, comparable policies aimed at developing digital competences of disadvantaged groups are examined in Section 2.4 to evaluate the progress on the topic in the policy history, which is still in its initial phases of deployment, especially concerning interventions on national scale.

## 2.4. State of the Art: Second-level Divide Policies

In this section we provide a comprehensive literature review concerning policies aimed at bridging the second-level digital divide in high-income countries – as defined by the World Bank. The common objective of all these policies is to increase digital competences, but we tried to evaluate which additional objectives emerged and what do they reflect, since they could be a consequence of the specific target, of the setting where the policy was deployed or of the priorities of the stakeholders involved.

Moreover, among the five phases of policymaking, we focus our attention mainly on the implementation one. This choice is done to evaluate the role that Policy Analytics could have in this sense, which, as mentioned previously, seem to be limited to analysis of preliminary results and mapping of resistances and side effects, and to gather insights that are informative to analyse the Digital Civilian Service.

In particular, with this section we want to:

- Analyse the additional objectives that emerged for different typologies of targets, to compare them with the ones that surface in the Digital Civilian Service case.
- Deploy useful recommendations for policymakers in order to improve the implementation of the Digital Civilian Service, since there is correspondence in terms of beneficiaries and, in some cases, also of typologies of interventions.
- Define which stakeholders are involved and their network of relationships, to determine if they coincide with the categories reported in literature and with those that have been included in the Italian case.

The discussion is divided based on the policies' target – since this dimension is the most relevant one to segment the typologies of objectives identified –, namely: general population, elderly, women, youths, disabled, migrants, and eFacilitators.

Each section is organised following the same structure:

1. We classify the main objectives of the policies, to identify whether they are coherent with the barriers and needs experienced by the designated policy beneficiaries. In particular Tables in Appendix A provide insights for each paper analysed, in terms geographical area of implementation, and policy main and additional objectives.
2. We describe the main approaches actuated during the implementation phase. A readaptation of the van Dijk (2020) '*Wheel of policy instruments to bridge the digital divide*', whose original version is represented in Figure 5, is used as a reference to categorise and map the typologies of interventions adopted.
3. We analyse impacts or results of the interventions, either quantitative or qualitative, focusing on the main key success factors or the reported reason of failures.

Concerning the second point, van Dijk (2020) framework tackles the digital divide in general, grouping the instruments in four dimensions - *motivation and attitude, physical access, digital skills, and usage*, - while our scope is instead to bridge or mitigate the second-level divide.

Nevertheless, it is worth to notice that often there is not a clear distinction among the different levels, since for disadvantaged groups, the improvement of digital skills may be conditional to the provision of devices and connectivity or of public access points that otherwise are not economically accessible. In the same way, the sphere of digital competences also comprehends the motivation and attitudes, that are one of the main determinants for (not) using the Internet. The emotional dimension, especially related to anxiety and the lack of self-confidence, turns out to be in fact one of the main barriers to act upon to guarantee a successful adoption of digital technologies.

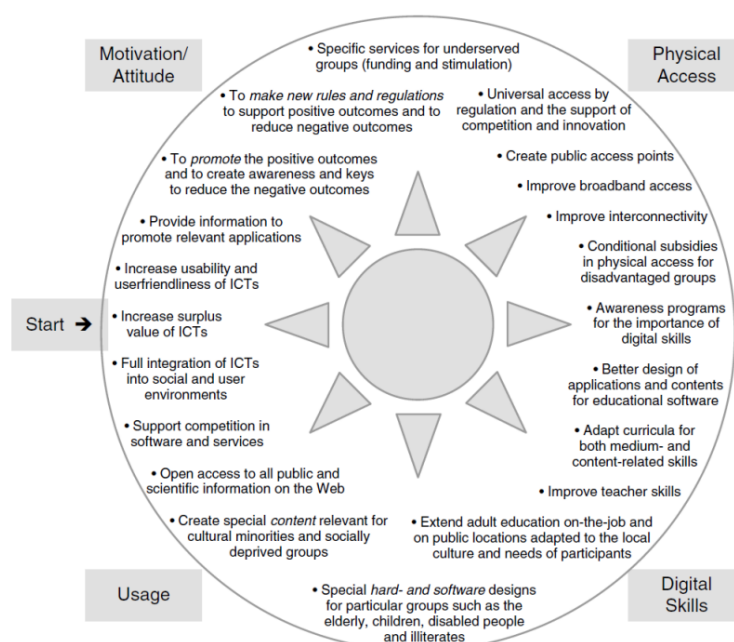


Figure 5: A Wheel of Policy Instruments to Bridge the Digital Divide (Source: van Dijk, 2020)

The readapted classification of the main types of interventions utilised in the analysed policies is in Table 9. We notice that, for the purpose of our work, it is necessary to increase the detail level of the interventions suggested for the digital skills area.

- First, we distinguish formal (training programs) and informal training (workshops) – as they respond to the needs of different targets.
- Second, we include the new typology ‘*Governmental one-stop service offices*’, which better defines the growing trend of facilitation services designed by the government to facilitate the digital inclusion of citizens, especially for the usage of public and private digital services – as it is confirmed by the Digital Civilian Service facilitation category of interventions.

- Third, we add the ‘*Tutoring*’ category, to map the informal provision of support aimed at transferring skills or expertise to respond to a particular need expressed by an individual or a small group.
- Fourth, as a consequence of the exclusion criteria based on sectorial policies defined in Section 2.1, interventions strictly related to the educational sector are out of scope, and any reference to teachers and curricula categorised as possible correspondence in Van Dijk Wheel framework have to be contextualised to the specific training program designed for the target.

Typology of intervention	Definition	Possible correspondence in Van Dijk Wheel
<b>Training programs</b>	Frontal educational activities involving teachers or experts in the sector, targeting disadvantaged groups or trainers. The course content is generally pre-defined.	<ul style="list-style-type: none"> <li>• Adapt curricula for both medium- and content-related skills</li> <li>• Improve teachers skills</li> </ul>
<b>Workshops</b>	Meeting of people to raise awareness, discuss and/or perform practical work related to a specific theme or activity. The content of each session can be adapted to the needs of the audience, even if the general subject is maintained.	<ul style="list-style-type: none"> <li>• Extend adult education on-the-job and on public locations adapted to the local culture and needs of participants</li> </ul>
<b>Tutoring</b>	Informal provision of support aimed at transferring skills or expertise to respond to a particular need expressed by an individual or a small group	Not mapped
<b>Governmental one-stop service offices</b>	Government digital access points in offices to provide facilitation services	<ul style="list-style-type: none"> <li>• Create public access points</li> </ul>
<b>Infrastructure provision – private domain (home)</b>	Provision of free or low-fee Internet connectivity and/or devices to be utilised in private domains (home). It generally also includes technical assistance and support.	<ul style="list-style-type: none"> <li>• Improvement of broadband access</li> <li>• Improvement of interconnectivity</li> <li>• Conditional subsidies in physical access for disadvantaged groups</li> </ul>
<b>Infrastructure provision – public domain</b>	Provision of Internet connectivity and/or devices to be utilised in public spaces (telecentres, cybercafés, libraries, computer labs, etc.) for free or at a low fee. It generally also includes tutorship interventions to facilitate the usage of devices and services.	<ul style="list-style-type: none"> <li>• Improvement of broadband access</li> <li>• Improvement of interconnectivity</li> <li>• Create public access points</li> </ul>
<b>Collateral activities</b>	Additional interventions to incentivise the usage of the technologies and reduce the barriers encountered by specific disadvantaged groups.	<ul style="list-style-type: none"> <li>• Special hard-and software designs for particular groups, such as the elderly, children, disabled people, and illiterates</li> <li>• Better design of applications and contents for educational software</li> <li>• Creation of special content relevant for cultural minorities and socially deprived groups</li> <li>• Awareness programs for the importance of digital skills</li> </ul>

Table 9: Typologies of Interventions and Correspondence to the van Dijk Wheel Framework

To give a full picture of the papers identified, the following summary table (Table 10) delineates the main indicators of the papers selected for each target.

Dimensions	General Population	Elderly	Women	Young People	People with Disabilities	Migrants	eFacilitators
# of Papers	12	15	6	11	3	3	6
# of Countries*	10	13	6	15	2	3	5
# of Policies	11	10	6	9	3	3	5
Temporal range *	2006-2021	2006-2022	2004-2019	2010-2017	2012-2020	2012-2014	2012-2020

Table 10: Summary Dimensions of the Papers Identified

\* To define the number of countries, we considered the country/countries where the case is implemented in the paper, in case of policies covering more than one nation

\*\* To define the temporal range, we considered the years when the papers were published

### 2.4.1. General Population

In this paragraph we consider policies addressing a broad and not specific target, namely citizens (in urban areas) or villagers (in rural areas).

#### 2.4.1.1. Policy Issues and Objectives

The common objective of these policies is to increase digital competences. However, some policies have also specific objectives, depending on the geographical target, namely rural and urban areas.

By increasing accessibility, use and quality of ICTs, policies for rural areas are designed mainly to favour the development of the local industry, and considering single individuals, to:

- Economically empower the community, to facilitate the access to the labour market or to support household income (Lim et al., 2007), (Hsiu et al., 2017).

On the contrary, in urban areas the same policies face a target that has on average a higher degree of adoption of technologies, therefore they generally aim at strengthening this condition. In particular, they are issued to:

- Foster people participatory citizenship, by incentivising the usage of e-government and of public and private digital services (Schou et al., 2019).
- Use technology and digital competences as a support to increase performance at school and work (Kowalska-Chrzanowska et al, 2021).
- Increase employability and the attractiveness of workers and develop advanced digital skills, to train new ICT professionals (Garcia Aguilera et al., 2019).

### 2.4.1.2. Interventions

Interventions vary by country and by area, and fall under three main typologies:

- Training programs.
- Infrastructure provision – public domain.
- Governmental one-stop service offices.

Rural areas are often characterised by a shortage of ICT facilities and skills; therefore, public access points with Internet connectivity and devices with tutors available in case of necessity are the prevalent type of intervention. Even if in a lower quantity, also training programs are documented for rural areas, mainly in cybercafés, telecentres, and libraries (Chao et al., 2016), (Hsiu et al., 2017), (Aires et al., 2018), (Mirke et al., 2019), (Willis, 2019).

The low income clearly affects rural people participation at these initiatives. Therefore, some of them are provided for free or in exchange of an affordable fee – as the Get IT Programme, part of the Rural Development Programme for England (Willis, 2019). Indeed, as reported by Mirke et al. (2019), *“every fifth respondent answered they used library Internet because they had no other alternatives”*.

Moreover, rural areas are characterised by a low interest in ICTs, since most of the inhabitants spend their time doing agricultural-related jobs, which do not stimulate the perception of usefulness and of how technologies can empower their daily private and working life. To solve this problem, Lim et al. (2007) documented how INVIL policy overcomes the lack of interest barrier by offering a coherent course (farmers are trained to sell their products on e-Commerce websites).

In urban contexts, training programs (Kambouri et al., 2006), (Becker et al, 2019), (Garcia Aguilera et al., 2019), (Kowalska-Chrzanowska et al, 2021), (Lev-On et al., 2021) and governmental one-stop service offices (Schou et al., 2019) are prevalent.

How can training be effective when the target is so wide? Becker et al. (2019) report the broad range of training topics covered during the *All Digital Week* to spread awareness among citizens, from sexual education to searching for a job online. When the target is more specific, however, the course content is more specific too. In the *E-active* training project in Poland, for example, the policy had multiple objectives for different targets (farmers, unemployed, young people, etc), but each participant could join only one module, based on their interest (Kowalska-Chrzanowska et al, 2021).

When dealing with governmental one-stop service offices, the main objective is usually to support e-government usage. Schou et al. (2019) document the wrong evaluation of the target made by policymakers: the policy was thought for the general population, but the real users turned out to be specific disadvantaged categories in need of peculiar assistance services, such as homeless, poor immigrants, and unemployed.

### 2.4.1.3. Results

Training programs frequently document their outputs, both qualitatively and quantitatively, but only few report outcomes and impact.

Kambouri et al. (2006), for example, analysing a *Skills for Life* program, found that:

- Confidence of older participants increased significantly, starting from high level of anxiety.
- Young learners were more likely to attend less frequently or drop out the course, having a high level of ICT self-efficacy.
- The higher the time spent using ICT in the classroom, the higher the increase in digital competences and confidence.
- Mobile technologies (such as tablets) allowed for more flexibility increasing the effectiveness of training.

Moving on to quantitative results, Kowalska-Chrzanowska et al. (2021) concluded that 51% of the training group moved from average to high competences, 4% of groups moved from low to average competences, and 35% of moved from low to high competences. Lev-On et al. (2021) report more sizeable results: 85% of people perceived they improved their confidence in using computers, although only 40% of the participants perceived they improved their digital competences.

Contrasting results come from the *All Digital Week* initiative: according to a self-assessment, only 46% of participants declared to perceive themselves with higher digital competences compared to the beginning of the course; 33% declared no improvements, while the remaining 21% stated they decreased their competences after the training (Becker et al., 2019). A possible explanation of such results of these two policies can be found in Kambouri et al. (2006), who observed that people tend to significantly self-overestimate their digital competences before training.

In this context, the critical success factors that emerge from the studies are:

- Free or low-cost provision for training and tutorship services, especially in poor or rural areas.
- Strong coherence between the content of the intervention and the policy objectives.
- Involvement of ICT skilled tutors, who are also able to customise the intervention according to the target, for example by providing further details about the activities performed (Kambouri et al., 2006) or by asking few preliminary questions about familiarity with using a computer before the session (Schou et al., 2019).
- Focus on hot topics for everyday life, to increase awareness and stimulate the take up of follow-up activities (Becker et al., 2019).

No results are available for most of the tutorship interventions in libraries, cybercafés, telecentres, etc. Here, as highlighted by Hsiu et al., 2017, the critical success factors is

connectivity – especially in rural areas –, since most of the policies couple the two dimensions of digital divide.

Finally, for training to be effective, tutors should be competent. Aires et al. (2018) highlighted how 90.3% of the people in charge of running the tutorship activities were not trained at all, making the provision of the intervention even more difficult.

## 2.4.2. Elderly

The literature offers many examples of policies targeting older adults to improve their digital competences. The peculiar characteristic is that these policies are mainly issued by high-income countries, where the population is rapidly aging (Tirado-Morueta, 2020).

But first: how do we define ‘old age’? The papers do not refer to a unique age range, hence we define older adults as people over 50 years of age, since most of the policies consider this lower limit as the threshold to be defined an older adult. This age limit is either explicitly cited in the policy objectives – as in (Lam et al., 2006), (Maçik et al., 2014), (Tomczyk et al., 2019), (De Carvalho et al., 2018 and 2019) and (Suchowerska et al., 2022) – or is the minimum age of the people joining initiatives funded by the policies – as in (Del Prete et al., 2011) and (Hill et al., 2008).

### 2.4.2.1. Policy Issues and Objectives

When dealing with this population category, the literature often focuses on the notion of self-efficacy, which is defined by Compeau et al., (1995) as “*the belief that one has the capability to perform a particular behaviour*”. The societal belief – often contradicted by the data (Margaryan et al., 2011) – according to which it is easier for younger people to keep up with technological advancements often leads to a lower self-efficacy in the elderly, which consequently leads to a higher degree of technological anxiety (Charness et al., 1992).

However, senior citizens have to overcome also other barriers: “*lack of technical skills and knowledge to deal with technical problems, upgrades, disruption and distress caused by security issues (all compounded by lack of familiarity with technical jargon), physical difficulties (e.g. problems in manipulating the mouse or seeing what is on screen), and cognitive difficulties (e.g. limitations of working memory which make it difficult to remember passwords or to recall sequential steps in an operating procedure)*” (Damodaran et al., 2016). Also language barriers must be added, especially for low-educated individuals.

Increasing digital confidence (i.e., self-efficacy), thus reducing tech-anxiety, and helping elder people overcome their barriers are primary policy objectives that are occasionally coupled with other additional objectives:

- Reduce the generational gender digital divide (Del Prete et al., 2011), (Chang et al., 2012),
- Increase the participation in professional life of older adults (Maçik et al., 2014).



- Increase elder people independence, enabling them in the usage of e-government, e-health, e-banking and other categories of services online (De Carvalho et al., 2018 and 2019).
- Enhance social and/or economic life of senior citizens, also stimulating the interactions online and the communication through social media channels (Nyce et al., 2013), (Maćik et al., 2014), (Robinson et al., 2020), (Cid et al., 2020), (Suchowerska et al., 2022).
- Favour intergenerational learning (Abad, 2014), (Tomczyk, 2015), (Tomczyk et al., 2019).

Additional objectives typically depend on the age of the participants, i.e., on where the policy is positioned in the age range 50+. For example, Maćik et al. (2014) focus on people aged 50 to 67 (i.e., the Polish threshold to enjoy retirement), who lost their job, wanting to find a new one by being digitally empowered, so that one day they can enjoy retirement.

However, these policies' objectives are not taking into consideration two relevant trends, which negatively impact on elderly people's life in the digital world.

First, some individuals, especially older ones, give-up and stop to use Internet after a certain usage period (Damodaran et al., 2016). Olphert et al. (2013) named this phenomenon '*fourth digital divide*', since it cannot be explained with a combination of lack of access, skills, motivation or interest (who gave up was previously a user). In older adults it is mainly driven by physical and cognitive impairments.

Secondly, according to Schreuers et al., (2017), older adults' engagement with technologies is often linked to repetitive habits, limited to carrying out the same digital activities. The authors named this phenomenon '*digital skills bubble*', with the idea that some activities and skills are placed inside the conform zone (i.e., the bubble), while others are not.

These two phenomena seem correlated. Indeed, elder people usually join digital competences initiatives just to learn few topics (e.g., how to communicate with distant relatives and friends) and then, if they can nurture ICT competences of their choice, then the risk of digital disengagement in the long-term is reduced, but the digital skills bubble effect is enhanced.

#### 2.4.2.2. Interventions

Gatti et al. (2017) noticed that elder people become more confident in using digital technologies when they are supported in understanding the terminology associated to the digital world and the reasons for using digital technologies (scholars call this pillar '*integration*'), and when they are helped to communicate with other people in new ways (scholars call this pillar '*empowerment*'). These findings are in line with what was observed several years before by Compeau et al. (1999).

In this direction, the literature highlights two types of interventions: training programs and workshops. The main difference between lies in their scope: while training programs typically offer a more comprehensive content on different ICT-related topics, workshops are customised according to the necessities of older adults (with the risk of feeding the bubble).

Coherently with all the limitations of elder people, the content of the training programs covered basic ICT skills, such as operational skills, communication, search skills, e-government usage, access to e-health services, e-banking, and e-commerce (Lam et al., 2006), (Chang et al., 2012), (Nyce et al., 2013), (Maçik et al., 2014), (De Carvalho et al., 2018 and 2019). As said, training programs are more likely to avoid the digital skills bubble effect, because they deal with a wider range of ICT-related notions. However, in Lam et al. (2006) lowering anxiety through the training program did not stimulate the elderly to keep on with using ICTs for more complicated tasks, such as online shopping and banking, limiting the spectrum of performed activities to reading online newspapers and sending emails.

On the contrary, workshops present shorter programs with a limited range of digital skills taught, but usually they are customised according to the target's needs and preferences – see (Hill et al., 2008), (Del Prete et al., 2011), (Robinson et al., 2020), (Cid et al., 2020), (Suchowerska et al., 2022) –, with 3 out of 5 papers documenting an evident digital skills bubble effect.

The bubbling effect is enhanced also by how the promoting organizations are polarised into:

- *Digital skills organizations*, providing digital skills learning programs
- *Community welfare organizations*, enhancing social and economic participation of elder people in the digital world
- *Lifestyle organizations*, wanting to create digital connections among elder people, to help them sharing their interests, experiences and identities and socialise.

A collateral intervention to these two categories is the special hardware and software design customisation, to prevent usage problems resulting from the interaction through a touch/gesture interface. For example, in the UISEL program the app was adjusted to accept more tapping than double tapping, and within the training software, the font and icon sizes were made adjustable to eventually cope with other physical limitations (De Carvalho et al., 2018 and 2019).

Smartphones play a crucial role for this target. According to a study by Kolland et al. (2013), “almost all seniors already used mobile phones for general communication purposes (i.e., calling people)”, but the use of smartphones for more complex functionalities is still residual. Similarly, tablets are not so much used by elderly. However, mobile devices are subjected to continuous updates, which stress elder people and risk to erase the digital skills previously learned (i.e., ‘de-skilling effect’) if the change is drastic (Damodaran et al., 2016).

Finally, Tirado-Morueta et al. (2021) highlight the relationship between age and the place where elderly attend training programs or workshops. Different age groups tend to attend training courses in different places, hence initiatives based upon university programs for seniors are not substitutes of initiatives placed in nursing homes or senior community centres.

#### 2.4.2.3. Results

The literature documents mostly qualitative results of these programs, mainly because of the trade-off between increasing self-efficacy and limiting the digital skills bubble. However, since the bubble effect is somehow coherent with the motivation for which people take part in such initiatives, increased self-efficacy, lower anxiety, and reduced barriers towards ICT usage are arguably better indicators of policy success.

As far as training programs and workshops are concerned, evidence is mixed.

Lam et al. (2006) stated that self-efficacy did not increase at the beginning of the program, despite the continuous support by tutors. Only when language barriers and unfamiliarity with keyboard and mouse were overcome, then self-efficacy increased but producing the bubble. The authors showed that it is a matter of both support and time to increase elderly confidence towards ICTs and make the policy successful. De Carvalho et al. (2018 and 2019) follow the same line, underlining the importance of recaps and repetitions of basic ICT concepts during the training course.

Nyce et al. (2013) described supporting strategies that tutors used to achieve success. Within the Biblionet Program, trainers created a very informal environment, leveraging upon humour and finding several creative pedagogical solutions – e.g., a book with all the users' passwords, catchy translations of English words, activities to reduce senior citizens' fear of breaking devices.

The level of support is a good predictor of policy success, but De Carvalho et al. (2018 and 2019) highlight other critical factors to be maximised: program duration and customisation. Workshops tend to address the personalisation problem, as shown by Del Prete et al. (2011), although favouring the digital skills bubble effect.

Both Lam et al., (2006) and De Carvalho et al. (2018 and 2019) also document relevant inconsistencies between the digital competence level declared in self-assessment activities and the actual knowledge assessed through cognitive tests. In De Carvalho et al. (2018 and 2019), in particular, most of the constructs do not show progress after the training. Senior citizens tend to overestimate their abilities, although literature (e.g., van Dijk, 2005) shows that *'silver surfers'* (Weightman et al., 2003) are more modest in reporting the level of their competences than younger respondents.

As for the additional objectives, Del Prete et al. (2011) and Chang et al. (2012) document the effectiveness of workshops and training program in increasing older women digital competences and decreasing their generational gender digital divide, although they do not account for self-selection in the initiatives. Nyce et al. (2013) described the

importance of libraries to foster socialisation of elderly between each other and, thanks to the competences acquired, also with relatives and friends living abroad. Maćik et al. (2014) highlighted that the Polish training program did not succeed in simultaneously increasing basic digital competences and improving also professional skills.

### 2.4.3. Women

The *gender digital divide* is defined as gender differences in resources and capabilities to access and effectively use ICTs within and between countries, regions, sectors, and socio-economic groups (Sey et al., 2019).

Policies targeting this category are less analysed by the literature with respect to those targeting other social groups, probably because in all regions the gender divide has been narrowing in recent years. According to the ITU (2021), globally, in 2020, the gender parity score – defined as the female percentage divided by the male percentage of Internet users – has improved from 0.89 in 2018 to 0.92 in 2020.

In particular, in high-income countries, parity in terms of usage has already been achieved. However, also in high-income countries the second-level gender digital divide persists in terms of educational and career paths, especially in STEM sectors: in Europe, only 1 in 3 STEM graduates and 1 in 6 ICT specialists is female. Furthermore, women make up just 21% of technology executives, thus resulting in a lack of role models and in the persistence of gender stereotypes (ITU 2021).

#### 2.4.3.1. Policy Issues and Objectives

First, to assess the suitability of the policies objectives with respect to the women target, it is useful to evaluate the barriers that this category is currently experiencing for the adoption and effective usage of the ICTs.

In high-income countries, lack of confidence is the most frequent barrier: women tend to underrate their competences with respect to men (van Deursen, 2010; Hargittai and Shafer, 2006; Hargittai and Hinnant, 2008); this is true also for women in entrepreneurial roles (Mack et al., 2017).

The (negative) gender effect on self-efficacy is typically exacerbated by other variables: old age is the major factor, as reported by Laguna and Babcock (1997) and by Orser et al. (2019), together with low educational levels, cultural differences, computer access, and learning opportunities (Chang et al., 2012).

Digital competences policies targeting women are consistent with these considerations, since they pursue two main objectives:

1. Development of digital competences as a mean for social and economic empowerment, targeting in particular young girls, female students and young female professionals (Rabayah, 2008), (Berger et al., 2012), (Mariscal et al., 2019).

2. Change of self-perception and adoption of a positive attitude towards the technologies, especially for adult and older women (Meiners et al., 2004), (Del Prete et al., 2011), (Chang et al, 2012).

#### 2.4.3.2. Interventions

Given the above-listed objectives, the policies analysed in this area encompass mainly training programs, workshops, and a tutoring initiative.

Training programs are closely linked to social and economic empowerment, focusing either on legal issues, non-violence, political participation, and civic education (Rabayah, 2008), or on topics expendable on the labour market (Berger et al., 2012), such as Internet publishing blogs and online transactions Internet auctions (Chang et al, 2012).

Del Prete et al., (2011) describe a workshop initiative coherent with the second policy objective, with the aim not only to acquire the knowledge and technical skills for using ICTs, but also with a substantial effort dedicated to the encouragement and recognition by peers and by educators.

Meiners et al., (2004) compare two typologies of interventions adopted in a working-class university in the Midwest, namely curriculum integration of medium- and content-related skills and peer tutoring in the university computer lab. The creation of spaces where to participate as legitimate community members managed by peers turned out to meet the students' requirements more effectively than the initial proposal of a curricular transformation.

However, these policies result to be outdated and most of them are not active anymore. In this regard, academic literature documents emerging response strategies addressing more complex barriers, but from the point of view of policy analysis they have not been studied thoroughly yet, especially concerning their outcomes and impacts (Orser et al., 2019). These interventions are being designed in the form of:

- *Role modelling*, i.e., aims at raising awareness, inspire and promote ICT skills development by providing entrepreneurial women role models utilising ICTs.
- *Women mentoring*, i.e., centred on supporting, encouraging, and coaching young women not only with respect to technology adoption needs, but also with respect to emotional and confidence needs.
- *Gender-sensitive entrepreneurship education or training programs*, targeting either secondary and higher education students – to foster entrepreneurship as a key competence for lifelong learning – or unemployed individuals and potential entrepreneurs – to prepare for starting and operating an enterprise.

Governments are currently funding these kinds of ICT support programs, but often fail to consider the gendered nature of technology (OECD, 2017).

### 2.4.3.3. Results

Frequently, the literature focuses on the results achieved in pursuing the second goal. In general, anxiety towards ICT usage was reduced and a more positive attitude was observed, as well as a significant increase in self-efficacy.

The typology of intervention that proved to be successful in this regard with an adult and older audience is the workshop, that gave the possibility to learn and interact as a group in a friendly environment. Lin et al. (2007), for example, pointed out that women would feel more comfortable if novices learned together.

Another critical success factor was learning about using technology while simultaneously introducing “*cultural components, rhythms, and motives in the education programs*”. For example, to understand how to digitise personal photographs and documentation, women were requested to bring in old photos and footage about their life, presenting to the group the story behind them, allowing participants to build a strong identity (Del Prete et al., 2011).

Results are less clear instead for the first goal, probably due to the difficulties that can be encountered in measuring constructs such as empowerment and independence with consistent indicators.

The positive effects reported were the improvement of abilities at work and the desire to seek further training.

Meiners et al. (2004) underlines that, even if the curriculum integration of a course focused on digital competences enabled female students to attain a higher level of confidence and technological abilities upon its completion, the peer tutoring intervention let them gain a kind of fluency that was not evident in the other case.

A critical aspect that was encountered was considering women as a homogenous category with similar needs – as in the Sabaya Program (Rabayah, 2008) and the Bridging Digital Divide for Women Project (Chang et al, 2012) – resulting in the slight decrease of older women’s perception of usefulness of the technology.

Furthermore, the program delivery should be coherent with the barriers that are experienced by the beneficiaries. For example, Berger et al. (2012) show that long and non-interactive learning experiences are not suitable for professional women; the protracted working hours cause both a lack of motivation and low participation, which can be raised only through financial incentives. Especially for working professionals, the implementation should be ‘*just-in-time*’, as defined by Orser et al. (2019), utilising online programs, social media, short course formats, providing hands-on interactive learning experiences.

### 2.4.4. Young People

When dealing with young individuals, corresponding to children and adolescents up to university students, most of the programs examined by the academic literature are

conveyed within the school perimeter – in terms of time, spaces and resources utilised – and thus fall into the category of education policy. Since they are by definition sectorial policies, we exclude all these papers from our analysis. The usage of devices in schools, such as the ‘*One Laptop Per Child*’ (OLPC) program or the ‘*Bring Your Own Device*’ (BYOD) initiative, the implementation of computer labs, the introduction of mandatory ICT courses within the students’ curricula, the training of teachers on new innovative pedagogical approaches are therefore outside this literature scope. In particular, 14 papers coming from the query are not taken into consideration for this reason.

#### 2.4.4.1. Policies Objectives

All youth-oriented policies identified pursue the objective of empowering children and young people with digital competences. Then, depending on the typology of intervention, some more specific objectives may be identified:

1. Provide connectivity or devices to young people and/or their family to close the digital gap between them and their peers, also in view of enhancing their performance at school or at work (Jewitt et al., 2011), (Assadi et al., 2014), (Cohen Zilka, 2016). In fact, thanks to the physical access to devices and to the support of skilled relatives, high-middle income students are more likely to develop basic ICT skills at home; low-income and disadvantaged students are harmed by this *do-it-yourself-at-home* approach, thus creating space for a public compensatory intervention (Larghi et al., 2015).
2. Foster the socialisation of youths in community places (Crump et al., 2010), (ChanLin et al., 2012), (Hsiu et al., 2017), (Cabello et al., 2017).
3. Increase their ICT skills to find a job in an ever-growing digital society (Loureiro et al., 2014), (Loureiro, 2015), (Moreno-León et al., 2015), (Baranowski, 2017).

#### 2.4.4.2. Interventions

In line with first goal, the *Computer for Every Child Project* and the *Computers in Homes* (CiH) programme provide devices respectively to poor children and poor families with children in school-age; the *Home Access Programme* (HAP), instead, provides household connectivity for free.

Such programs typically couple multiple objectives, to maximise the social impact of the policy: when devices are distributed to children (together with a short training on how to use them), their use increases also for their families, diffusing the effect (Cohen Zilka, 2016); when the focus is on parents only, the aim is also to involve them in the school life of their children, by helping them doing their schoolwork (Assadi et al., 2014). However, such type of policies may not be sufficiently powerful to counterbalance what Barrantes (2007) defines ‘*digital poverty*’, i.e., the lack of interest and time to be devoted to fruitful ICT usage, despite the home access.

The second goal is linked to the influence of the wider social network on the young people. In particular, according to Downes (2009), “*by creating their own personal networks, and engaging in different services, communities, groups and networks, according with their needs, interests, likes and motivations, students are leading us into a modern learning approach: Connectivism*”. Connectivism relates to the distribution of knowledge and learning thanks to a network of connections made by experiences and interactions.

The *Secret Level ICT Project*, consisting in equipping several public places with devices and connectivity to be used by young people, obtained the following results. Even if 83% of the users had a computer at home, students really liked spending their afternoons in these places to carry out homework activities and school research, and to spend time fostering online relations with families and friends, as well as developing networks of new friends (Crump et al., 2010). Another interesting initiative to foster friendship bonds is represented by online companionship. This initiative takes place in *Digital Opportunity Centres* (DOCs) in Taiwan, where disadvantaged children can use devices to remotely connect with a university tutor for help during their schoolwork and for nurturing their digital skills (Hsiu et al., 2017).

Finally, the third goal encompasses initiatives (mainly in Europe) where students voluntarily join to develop competitive curricula profiles to fill gaps in the job market. Fall into this category initiatives such as the *EU Code Week* (Moreno-León et al., 2015), *e-Skills IP* (Loureiro et al., 2014), (Loureiro, 2015) and *Erasmus+* (Baranowski, 2017). All these initiatives make extensive use of workshops to illustrate specific skills (e.g., coding) and applications (e.g., office automation software) useful in the job market.

#### 2.4.4.3. Results

None of the papers analysed provide quantitative results, so we focus only on qualitative ones.

Cohen Zilka (2016) highlights mobility as a key factor to increase children’s digital competences, enabling continuous practice and usage also outside the home environment. Also, Assadi et al. (2014) and (Jewitt et al., 2011) report increases in confidence, sociability, and perceived ICT competences. However, both Jewitt et al. (2011) and Assadi et al. (2014) observed two problems:

1. First, parents were not trained enough or at all on the topic of e-safety, raising lots of concerns about the dangers represented by the Internet
2. Second, most of the times, devices or connectivity were used for leisure activities, allocating less time to school or work practice.

Assadi et al. (2014) also observed that “*Internet use was extending some users social networks in general as well as helping them to be more established in their community*”. Moreover, the authors highlight the importance of the support of families and friends, who were already computer literate, in helping participants nurture their digital skills.



Similar findings come from Crump et al. (2010), who document that the students attending Secret Level places became more socially aware and interacted more among each other. Hsiu et al. (2017) reported that having a digital study partner/friend exerts positive influence on young students learning motivations and performance, who, according to ChanLin et al. (2012), mainly improved their communication competences. However, without a proper counterfactual analysis, it is impossible to say whether socialisation fostered also competence development, or instead the former objective did not interact with the latter.

Finally, no clear job market outcomes are described with respect to the initiatives addressing the third goal. According to Loureiro (2014) and Loureiro et al. (2015), however, *“the learning outcomes were achieved; participants were able to develop competencies on digital literacy and soft skills, enhance their social, communication and presentation skills, and to improve language skills (English)”*. Similarly, Baranowski (2017) report the increase in digital competences of Erasmus+ participants but highlight their repetitive use for two years of the same applications, even if they were trained for a variety of them, suggesting a sort of digital skills bubble also for this category.

#### 2.4.5. People with Disabilities

The literature has devoted little attention to this category, and mainly in high-income countries. This is a great deficiency, especially if we consider the numbers that can be observed for the European Union. In fact, according to the European Council, there are 87 million Europeans with some forms of disabilities, resulting in a percentage of 1 out of 4 European adults.

Before proceeding, we clarify that it is difficult to elaborate general considerations on this social category, since there are thousands of different disabilities, from cognitive ones to physical ones, to arrive in some cases to a combination of both. The type of disability highly influences Internet usage and the development of digital competences. Haage (2017), for example, observed that people with impaired vision or hearing or physical difficulties are less likely to be Internet users than people with other common disabilities.

##### 2.4.5.1. Policies Objectives

Among the papers analysed, only two policy packages fund initiatives explicitly targeting people with disabilities, and they are the case of *Internet Erfahren* (Berger et al., 2012) and *Connected Lithuania Project* (Manžuch et al., 2020), which show initiatives for visually impaired elder people and people with hearing impairment, respectively. Becker et al. (2019) instead describe the *All Digital Week* as an initiative for all citizens, but attended by a consistent group of disabled people, without specifying the types of disabilities they have.

#### 2.4.5.2. Interventions

All the three policies provide the same type of intervention, that is the training program. In the case of *All Digital Week*, the topics and the training provision were not customised on disabled and their specific disabilities (Becker et al., 2019). On the contrary, the other two policies adopted some specific solutions to make the training program accessible also to the disabled. Berger et al. (2012) highlighted the importance of using digital tools created for blind people, so that participants could maximise their learning activities, mainly about writing and sending e-mails, overcoming their eyesight difficulties. Instead, Manžuch et al. (2020) highlighted how impactful teaching ICTs was when involving deaf people in the creation and reading of digital comics, exploiting the fact that deaf people tend to communicate with each other by sending pictures with their phones.

#### 2.4.5.3. Results

Few results are available concerning these policies and they are mainly qualitative. Becker et al. (2019) found out that people with disabilities had bigger improvements of digital competences compared to the general population; indeed, almost 59% of disabled participants perceived their competences to be increased. Manžuch et al. (2020) reported that deaf people participating in the course understood how to use tablet PCs, how to search for digital comics online and how to create them, but they also improved their literacy and grammar (i.e., common difficulties for deaf people), mainly thanks to the continuous reading of digital comics, also outside the training activities. Thanks to Manžuch et al. (2020) it is possible to see how a customised intervention based on the disability is effective in overcoming the second-level digital divide and, even more importantly, some other problems related to the disability itself.

In particular, the main critical success factor is not the fact that disabled people are supported during their training pathway, but the fact that the tutor itself knows the disability very well. For example, Berger et al. (2012) highlighted that people with visual impairment were motivated by the fact that the trainer was a blind person too. Indeed, *“it turned out that being disabled himself gave the teacher’s remarks and knowledge about Internet use with assistive technology a different quality in the perception of the learners”*. Similarly, Manžuch et al. (2020) observed that deaf people were highly motivated in continuing the course by the fact that everything was translated into sign language by the tutor, so that language barriers were overcome.

#### 2.4.6. Migrants

There is little evidence in the literature concerning digital competences policies targeting migrants. Indeed, only 3 papers on this category were found.

Also in this case, it is necessary to say that migrants are very different depending on the reasons why they migrate and on the country and culture of origin. Therefore, the

results presented in the following case studies might be little generalisable to other contexts.

#### 2.4.6.1. Policy Objectives

As already said migrants are left behind by policymakers when thinking about the digital world, so not surprisingly the objective of 2 of the policies found do not mention them. Indeed, one paper deals with ICT provision to disadvantaged families in New Zealand, among which a consistent part is made by refugees (Assadi et al., 2014); another one instead describes a training course targeting Taiwanese women, highlighting also the difficulties faced by non-Taiwanese ones (mainly migrants from China), representing a consistent part of the training group (Chang et al., 2012). Only the third paper has a specific objective: increase the employability of young Russian migrants joining the Internet Erfahren policy in Germany (Berger et al., 2012).

#### 2.4.6.2. Interventions and Results

Regarding the *Computers in Homes* (CiH) initiative, Assadi et al. (2014) mention that “migrants [...] were using [ICTs] to stay connected with family and read news from overseas”. Indeed, as observed by Alam et al. (2015), one of the main problems for migrants, alongside with the lack of digital competences and language barriers, is the accessibility to ICTs and broadband connectivity, which could be very costly and therefore unaffordable, unless government steps in to overcome the first-level divide of migrants. Hence, despite not estimating specific impacts for refugees, the CiH initiatives underlines the close link between first- and second-level divide for this sub-population.

Not surprisingly, aspects of cultural mediation are key for achieving results on this target. Berger et al. (2012) report that the training was regarded successful by the migrants, who wanted to increase their digital competences in view of future job opportunities, and the main critical success factor seemed to be that ICTs were taught in their mother tongue. Coherently, Chang et al. (2012) observed difficulties for non-Taiwanese learners concerning typing and learning in Chinese, which reduced the impact that the training program had on them: as a result, computer anxiety decreased more in Taiwanese learners than in non-Taiwanese ones.

#### 2.4.7. eFacilitators

In this section we deal with the figure of eFacilitators, also labelled as trainers or tutors in the literature and in our review. This section is organised differently, and is based on facilitation strategies, attitudes, and outcomes. This is due to the low diffusion of policies aimed at increasing the digital competences also of the service providers, rather than only of the recipients of the intervention. In particular, to identify the papers targeting this category, we took as reference the definition given within the Italian Digital Civil Service policy, as “young people with the role of making citizens

*knowledgeable and autonomous in the usage of Internet and digital services*". 21 papers deal with them, but only 6 of them describe policies whose primary target are facilitators.

When facilitators are considered as target of a policy, the objective is not only increasing their digital skills, but also defining their social responsibility with respect to the community. For example, in the Polish case they are named *'Lighthouse Keepers'* – to refer to their role of lighting the way for disadvantaged populations – or even *"the agents of necessary civilizational transformation in Polish communes"* (Tomczyk et al., 2019).

The most widely recognised responsibility they have is that of customising interventions according to the needs of the users, encouraging the digitally excluded to use ICT both in tutored and untutored environments (Tomczyk, 2015).

Even if 6 papers mention explicitly facilitators in their objective, they do not provide any insight on how they are trained and whether their digital competences increase or not. Only Mirke et al. (2019) report that librarians digital competences increased by joining the *Father's Third Son* initiative, but they do not provide any information on how these results were achieved. The lack of results on facilitators competences is also observed for all the other papers, describing policies not having as a primary target them. Only Meiners et al. (2004) report that the workshop assistants increased their digital competences, but they do not provide further details, either.

On the contrary, most of the papers document qualitatively the strategies, the attitudes and the outcomes of training programs, workshops, governmental one-stop shops, and tutorship activities from the perspective of facilitators.

#### 2.4.7.1. Facilitation Strategies

Chang et al. (2012) observed the importance of multiple demonstrations of the activity taught to participants, especially adult and older women, so that they could understand better how to perform it. Moreover, the authors report the importance of taking notes during facilitations activities, so that participants could practice at home also on their own. Not only taking notes is necessary but De Carvalho et al. (2018 and 2019) observed that complementing them with online learning contents and materials can be even more beneficial for autonomous learning activities at home, also for elder people.

Considering the same target, Del Prete et al. (2011) found out that creating a positive environment is fundamental, when the intervention is provided to a group of participants. Indeed, high level of cooperation and mutual support among participants increase their desire to learn and their confidence in asking questions to the tutors in order to remove their doubts or fears, as well as correcting their mistakes. Moreover, the authors observed that memory and experience are fundamental for a beneficial learning of ICTs by older women; indeed *"this process of sharing and retrieving shared memories was essential to ensuring a relatively long-lasting motivation towards learning ICTs"* thanks to the trainers that allowed these women to debate and reflect several

times. De Carvalho et al. (2018 and 2019) add that providing spare and recreational time after and before the ICT classes can foster cohesion between the learners' group and increase the proficiency of their debates. Also, Kambouri et al. (2006) provided insights on *"collaborative working being useful for increasing confidence in using ICT"*; these findings are confirmed also by Hsiu et al. (2017).

Berger et al. (2012) refer to the strategies highlighted in this paragraph as non-formal education. Being non-formal education freer and more flexible in adapting to different needs, it can be more effective in increasing the digital skills of participants, especially when they are a disadvantaged category, such as women, elderly or migrants.

However, when the intervention is performed in groups some problems may arise. Kambouri et al. (2006) observed that *"when collaborative work was forced by the need to share technology it was not as successful as when tutors developed tasks that required peer interaction"*. Moreover, no changes in terms of digital skills and confidence were observed in the tutees when the tutor was adopting a lecture-like strategy (i.e., *"a one-way dialogue from the tutor to the students on 'how' to complete a task"*) or was using a specific software to explain the concepts without a practical demonstration. On the contrary, spending time in managing tutorship activities and incorporating learners' comments and observations inside the material taught (i.e., the *'extending'* strategy) demonstrate a positive correlation with an increase in ICT skills and confidence.

When the target is a disadvantaged group, facilitators should act trying to remove the barriers learners face during the interventions. At this regard, a fundamental strategy is to collect data through a survey to understand the training need of the different people involved in the facilitation activities (Nyce et al., 2013; Tomczyk et al., 2019; Schou et al., 2019). Once tutors have identified the main constraints users face, they can identify specific remedies.

#### 2.4.7.2. Facilitators Attitudes

Chang et al. (2012), Berger et al. (2012), Nyce et al. (2013) and Cid et al. (2020) highlighted that tutors' patience and perseverance, their slow pace during explanations, their humour and their friendliness were appreciated by adult and older targets. Moreover, dealing with an older target, Del Prete et al. (2011) stated that *"a great deal of support and positive encouragement was needed to reinforce the conviction that they could complete the task"*. These findings are confirmed also by Lam et al. (2006) and Nyce et al. (2013). Indeed, *"encouragement by others exerted influence on Internet self-efficacy and outcome expectations"* (Lam et al., 2006), and trainers had to continuously assure elder people that they were unlikely to break or damage the equipment, to encourage them proceeding and completing the task (Nyce et al., 2013).

### 2.4.7.3. Facilitation Outcomes

Even if the literature concerning the digital competences of facilitators is very scarce, there are several papers on positive social outcomes – i.e., concerning the third-level divide – that are linked to the role of eFacilitators.

Firstly, ChanLin et al. (2012) report a sense of achievement and rewarding given by the relationship created between the tutors and the tutees as well as by the positive feedback given to tutors by learners. Also, the authors observed that facilitators improved both in terms of patience and in terms of interactions with other people, especially older ones, thanks to the effects of intergenerational learning. Similarly, also Tomczyk et al. (2019) underline the importance and benefits of intergenerational learning.

Lastly, Meiners et al. (2004) highlighted the positive outcomes facilitation activities have on female facilitators in terms of gender digital divide and gender gap reduction. Female facilitators did not only increase their digital competences and confidence, but they were also able to self-finance their university courses by working in the ICT lab and being paid more, compared to their previous general working experience, usually characterized by gender pay gap.

### 2.4.8. Stakeholders' Networks

From the analysis of such policies aimed at developing digital competences, it is possible to notice the multiplicity of objectives, interventions and actors involved. In this regard, we argue that it is valuable to focus our attention on the stakeholders dimension of policy analysis, through the lens of '*collaborative policy networks*', and to map the actors involved in the policies presented in this section using Bullock et al. (2021) framework based on Dente's categories of stakeholders, introduced in paragraph 2.2.4.

In particular, the purpose of this analysis is two-fold:

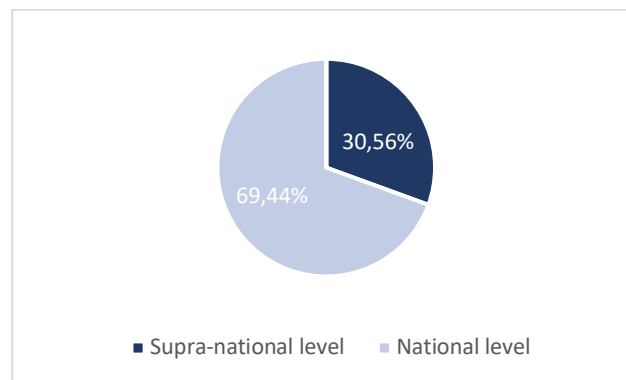
- Determine the roles and the network relationships of stakeholders in the implementation phase for policies aimed at bridging the second-level divide.
- Identify whether there are particular typologies of actors that do not find a clear correspondence in the categories mapped by Bullock et al. (2021).

As anticipated at the beginning of this Chapter, we consider the following definition of stakeholders, i.e., "*those who can affect or may be affected by a policy*" (Helbig et al., 2015). In the public policy realm, stakeholders can be either public entities, such as ministries or public agencies responsible for the implementation of the policy, or external to it, such as communities, individuals, and firms. Since we have already detailed the considerations for different categories of beneficiaries, for the purpose of this paragraph we will focus our attention just on organisational stakeholders.

### 2.4.8.1. Political Actors

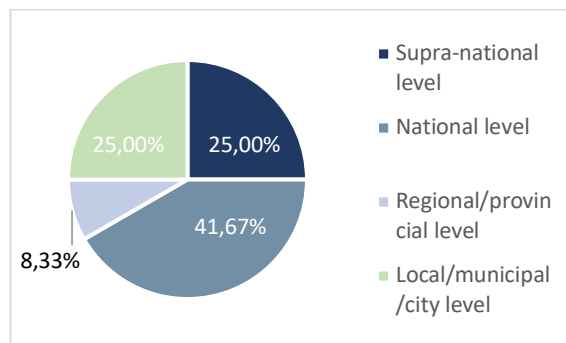
According to Bullock et al. (2021), the role of political actors should be to provide leadership and focus in guiding the policy towards the expected results, and funding the actors involved in the policy implementation. The papers analysed instead focus only on the second role.

Political actors offer more interesting insights, when looking at the geographical perspective of policies. Indeed, they can act at different levels: e.g., supra-national, national, regional/provincial, local/municipal/city. Graph 3 shows how policies described in papers are geographically spread.



Graph 3: Geographical Coverage of Policies

Even if all the policies analysed were at supra-national or at national level, the papers did not always highlight these levels; indeed, they usually focus on the implementation of such policies at the regional or local/municipal level (Graph 4). However, no information is reported about top-down or bottom-up information and communication flows among political actors, as well as about the translation of a supra-national or national policy objective into a more regional or local objective.



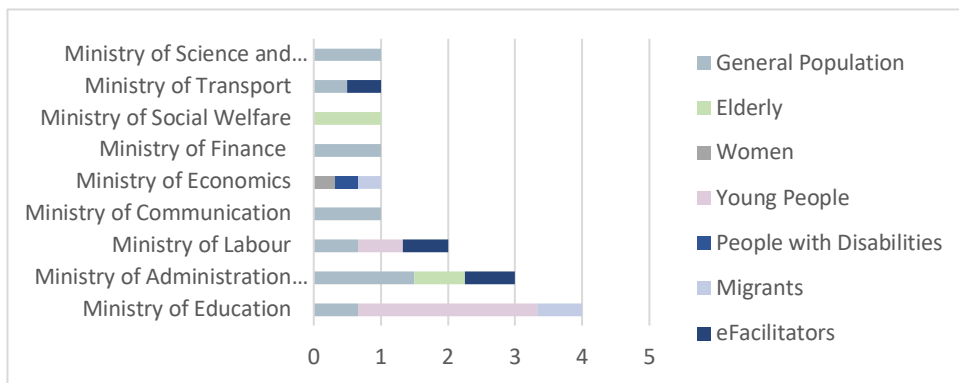
Graph 4: Geographical Level of the Policies Implemented

### 2.4.8.2. Bureaucratic Actors

This category of actors is mainly represented in Executive Departments and Board and Agencies of Government sub-types. According to Bullock et al. (2021), ministries are responsible of following policy implementation, mainly in providing crucial tasks to the other actors and coordinating them towards their right execution, and of providing funds to the organizations involved. Instead of providing funds, governmental agencies or boards act as regulators and give sanctions when laws are not respected.

Among the 36 policies analysed, only 12 cite one or more ministries involved in their implementation, mainly for providing funds with no other details on their roles.

Graph 5 highlights the ministries involved and their frequency, detailed by target. Clearly, each country has its own ministries with their names; therefore, ministries with similar names and roles in different countries were grouped under the same name.



Graph 5: Ministries involved in Digital Competences Policy Implementation by Target

Both in terms of topic and in terms of frequency, it is clear how the most important policy domains are Education, Public Administration and Digital Affairs, and Labour. None of the papers specifies what role is played by ministries, but we can see that some of the targets analysed are directly represented by a dedicated ministry (e.g., the young), while other categories (e.g., women, migrants) are not.

In general, the Ministry for Public Administration and Digital Affairs plays a key role, for example:

- Preparing the digital training courses contents and issuing ICT knowledge certification frameworks, such as the '*Standard for Digital Competences Requirements*' in the Digital Poland Operational Program described by Kowalska-Chrzanowska et al (2021).
- Setting up partnerships with the private sector and universities for the provision of devices and training – e.g., 143 INVILs' centres have created 282 partnerships with local firms and organizations (Lim et al., 2007).



As far as governmental agencies or boards are concerned, 11 policies mention these actors. Table 11 highlights the names and roles of the agencies that actively participated in 5 policy implementation cases for which the role is specified.

Agencies	Roles	Policy
British Educational Communications and Technology Agency (BECTA)	Delivery of connectivity and devices	Home Access Programme (HAP)
National Network Manager	Adjustment of educational and financial resources to local needs, and provision of materials on how to support mentors, recruit learners and understand their needs	Digital Literacy for All the Australians Strategy
National Development Council	Analysis of digital opportunities for policy implementation support	Digital Application Promotion Project in Remote Areas
Korea Agency for Digital Opportunity & Promotion (KADO)	Support planning and research for digital divide policies	Information Network Village (INVIL)
Stiftung Digitale Chancen	Development and evaluation of the digital literacy training courses	Internet Erfahren

Table 11: Main Agencies and their Roles in Policy Implementation

#### 2.4.8.3. Actors with Special Interests

Among the actors with special interest, we find *implementing agencies* and *street-level bureaucrats*, that act with a complementary role.

In fact, according to Bullock et al. (2021), implementing agencies are the organizations responsible for executing the laws or policies developed according to their interpretation, not only by adapting organisational policies and procedures, but also training and supporting the workforce, managing funds to support implementation, and monitoring the results at organisational level.

The implementing agencies involved in the policies analysed are of different types, e.g., NPOs, public and private enterprises, and perfectly reflect the activities identified by Bullock et al. (2021).

Lam et al. (2006), and Suchowerska et al. (2022) document all cases where NPOs were responsible of providing digital competences training to tutors. In particular, Lam et al. (2006) describe the importance of focus groups between NPOs and older adults to tailor the formation of trainers based on the target's needs.

Suchowerska et al. (2022), instead, report a case of failure by NPOs. If on one side the authors highlight that *“to implement a national digital inclusion strategy, it makes sense to*

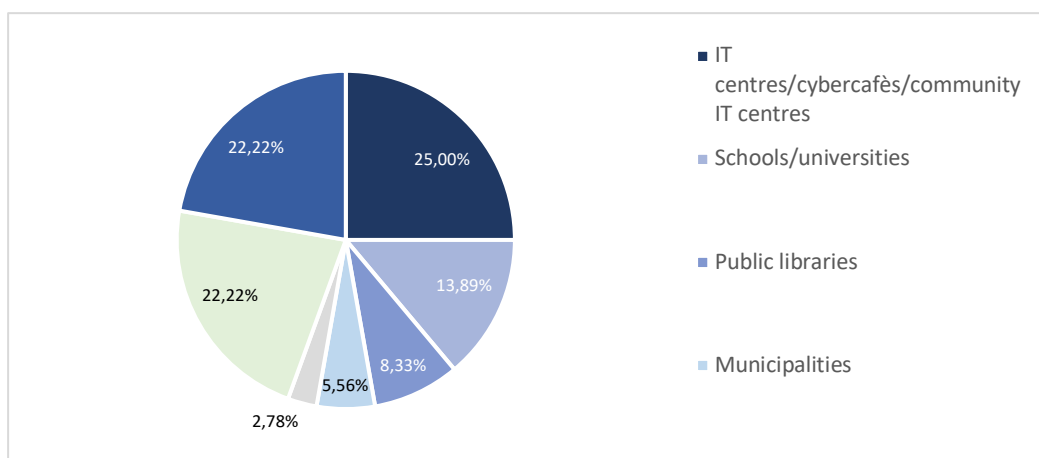
*work with community-based organizations and leverage their capacity to understand and address the particular barriers and drivers of digital participation for their members”, on the other side among the 3000 community-based organizations involved in the policy scheme in Australia, less than half accessed the training resources developed by the government to train the mentors.*

The main reason lies in the heterogeneity of NPOs’ structure and mission, that often did not match the material developed by government. For example, digital skills organizations want to develop comprehensive ICT knowledge; community welfare organizations want to increase social and economic participation in the digital world; lifestyle organizations want to create digital connections among people. In this sense, implementing agencies failed to optimise the management of funding and resources to support implementation and *“rather than taking on the administrative burden of adjusting the educational resources to meet the needs and interests of learners, many organizations reported looking for other content”*.

In other cases, NPOs had the role to organise digital education workshops – as in the case of *All Digital*, an organisation representing approximately 25,000 NPOs (Becker et al., 2019) – or help recruiting trainers (Hsiu et al., 2017).

Also street-level bureaucrats are crucial stakeholders, since they directly provide the intervention (i.e., benefits) to citizens. They can be both organizations and specific individuals who are in direct contact with the target of the policy. Considering only the 28 cases where organisational street-level bureaucrats were specified, it is possible to recognise some relationships between targets and chosen locations. The young and the elderly are more inclined to join community centres (6 cases), to socialise and interact with their peers. Then, for the two targets, there exist more tailored places: schools or universities for young people (4 cases) and long-term care facilities (i.e., hospitals) for elderly. For the other target groups, instead, there is no clear correlation.

Graph 6 illustrates.



Graph 6: Organizations involved as Street-level Bureaucrats

The eFacilitators working in the street-level bureaucrats' locations perform different activities:

- Teach to participants ICT skills during training programs or workshops (Meiners et al, 2004), (Lam et al., 2006), (Nyce et al., 2013), (Manžuch et al., 2022).
- Provide tutorship to those in need of help (Kambouri et al., 2006), (Abad, 2014), (Mirke et al., 2019).
- Organise local ICT training events (Becker et al., 2019).
- Work as study partners (ChanLin et al., 2012), (Hsiu et al., 2017).
- Manage community-centres (Lim et al., 2007), (Aires et al., 2018), Willis (2019).
- Offer support to elderly as caregivers (De Carvalho et al., 2018 and 2019) or hospital staff (Cid et al., 2020).

Finally, regarding the last two stakeholders with special interests, i.e., donors and government corporations, few information is available. Donors are responsible for providing devices to community centres or public libraries. Hsiu et al. (2017) describe the partnerships between Digital Opportunity Centers (DOCs) and various enterprises, to collect laptop computers in relatively good conditions to hold roving classes in nearby communities, while Nyce et al. (2013) report the key role played by the *Bill & Melinda Gates Foundation* in providing computers to Romanian libraries.

#### 2.4.8.4. Experts

Among the different subtypes of actors identified by Bullock et al. (2021), only two are present in the papers evaluated. They are namely *researchers*, who “*share or contribute research expertise concerning the problem, the innovation, the implementation or the evaluation of the implementation effort and any expected outcomes*”, having a potential influence on policymakers during feedback sessions, and *intermediaries and technical assistance providers* that are in charge of facilitating the implementation.

In our literature review, experts can be either individuals or research teams, carrying out several activities:

- Run workshops or consultations with other experts, university departments, or institutions, to understand the targets' needs and better implement the policy. For instance, De Carvalho et al. (2018 and 2019) highlighted how the *UISEL* policy was implemented together with the advice of 31 experts in senior learning to understand elderly needs and how they could be satisfied thanks to mobile technologies. Similarly, Becker et al. (2019) described the involvement of the employees of 25 institutions to tailor *All Digital Week* training courses.
- Train the tutors (Berger et al., 2012), (Cid et al., 2020).
- Prepare or administer surveys and conduct interviews or focus groups to understand policy impact (Lam et al., 2006), (Kambouri et al., 2006), (Jewitt et al., 2011), (Cid et al., 2020), (Lev-On et al., 2021).

#### 2.4.8.5. Media

In order for a policy to be successful, it must be well-communicated to its beneficiaries. Therefore, stakeholders should oversee the policy communication aspect, as well as of the engagement aspect, ensuring that the targets keep on using the service offered by the government. Moreover, according to Bullock et al. (2021), media stakeholders should also keep the engagement among all other stakeholders, by providing feedback loops regarding policy implementation.

Therefore, communication channels, citizens engagement and stakeholders' relationships among each other are critical success factors. However, the papers in our literature review rarely focus on these aspects: only for 5 policies the communication channels used are described (Table 12). Similarly, for all the policies, no information is given concerning citizen engagement and stakeholders' relationships.

Target	Communication Channels	Policy
Women	Signs across the campus and business cards to let students know that one-on-one help was available	Women's Studies Program
Elderly	Advertisements on free computer training placed in several local daily newspapers and announced on local radio stations	Opportunities for the Elderly
General Population	Creation of an INVIL brand and communication of it through public good campaigns on TV, online ads, off-line ads such as subway, newspaper, public information materials, and special products exhibition	Information Network Village (INVIL)
Disabled	Advertising by the German association of blind people	Internet Erfahren
Migrants	Advertising in local Russian newspapers	
Women	Posters in the workplace, in the bus and creation of information flyers	
Youths	Creation of a network of ambassadors (entrepreneurs, software developers, primary and secondary teachers, university researchers, and member of the Ministry of Education) to advertise the initiative	Europe Code Week

Table 12: Targets and Communication Channels

Since second-level divide policies target people digitally excluded, the choice of off-line communication channels is fundamental; (Lam et al., 2006) and (Lim et al., 2007) show how the advertisement that was made on newspapers, radio or television helped in reaching their users, especially in the case of the elderly and of the wider population.

Similarly, another critical success factor lies in the coherence between the policy target and the communication channel, as it happened in the cases of the usage of Russian newspaper to reach Russian migrants (Berger et al., 2012), or in the case of the network of ambassadors made by people linked to schools and work domains (Moreno-León et al., 2015).

In addition to formal communication channels, several programs make deliberate use of so-called *word-of-mouth*, e.g., *informal* communication through relatives and friends, who had gone through the policy program – as in the cases of *Internet Erfahren* (Berger et al., 2012) and of *Computer in Homes* (Assadi et al., 2014).

#### 2.4.9. Main Findings

Table 13 shows the main findings of our literature review concerning second-level divide policies, highlighting for each target, its barriers, the additional objectives emerged, the typology of intervention followed and the critical success factors.

Target	Beneficiaries	Objectives	Interventions	Critical Success Factors
<b>General Population</b>	<ul style="list-style-type: none"> <li>• Accessibility</li> <li>• Connectivity</li> <li>• Low interest</li> </ul>	<ul style="list-style-type: none"> <li>• Bridge territorial inequalities</li> <li>• Active citizenship</li> <li>• Promotion of education and schooling</li> <li>• Employability</li> </ul>	<ul style="list-style-type: none"> <li>• Training programs</li> <li>• Infrastructure provision- public domain</li> <li>• Governmental one-stop service offices</li> </ul>	<ul style="list-style-type: none"> <li>• Provision for free</li> <li>• Hot topics of everyday life covered by the training</li> </ul>
<b>Elderly</b>	<ul style="list-style-type: none"> <li>• Anxiety</li> <li>• Lack of technical skills</li> <li>• Physical difficulties</li> <li>• Cognitive difficulties</li> <li>• Fourth-level divide</li> <li>• Digital skills bubble</li> </ul>	<ul style="list-style-type: none"> <li>• Motivation and attitudes</li> <li>• Employability</li> <li>• Active citizenship</li> <li>• Socialisation</li> <li>• Intergenerational learning</li> </ul>	<ul style="list-style-type: none"> <li>• Training programs</li> <li>• Workshops</li> <li>• Creation of a customised hardware and software</li> </ul>	<ul style="list-style-type: none"> <li>• Support of the tutors</li> <li>• Basic training content</li> <li>• Long duration of the courses</li> <li>• Informal training environment</li> </ul>
<b>Women</b>	<ul style="list-style-type: none"> <li>• Lack of confidence</li> <li>• Accessibility</li> <li>• Low educational level</li> <li>• Culture and family life</li> <li>• Fewer learning opportunities</li> <li>• Work</li> </ul>	<ul style="list-style-type: none"> <li>• Employability</li> <li>• Motivation and attitudes</li> <li>• Reduce the gender pay gap</li> </ul>	<ul style="list-style-type: none"> <li>• Training programs</li> <li>• Workshops</li> <li>• Peer Tutoring</li> </ul>	<ul style="list-style-type: none"> <li>• Support of the tutors</li> <li>• Friendly environment – encouraging interactions among them</li> <li>• Financial incentives</li> </ul>
<b>Young People</b>	<ul style="list-style-type: none"> <li>• Accessibility</li> <li>• Connectivity</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of education and schooling</li> <li>• Socialisation</li> <li>• Employability</li> </ul>	<ul style="list-style-type: none"> <li>• Infrastructure provision – private domain</li> <li>• Infrastructure provision – public domain</li> <li>• Workshops</li> </ul>	<ul style="list-style-type: none"> <li>• Devices mobility</li> <li>• Support from computer literate families and friends</li> <li>• Having a digital study partner</li> </ul>
<b>People with Disabilities</b>	<ul style="list-style-type: none"> <li>• Disability</li> </ul>	<ul style="list-style-type: none"> <li>• Socialisation</li> </ul>	<ul style="list-style-type: none"> <li>• Training program</li> </ul>	<ul style="list-style-type: none"> <li>• Usage of tools tailored to the disability</li> <li>• Support of tutors with the same disability</li> </ul>
<b>Migrants</b>	<ul style="list-style-type: none"> <li>• Language</li> <li>• Accessibility</li> </ul>	<ul style="list-style-type: none"> <li>• Employability</li> </ul>	<ul style="list-style-type: none"> <li>• Infrastructure provision – private domain</li> <li>• Training program</li> </ul>	<ul style="list-style-type: none"> <li>• Training carried out in migrants' mother tongue</li> </ul>

Table 13: Main Findings detailed for Targets

Regarding eFacilitators, instead, the additional objective emerging is active citizenship, wanting to involve these figures more in the society, favouring their participation.

However, some open points still remain concerning women, people with disabilities, migrants and eFacilitators.

First, women are not well-represented by the policy literature; indeed, the policies mentioned result to be outdated and most of them are not active anymore. Moreover, interventions such as role modelling, women mentoring, and gender-sensitive entrepreneurship education and training programs, which became popular in recent years, are not widely discussed by scholars.

Second, in literature there are only few examples that represent policies specifically targeting people with disabilities and migrants, leading to the impossibility to look at more barriers, additional emerging objectives, and critical success factors of a second-level divide intervention.

Third, these papers did not study the effects of ICT training on eFacilitators and the reasons why they decided to work as such.

Lastly, for all the targets, the literature lacks long-term impact evaluation of the policies; indeed just few and short-term quantitative results on improvements of digital competences are highlighted.

Concerning instead paragraph 2.4.8, after mapping stakeholders in the respective categories of Bullock et al. (2021) framework, we identify coherence between the role in the implementation phase proposed by the authors and those derived from the second-level divide policies papers, when this kind of data was available. However, we can highlight two main limitations.

First, moving from words to facts, not always literature is exhaustive in clearly describing the policy networks. For instance, there are cases in which the relationship between the street-level bureaucrats where the intervention takes place and the targets attending it is not clear. The role of implementing agencies was overlooked in 28/36 (77.78%) policies, with only few information about the role of NPOs, private and public companies in policy implementation.

Moreover, even if 5/36 (13.89%) policies describe widely their communication channels and it is possible to relate them with the policy target, there is still limited evidence on it. To this, we must add the total lack of information concerning citizens' engagement with stakeholders and stakeholders' network in the papers analysed, meaning their relationships and their information and communication flows to keep their reciprocal engagement during the implementation of a second-level divide policy.

Second, as Bullock et al. (2021) claim, the list of actor sub-types proposed is non-exhaustive but derives from those that are frequently mentioned in the literature, and

therefore some categories of stakeholders identified from the papers do not perfectly coincide with the one proposed, – or are not covered at all.

To mention an example, the interventions analysed often include the provision of hardware and software, that can be standard or designed ad hoc for specific disadvantaged groups. For example, public and private enterprises often provide digital devices, as in the *Computer for Every Child Project* (Lev-On et al., 2021). Be Connected program also included a new online learning portal that hosted educational resources, as reported by Suchowerska et al. (2022). Another case is given by Berger et al. (2012), where Cisco Network Academy supplied learning platform and materials, and, at the end of the course participants were given the possibility to receive a certification for basic network technology skills through the Cisco program. Both service providers and certification authorities are not included in the framework.





## 3 Knowledge Gaps and Research Questions

In this Chapter we want to highlight the main knowledge gaps of the literature and formulate coherent research questions to answer them.

### 3.1. Knowledge gaps

After having examined the state of the art on Policy Analytics and on Digital Inequalities and having evaluated comparable policies aimed at bridging the second-level divide in high-income countries, this section elaborates on the main research gaps that emerged. In particular, it is structured along four main observations.

- I. Considering the section 2.4, we can derive that most of the papers examined, despite providing information of results obtained from the implementation of almost each policy, do not provide a measure of impact, that, according to Bengo et al. (2016), is a different concept with respect to the ones of 'output' and 'outcome'.

Impact is defined as '*positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended*'. (OECD-DAC 2010). Therefore, impact evaluation analysis is long-term oriented, aimed at evaluating policies effects on the lives of beneficiaries in a broader context, outside the policy time boundaries.

Contrarily, *output* corresponds to '*the products, capital goods and services which result from a development intervention*' (OECD-DAC 2010). It relates to the services offered by the organizations involved in the policy and is a collection of measures connected to them. (OECD-DAC, 2010)

*Outcome*, instead, focuses on '*the likely or achieved short-term and medium-term effects of an intervention's outputs*', therefore corresponds to the changes experienced by the targets immediately after having benefited of the service.

In the papers analysed, we noticed a number of limitations in this regard. First, the measures were quantitative only for 6/36 (16.67%) of the policies analysed and were carried out in a short-time span.

Second, variations in terms of digital skills and/or competences were measured only in 5 cases and in a short period with respect to the end of the training program, while more frequently the authors investigated complementary aspects, such as confidence, level of anxiety, usage patterns etc.

Third, the methodology followed for the measurements perfectly mirror problems identified by van Deursen et al. (2015), namely *incompleteness and oversimplification*, with a strong focus on technicalities of Internet use as opposed to a broad range of skills, *conceptual ambiguity* (e.g., skills questions put in par with Internet usage), and the use of *self-reports*, that easily lead to individuals overrating or underrating their level of skills. For example, in the paper from Kambouri et al. (2006), people tended to significantly self-overestimate their digital competences before training.

Hence, the first gap concerns the lack of well-defined and unambiguous quantitative impact evaluation of the policies discussed.

- II. The second observation is focused on stakeholders. As analysed in paragraph 2.2.3, stakeholders have high relevance in the policy cycle, especially for the definition of the objectives. Moreover, one of the most diffused instruments in Policy Analytics is Social Network Analysis, used to analyse the social links derived from social interactions among individuals and/or organizations, their formation, their evolution and their impact (Ghaffar et al., 2018).

This important dimension seems to be overlooked by the majority of authors of the policies analysed in section 2.4, since there is a lack of focus on policy network description, stakeholders mapping and evaluation of their roles. It emerged clearly the role of bureaucratic actors (i.e., ministries and governmental agencies) and of street-level bureaucrats in the implementation phase of policy cycle. Contrarily, few information is given concerning implementing agencies and experts. Indeed, the key role of implementing agencies was overlooked in 28/36 (77.78%) policies, with only few data on the role of NPOs, private and public companies in policy implementation. Similarly, the role of experts seems limited to support and to carry out research on the target to better tailor the implementation, without deep diving into their specific expertise competences they can apport to the intervention. Moreover, there is still limited evidence on communication channels and a total lack of information concerning citizens' engagement with stakeholders and stakeholders' network in the papers analysed.

As a consequence of the lack of stakeholders mapping activities, the papers do not highlight any collaborative policy network, increasing the difficulty in better understanding actors' roles and relationships.

Focusing now on Policy Analytics and in particular on the Social Network Analysis, a second consideration is that while it is clear the meaning and the value of this instrument, there is no standardised procedure that guides its implementation. While Bullock et al. (2021) emerges as a first attempt to provide a more analytical, operative, and comprehensive categorisation of stakeholders involved in the implementation phase, the list of actor sub-types proposed is non-exhaustive and therefore new categories of stakeholders are required.

On the other side, Dell'Ovo et al. (2020) framework maps different set of actors' interactions based on a readaptation of the Arnstein's Scale. While they clearly represent the level of engagement and participation of actors in the different stages of the policy cycle, they have (voluntarily) a high level of abstraction and are not informative to map other typologies of relations, such as information and resources exchanges.

Therefore, since dealing with stakeholders at operational level is a complex task, more guidance in this perspective is missing in literature.

- III. The third and last gap reflects the distance between the policy formulation phase and its implementation. Indeed, for each target presented in the paragraphs of section 2.4, we identified a cluster of explicit objectives, mainly increasing its digital competences coherently with the scope of this work, and a cluster of additional objectives, which were collateral to the explicit objectives.

While in a traditional view of policymaking (i.e., Evidence-Based Policy-Making), policy formulation is data driven, rather, from the Policy Analytics viewpoint there are both data- and value-driven objectives. Stakeholders are usually more grounded in the community than policymakers, knowing better its issues and needs. Therefore, acting as implementing agencies, they can tailor the policy implementation towards achieving not only explicit objectives, but also additional ones defined by them coherently with their values and the needs of the specific territory in which they operate.

However, as evinced with the literature review, there is no information concerning:

- If and how the additional objectives derived from the values and the priorities of stakeholders
- Which top-down and/or bottom-up information and communication flows with political actors were present, as well as how supra-national or national policy objective were translated into a more regional or local objective.
- How stakeholders structure the intervention and act to achieve the additional objectives defined, without risking losing the focus on collective objectives achievement.

In conclusion, the main research gaps, emerged from the review, concern: (1) The lack of well-defined and unambiguous quantitative impact evaluation of the policies discussed; (2) The lack of or incomplete presence of frameworks and/or procedures that help to operationalise stakeholder analysis in the implementation phase of the policy cycle; (3) How the distance between the policy formulation phase and its implementation can be affected by stakeholders' priorities and characteristics.

## 3.2. Research Questions

This section aims at detailing each research gap into specific research questions and therefore to clarify the objectives of our work.

The first knowledge gap – the lack of well-defined and unambiguous quantitative impact evaluation – due to time constraint cannot be responded using the Digital Civilian Service case, as impact quantification can only be analysed in the long-term.

The second knowledge gap instead consists in a lack of focus on the stakeholders' dimension, which can be derived from the absence of policy network description in the cases analysed. In this sense, we want to provide a detailed mapping of the main actors involved in the Digital Civilian Service case and evaluate if they differ or if there are additional categories involved with respect to what emerges from the literature review. Therefore, the first research question is:

*RQ1: How is a real collaborative policy network composed?*

Research question 1 enables a comprehensive analysis of the stakeholders involved in a second-level digital divide policy and thus can lead us to enrich the Bullock et al. (2021) framework with additional subtypes of actors that have a role during the policy implementation phase.

In addition to mapping and classifying the main actors, we carry out also a Social Network Analysis (SNA) on the Italian Digital Civilian Service policy to provide to policymakers some considerations about the characteristics of the network in terms of density, distance, and centrality.

This allows also to respond to the knowledge gap in terms of the necessity of frameworks and/or procedures that can guide the operationalisation of stakeholder analysis in the implementation phase of the policy cycle. In fact, we propose a methodology to:

- Define the typologies of data required to perform the analysis.
- Define a possible standard procedure to classify stakeholders and their relationships into generalisable categories.
- Determine a method to weight actors and relationships replicable in different contexts.

- State which are the main assumptions we have done to model our policy network.

This allows to evaluate formal information and resources flows among the actors and to provide suggestions on possible improvements, which are fundamental factors for a good collaboration inside the policy network.

Moreover, the related research questions emerge to inform policymakers about both the most influential actors, that are granted the highest power since they manage many resources and relationships, and the most peripheral ones:

RQ1a: *Which nodes are central, and which are peripheral?*

RQ1b: *How do they relate with the other actors in the network?*

The last knowledge gap was focused on how stakeholders' characteristics and priorities impact the policy implementation.

Therefore, the following research question emerges:

RQ2: *Which values stakeholders bring in a policy network?*

We know that value is a broad concept and is the essence of policymaking. According to De Marchi et al. (2014) values "*induce preferences, priorities, judgements and justify actions*" and they can have several different origins, namely "*ideology, culture, religion, beliefs, knowledge, discussion*" to mention some examples.

In this thesis, it is not available a complete and unambiguous measure of the stakeholders' set of values since, first, they are difficult to observe, and second, the information that can be extracted from the programs and project forms have different levels of detail. Therefore, when we mention value, we are aware that we are using improperly this term to address organizations' priorities, judgments, and knowledge.

While one way to deduce and qualify values can be to examine the mission, the history and ex-ante profile of stakeholders, this process is time-consuming and could lead to not coherent results due to heterogeneous typologies of information disclosed. Moreover, the previous attitudes and intervention decisions adopted in other contexts such as the Universal Civilian Service may be not representative of the line of action and approach that they are prone to implement in this different digital inclusion policy setting.

The methodology followed in our work is instead to map the priorities based on the institutions' proposal design and implementation specifically delineated for the Digital Civilian Service, based on the information collected from decisions taken in this context. To give a reference, the dimensions over which organizations acted were multiple and evidence strategic choices that reflect their characteristics, expertise, and beliefs in terms of what is more effective, and they are namely:

- Targets and beneficiaries on which to customise the intervention.
- Geographical area of influence.
- Competences that could be acquired from the initiatives.

In this sense, we want to detail the previous question in the following:

RQ2a: *How is the network structure modified by the choice of the target?*

RQ2b: *How is the network structure modified by the choice of the geographical dimension of implementation?*

RQ2c: *How is the network structure modified by the choice of digital competences areas?*

A last consideration can be made starting from the additional objectives that the SCU organisation have explicitly mentioned in the project forms. As already discussed, digital inclusion policies are in fact intrinsically location-based and need to be contextualised and linked to the digital inclusion setting. Therefore, only stakeholders with ground experience of the local context and communities where they operate have clear insights on how to maximise the effectiveness of their intervention.

Since from the Policy Analytics viewpoint objectives are both data- and value-driven, we want to focus our attention on the following last point:

RQ2d: *Which are other objectives indicated by the SCU organizations? How influential are the actors that suggested them in the network?*

Since the approach used in the Digital Civilian Service is not totally top down and defined a priori, but voluntarily allows organizations to adopt a certain degree of freedom in the implementation phase, we want to evaluate how the additional objectives resulting from the stakeholders emerge and evolve over time as a result of the context where they operate and of the selected target of intervention.

Finally, we think it is important to link the number of additional objectives that emerged to the absolute number and level of influence that the actors they derive from have in the network. This is fundamental to be monitored by policymakers, since the higher the importance of such actors in the network, the higher the risk of deviation from the objective of increasing digital competences is.

## 4 Data and Methodology

### 4.1. Data

Two main sources have been used to collect data necessary for analyses carried out to answer the before mentioned research questions.

- Universal Civilian Service Register that encompasses all the data of SCU organizations, their operative sites and host sites and the related number. This was used to map the actors involved in the implementation at operative level.
- Program and Projects forms submitted by the SCU organisation to the Pilot and PNRR Digital Civilian Service policy calls and their updated version published on each institutions' website. At program and project level, they describe the main characteristics of the interventions that were designed to bridge the second level divide.

For each project presented, the information provided was structured in the dimensions and subdimensions listed in Table 14.

In particular, among the categories listed, we focused our attention on those transversal dimensions that detailed the stakeholders and that were most representative of the priorities of the proponent SCU organizations – beneficiaries, geographical area of influence and acquirable digital competence areas.

- I. The first is to extract from the forms and map of the stakeholders that operate at project and program level, that are grouped in SCU Organizations, Beneficiaries, Project Partners and/or Program Partners, Host Sites, Training Sites, Certification Authorities, and Tutorship Authorities.
- II. To be more specific, seven main categories of beneficiaries emerged: Elderly, People with Disabilities, Women, Young People, Migrants, Adults, and eFacilitators.
- III. Then we detailed the geographical area of influence, which was generally present at program level. It was divided into four main levels of aggregation: Municipality, Single province, Regional Area encompassing Multiple Provinces, and Interregional.
- IV. Finally, we considered the five digital competence areas of the DigComp 2.2: Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Safety, and Problem Solving.

Dimension	Subdimensions
<b>Basic Registry</b>	<ul style="list-style-type: none"> <li>• Code and denomination of the program proponent institution</li> <li>• Code and denomination of the project proponent institution</li> <li>• Program title</li> <li>• Project title</li> <li>• Number of volunteers involved</li> </ul>
<b>Additional data</b>	<ul style="list-style-type: none"> <li>• Co-programming and co-projecting</li> <li>• Sector and area of intervention of the project</li> <li>• Number of sites</li> </ul>
<b>Project characteristics</b>	<ul style="list-style-type: none"> <li>• Context description: DESI data, local digital context description, socio-economic data, other local context data</li> <li>• Beneficiaries: number and main categories</li> <li>• Objective description: Agenda 2030, general and specific objectives and related performance indicators</li> <li>• Main activities: typologies of intervention (digital facilitation, digital education), presence of data collection</li> <li>• Human resources (OLP involved)</li> <li>• Technical resources (Internet connection, number of seats, number of pc workstations, software availability, spaces and meeting rooms, audio-video system)</li> </ul>
<b>Acquirable Digital Competence Areas (DigComp 2.2)</b>	<ul style="list-style-type: none"> <li>• Information and data literacy skills</li> <li>• Communication and collaboration skills</li> <li>• Digital content creation skills</li> <li>• Safety skills</li> <li>• Problem solving skills</li> <li>• Other frameworks for competences certification</li> </ul>
<b>Training</b>	<ul style="list-style-type: none"> <li>• General information: number of hours and number of trainers</li> <li>• Training modules (digital facilitation, digital education, digital competence areas)</li> </ul>
<b>Additional measures for young people</b>	<ul style="list-style-type: none"> <li>• Additional targets as eFacilitators: young people with fewer opportunities, with disabilities, with low schooling, with economic difficulties, care leavers, young people with fragilities</li> <li>• Tutoring: duration, number of hours</li> </ul>

Table 14: Summary Structure of Data Collection

## 4.2. Methodology

In this section we present the methodology that we have followed and the assumptions that we made to structure the Social Network Analysis for the Digital Civilian Service case.

In particular, we structure the empirical discussion to answer the evidenced research questions based on the Policy Analytics concept and its four main aspects:

- *Process-based Vision*: this pillar focuses on the contribution that Policy Analytics gives in the different phases of the policy cycle, and the most relevant framework concerning this side is Tsoukias et al. (2013) in paragraph 2.2.3. In the Digital Civilian Service case, at the beginning of the period of our work



(April 2022) the policy was already in its testing and finalisation phases and is currently in the implementation one. Therefore, less can be said on the initial stages of the policy cycle, but we can reason anyway on the advantages that Policy Analytics can bring, especially considering this particular innovative context characterised by high entropy and variability. This element will be analysed transversally in our work and will emerge in the discussion.

- *Stakeholders' Role*: since we have derived the importance of stakeholders in the different phases of the policy cycle according to Policy Analytics approach, and we have evidenced a knowledge gap around this area in literature presenting second-level divide policies, we particularly focus on their role. First, we analyse the main actors that are involved, structured around three hierarchical levels, and we describe the main roles that they accomplish in the policy implementation phase. The objective is, also considering the food for thought obtained from the papers about second-level divide policies, to enrich the Bullock et al. (2021) framework with new categories that better match the actors involved in a real context setting.
- *Stakeholders' Relationships*: as represented by the 'Normative Transparency' requirement of Meinard et al. (2021), a Policy Analytics exercise should consider the interactions of different actors involved and their relationship with the decision-makers. This aspect is relevant also considering the Collaborative Policy Networks theory, since most of the members are equally interconnected, increasing their cooperation to achieve a collective goal (deLeon et al., 2009). Then, we defined the main formal stakeholders' relationships related to the circulation of resources, services, and data, that will be used as labels for the edges in the Social Network Analysis and as a basis for the edges weighting system. In this regard, the choices around such weights of edges are not only operative and contextual to this specific setting but are accomplished in order to be value-driven and to make the procedure generalisable.
- *Stakeholders' Values*: this pillar is highly relevant since, according to Tsoukias et al. (2013), Policy Analytics is characterised by a "constructive approach as surfacing, modelling and understanding the opinions, values and judgments of the range of relevant stakeholders".

In the literature review it emerged since, for each target presented in the paragraphs of section 2.4, we detailed a cluster of additional objectives, which were collateral to the explicit high level ones. In the same way, in the Digital Civilian Service case we want to provide a classification of those that are indicated as additional objectives by the SCU organizations and detail them on the basis of the typology of beneficiaries indicated. These considerations are informative as they enable to understand which are the stakeholders' priorities and would allow policymakers to better manage the implementation phase.

### 4.2.1. Modelling the Digital Civilian Service Policy Network

To run our Social Network Analysis (SNA), whose results are presented in Chapter 5, we must first clarify who the stakeholders of the Digital Civilian Service policy are, which kind of relationships they may have while interacting among each other, and which are the main assumptions we have done to model our policy network.

#### 4.2.1.1. Stakeholders

In this paragraph, the main stakeholders of the policy and their roles will be presented.

They are organisational stakeholders distributed on three hierarchical levels:

- Policy authorities level.
- Program level: SCU organizations.
- Project level: implementation sites and training sites.

There are also additional actors such as related partners of SCU organizations, certification authorities, and tutorship authorities, which can be found both at program and project level, depending on the strategic choices that the institutions made case by case.

Starting from the first hierarchical level, we find the two governmental ministries co-owning the policy: the Digital Transformation Department (DTD) and the Department for Youths Policies and Universal Civilian Service (DPG). The DPG financed the programs, presented by SCU organizations, with public funds if belonging to the pilot call of the policy, and with PNRR funds if belonging to its second call.

Moreover, the DPG is in direct contact with Digital Agenda Observatory of Milan Polytechnic university centre, in charge of supporting SCU organizations during their Capacity Building phase on digital topics and of monitoring the impact of the policy. The ministry is in direct contact also with the national public training agency Formez PA for the pilot call of the policy, in charge of providing general training to SCU organizations and of managing the platform collecting all the data from these organizations to let Milan Polytechnic run the impact evaluation. For the PNRR round of the policy Formez PA is substituted by Intellera, which has the same role but works with DTD instead of DPG.

The second hierarchical level, instead, starts with SCU organizations. These organizations designed programs (i.e., collections of two or more projects) standalone or together (i.e., co-programming: each organisation responsible of at least one project of the program). Therefore, this second hierarchical layer is the program level.

Here, there are also other actors involved, called '*Program actors*', since they are partners at program level, providing useful resources or services to the organizations

leading the program and all their sites. Moreover, linked to them, we usually have a certification authority, certifying the digital competences obtained by volunteers taking part in the initiative, and a tutorship authority with the aim of orienting eFacilitators towards the job market, after their volunteering period is ended. There could also be cases where they are not present, or it is directly the SCU organisation that provides a certificate that testifies the digital competences areas developed and/or tutorship to its volunteers.

The third and last hierarchical level is the project level, that is instead represented by SCU organizations sites where the project actually takes place (i.e., *'operative sites'* or *'host sites'* depending on whether or not they belong to the programming SCU organisation or to other entities available to implement its project) and by all the training sites where facilitators are trained to provide their interventions to citizens in the right way. Sometimes they may overlap. Moreover, the same declension of sites may also be present for other organizations involved in the same project through a co-projection activity.

Here, there are also partners, who provide useful resources or services, and can be specific for one site or common to all the sites of the project. Lastly, it is possible sometimes that certification and tutorship activities are not directly associated to the SCU organisation itself in the second hierarchical level, but they are instead associated to the single sites of the organisation, with different sites dealing with different certification and tutorship authorities.

Figure 6 highlights an exemplificatory configuration considering both the cases of co-programming and co-projecting. In particular:

- *'SCU Organisation 1'* is co-programming with *'SCU Organisation 2'*
- To make clear the graphical representation, we focus on only one project within the program, proposed by *'SCU Organisation 1'*, even if a program by definition is composed at least by two projects.
- This project is carried out by the *'SCU Organisation 1'*, together with the *'Co-projecting SCU Organisation'*. Therefore, the training of the volunteers and the implementation of the intervention will happen respectively in the training and operative sites of both entities.
- To simplify, we assume in this case certification and tutorship activities to be provided at central level by a third party. Therefore, they are connected both to *'SCU Organisation 1'* and *'SCU Organisation 2'*;
- The typologies of relationships among actors are not represented since they will be highlighted in detail in the next paragraph.

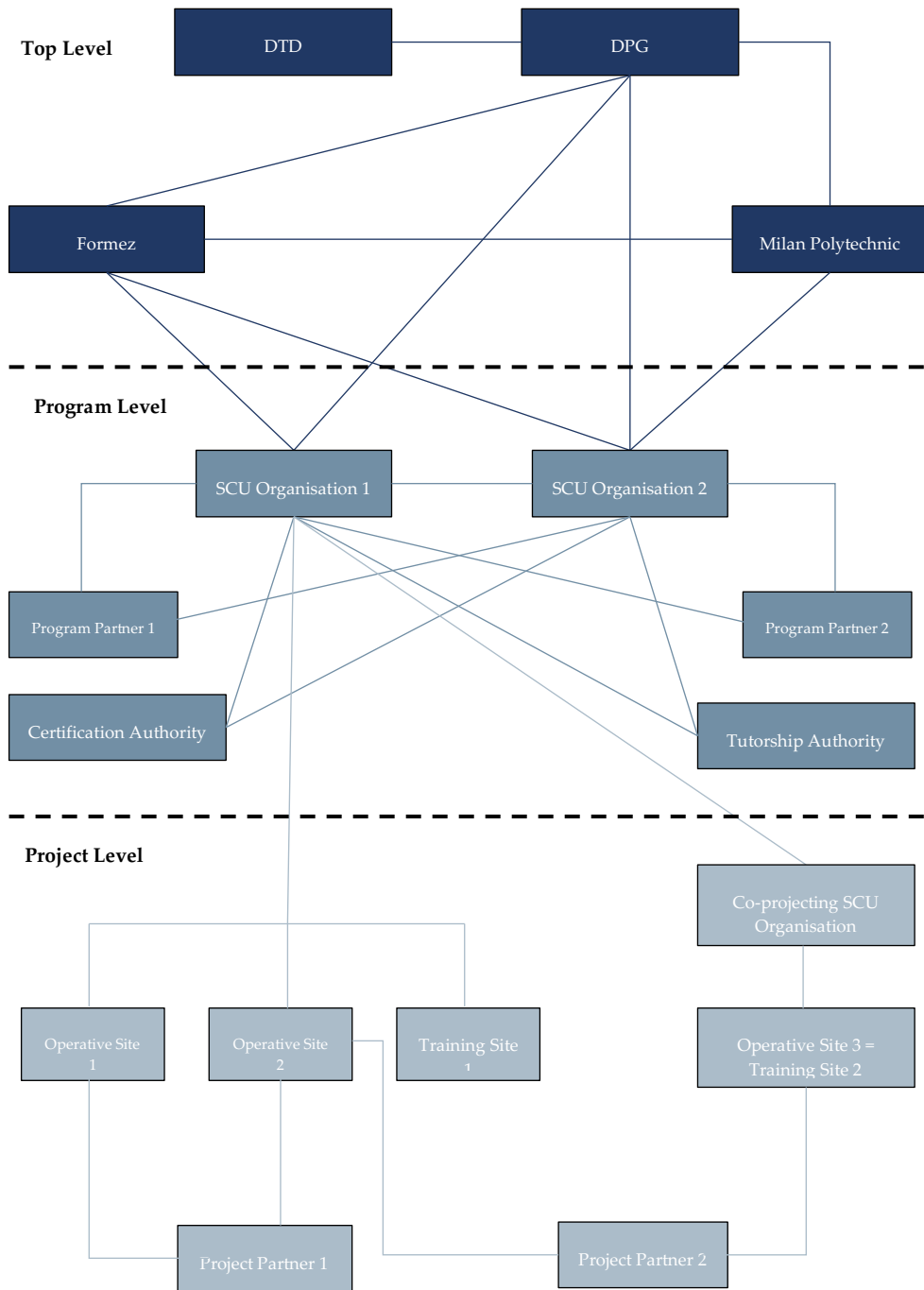


Figure 6: Exemplificatory Network Configuration

#### 4.2.1.2. Stakeholders Relationships

For our Social Network Analysis, we have considered only the formal relationships among the actors, for which we have data available in the project and program documentation. Therefore, we can only investigate the circulation of resources, services, and data.

In this regard, we have defined different types of relationships for different hierarchical levels.

In the first category, that links the central actors to the program level, we have:

- *Co-ownership*: assumption and sharing of responsibilities for the policy and its results.
- *Funding*: provision of funds to organizations for the implementation phase.
- *Operative Support*: practical assistance in carrying out the policy activities.
- *Data Provision*: provision of relevant data to carry out the activities.
- *Data Analysis*: evaluation of policy data for impact quantification.
- *Platform Provision*: availability of a platform for data collection.
- *General Training*: training of facilitators on civilian service topics.

With these relationships, the top-level can be represented as in Figure 7.

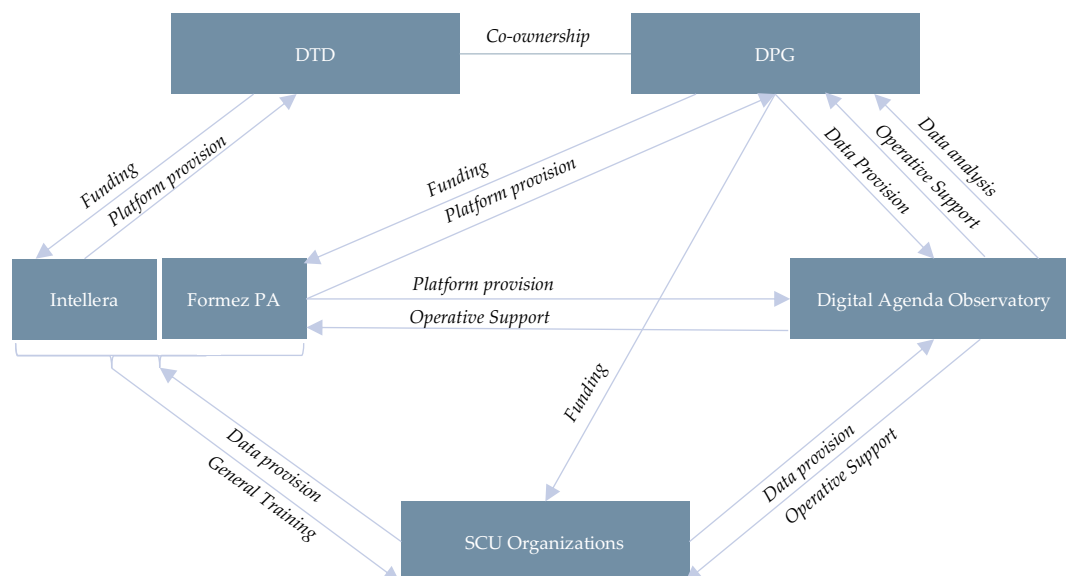


Figure 7: Top Level Actors Relationships

Contrarily, it is more difficult to represent all the relationships among the stakeholders at program and project level, since for program and project partners we identified many possible linkages, depending on the case analysed.

A list of the relationships at program and project levels is presented below.

In particular, the linkages are not divided between program and project level, since:

- Certification and tutorship authorities may be at project level instead that at program level.

- There could be an overlap between partners at program level and partners at project level since they establish the same kinds of relationships.
- There could be an overlap between the role of partners at program and project level with the activities carried out by certification and tutorship authorities.

Excluding the typologies of relationships that SCU organizations could have with program and project partners, in the second category we have the relationships established between SCU organizations and the other entities involved in the policy network:

- *Co-programming*: relationship between two or more SCU organizations jointly presenting a program.
- *Co-projecting*: relationship between the project proponent SCU organisation and one or more organizations that make available their respective implementation sites to receive eFacilitators.
- *Operative site*: relationship between the central site of a SCU organisation and its local level subsidiaries that receive the eFacilitators to accomplish the operative activities in their sites.
- *Host site*: relationship between the central site of a SCU organisation and the site of another organisation (not necessarily present in the SCU register) available for implementing the project/program.
- *General Training site* and *Specific Training site*: relationship between a SCU organisation and its training sites, where facilitators follow training interventions to develop their digital, facilitation and education skills and deliver a proper service to citizens in need.
- *Certification*: relationship between a SCU organisation (or a specific site) and a certification authority, certifying the achievement of digital competences by facilitators.
- *Tutorship*: relationship between a SCU organisation (or a specific site) and a tutorship authority, helping facilitators orienting in the job market during and after their volunteering period.

Table 15 instead shows all the possible linkages between partners and Universal Civilian Service organizations, clustered in six categories. To them, certification and tutorship relationships must be added if they are provided by partners, rather than by specific authorities or the SCU organisation itself.

Clusters	Relationships
<b>ICT Services</b>	Provision of ICTs or ICTs equipped spaces (informatised spaces, tablets, PCs, etc.)
	Provision of software (open-source software, platforms, apps, etc.)
	Provision of human resources expert in digital competences
	Maintenance and technical assistance in case of ICT related problems
<b>ICT-related Training</b>	Training on digital competences (i.e., training on ICT topics not stated in the modules of the project)
	Specific training (i.e., training modules of the project carried out by the partner)
<b>Not ICT-related Training</b>	Recognition of the service by universities as working stage for volunteers' study curricula
	Training on project management topics
	Training on graphic and communication topics
	Training on facilitation topics (i.e., how to intervein with a particular fragile target)
<b>Managerial Services</b>	Planning and organisation of the activities
	Management and administration activities
	Monitoring of implementation performance
	Provision of human resources experts in organisational coordination
<b>Implementation Activities</b>	Mapping targets' needs
	Educational activities to the target (i.e., training meetings concerning a digital topic for the target)
	Support to the target
	Provision of human resources experts in facilitation aspects
<b>Certification</b>	Certification of the achievement of digital competences by facilitators
<b>Tutorship</b>	Orienting in the job market during and after their volunteering period
<b>Other not ICT-specialist Services</b>	Provision of generic spaces not ICT equipped, to carry out the intervention or divulgation activities
	Provision of consumable materials (pens, books, etc.)
	Consultancy for facilitators
	Psychological support
	Communication of the project to the target
	Provision of human resources experts in graphic and communication

Table 15: Partners Relationships with Universal Civil Service Organizations

In particular, we have divided training activities and services since training activities are provided to enhance the competences of eFacilitators and local projects operators, while services are meant for the implementation beneficiaries.

For what concerns services, we further detail the activities for which information is available, obtaining ICT services, managerial services, implementation activities, certification, and tutorship, and we group all the remaining in other not ICT-specialist services, as they constitute collateral activities with respect to the policy objective.

#### 4.2.1.3. Assumptions

To model our Social Network, we do the following assumptions.

First, we decide to map only the formal relationships (i.e., the relationships agreed in formal signed contracts among the actors involved). The following exemplifying cases instead are excluded:

- Informal agreement with local schools and churches to distribute flyers concerning their projects
- Opportunity for volunteers to see their volunteering period recognised as working stage by universities; being this only a potential opportunity, this relationship was not mapped too.

The reason why informal and/or potential relationships were not mapped is because information such as communication channels were not required in the forms and therefore a disclosure on this side was at complete discretion of the institutions, leading to a different level of detail.

Second, we adopt an undirect network. This choice was taken because, at program and project levels, only the relationships from certification authorities, tutorship authorities, and partners to SCU organizations and/or their sites were specified, while the opposite flow was never mentioned. Therefore, this was the more prudent decision to avoid obtaining biased conclusions.

Third, only organisational stakeholders were mapped, thus the relationship between organizations and facilitators and targets was not directly considered.

Fourth, we use a weighted policy network to reflect the amount of resources handled. In particular, we assign weights to nodes and arches as follows.

For the nodes, the weight is proportional to the human capital involved on the Digital Civilian Service and is also based on the relevance of the activities and the contribution offered to the rest of the network. The weight of a node is calculated as the sum of the weights given to all the actions carried out during pilot/PNRR call or both if belonging to both the cycles.



The nodes were weighted as:

1. Programming/Projecting nodes: weight equal to the number of volunteers managed by the SCU organisation.
  - ◆ In case of co-programming/co-projecting, every co-programming entity is associated a weight equal to its volunteers.
2. Operative/Host nodes: weight equal to the number of volunteers received in each operative/host site.
3. Training sites: weight equal to 1.
  - ◆ In case of overlap between operative/host sites and training sites, a +1 was added to the weight already assigned to that operative/host site.
4. Partners: number of entrant links (weight equal to 1 if partners of just one SCU organisation; otherwise, weight equal to the number of SCU organizations they collaborate with).
5. Certification and Tutorship authorities: weight equal to 1 for each entrant link.
  - ◆ In case they overlap, weight equal to 2.
6. Nodes common to more programs of different SCU organizations: weight equal to the sum of the contributions the nodes give in all the programs they are involved.
7. Central actors: weight according to the number of resources permanently employed for the Digital Civilian Service case, respectively:
  - ◆ DPG: 6
  - ◆ DTD: 5
  - ◆ Digital Agenda Observatory of Milan Polytechnic: 4
  - ◆ Formez PA / Intellera: 3

For the relationships (links/arches), instead, the weight represents the intensity of the formal relationships between the nodes the link is connecting. The relationships were weighted as:

1. Co-programming: ratio between the total number of volunteers on the program and the number of co-programming SCU organizations.
2. Co-projecting: ratio between the total number of volunteers on the project of the main SCU organisation and the number of volunteers of the co-projecting SCU organisation.
3. Program partnership: number of operative/host sites of the program.
  - ◆ In case of co-programming, the program partners are connected to all the co-programming actors and their relationships will weight differently depending on the number of operative/host site of each SCU organisation involved.
4. Operativity/Host: weight equal to the number of volunteers associated to that operative/host site.

- ◆ If the number of volunteers per site is not specified, an average is taken in consideration.
- 5. Training: weight equal to the number of volunteers trained in that site.
  - ◆ If the number of volunteers per site is not specified, an average is taken in consideration.
- 6. Project partnership: weight equal to 1 if the partner is specific for a certain operative/host site; weight equal to the number of sites and a direct relationship with the SCU organisation if it is a partner for all the sites of that SCU organisation.
  - ◆ Project partners that are also program partners are considered as program partners only.
- 7. Certification: weight equal to 1 if the certification authority is specific for a certain operative/host site; weight equal to the number of sites and a direct relationship with the SCU organisation if it is the certification authority of all the sites of that SCU organisation.
- 8. Tutorship: weight equal to 1 if the tutorship authority is specific for a certain operative/host site; weight equal to the number of sites and a direct relationship with the SCU organisation if it is the tutorship authority of all the sites of that SCU organisation.
- 9. Concerning the central actors:
  - ◆ Relationships that imply a contractual agreement: weight equal to 10 to maintain the proportion in terms of resources involved for a national agreement with respect to the low-level partners agreements. This weight is used for the relationships between DPG and Formez PA, DTD and Intellera, Formez PA and Digital Agenda Observatory of Milan Polytechnic, and Intellera and Digital Agenda Observatory of Milan Polytechnic in order to map the platform provision service and related funding.  
It is also used to link DPG and Digital Agenda Observatory of Milan Polytechnic for data provision, data analysis and operative support.
  - ◆ Co-ownership: weight equal to 10 as it is counted as an agreement and since here the focus is just on the implementation phase.
  - ◆ Resource management and funding between DPG and SCU organizations: weight corresponding to the number of volunteers managed by each institution.
  - ◆ Operative support and monitoring: weight equal to 1 for each SCU organisation in each call. This relationship is established between Digital Agenda Observatory of Milan Polytechnic and SCU organizations
  - ◆ General training: weight equal to 1 for each SCU organisation in each call. This relationship is established between Formez PA / Intellera and SCU organizations

The fifth and last assumption is the introduction of a labelling system based on Boolean variables for each program, to perform analyses on the Social Network based on filtering operations. In particular, we used the following:

- *Geographic Dimension*: inter-regional, regional on more provinces, single province or metropolitan city and municipality.
- *Target Dimension*: eFacilitators, elderly, women, youths, disabled, migrants, and adults.
- *Digital Competences Dimension*: assuming a correspondence between training modules for eFacilitators and digital competences the population is interested to develop, we will consider the modules of specific training taught, which is variable depending on each program.

#### 4.2.2. Social Network Analysis Measures

As already highlighted in paragraph 2.2.4, the Digital Civilian Service can be considered as a '*collaborative policy networks*' according to deLeon et al. (2009) definition, since the actors involved must collaborate to reach a common objective, by establishing various relationships among each other.

Therefore, we analyse it through the Social Network Analysis tool:

- To understand how the Digital Civilian Service network is structured and what are its characteristics.
- To quantify the social importance of different actor in the network and the strengths and typologies of relationships among the different agents.
- To identify '*value regions*' inside the network and how they modify the network structure.
- To inform policymakers about potential problems in the network looking at its topology.

Once the Social Network (SN) of stakeholders involved has been mapped according to the described methodology, by modelling networks as nodes (i.e., the social agents) connected with links (i.e., the relationships among them), we structured the analysis according to three levels, as suggested by Ghaffar et al. (2018):

- *Network level*: analysis of the global structure of the network.
- *Node level*: analysis of node's position in the network.
- *Dyad level*: analysis of links and their properties.

In order to graphically map the network and derive relevant measures, we utilised Gephi software and we focused in particular on specific indicators, both to provide a measure of the network (Table 16) and to evaluate the node level (Table 17).

Network Measure	Definition	Scope
<b>Network Density</b>	Ratio of the actual connections in the network over all the potential connections	Represent the probability of collaboration among the actors in the network
<b>Network Diameter</b>	Longest graph distance between any two nodes in the network, where connected nodes have graph distance 1	Represent the quickness of exchanges and of reaction to outside stimuli
<b>Average Path Length</b>	Average number of steps along the shortest path for all possible pairs of network nodes, where a path is a sequence of lines or walks that connects different points and lines without repeating any.	
<b>Average Degree</b>	Average number of edges per node in the graph.	Represent the hierarchical or horizontal distribution of power among the actors
<b>Average Weighted Degree</b>	Average sum of weights of the edges of nodes.	

Table 16: Network measures, definition, and scope

Node Measure	Definition	Scope
<b>Degree Centrality</b>	Number of links a node has with others	Represent the node's connectedness
<b>Closeness Centrality</b>	Average length of the shortest path between a node and all the other nodes	Represents the node's reachability to others in the network
<b>Betweenness Centrality</b>	Number of times a node acts as a bridge along the shortest path between two other nodes	Represent other nodes' dependency on the connector node to connect with other nodes in the network

Table 17: Node measures, definition, and scope

## 5 Results

In this chapter we present the obtained results of our SNA at network, node, and dyad level, clustered per research question. Moreover, for the second one, we transversally add also priorities, coherently with the value-driven logic of Policy Analytics.

### 5.1.1. Network Level Analysis

Figure 8 represents the network, made by 2680 nodes and 7296 relationships, and depicted considering both the pilot and PNRR programs.

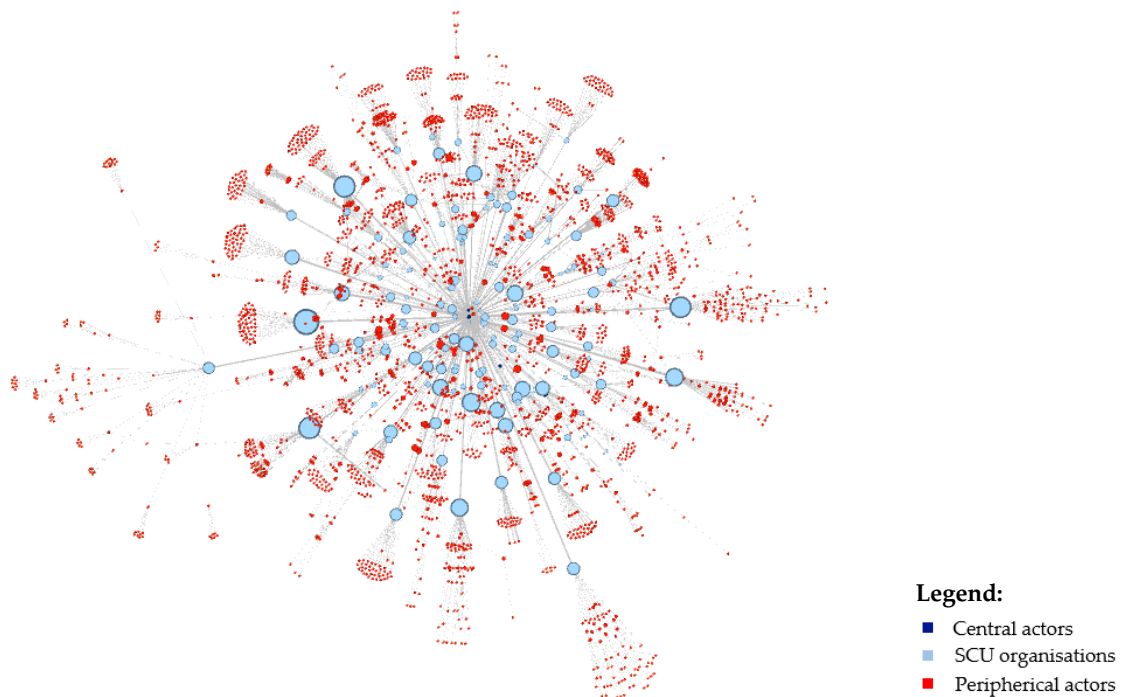


Figure 8: SCD Network detailed by Hierarchical Levels

In Figure 8, it is possible to recognise the three hierarchical levels described. In particular,

- The core is made up of DPG, DTD, Formez PA/Intellera and Milan Polytechnic, since they form a cohesive group and are densely tied to each other, and in addition, from these actors, direct linkages towards each SCU organisation depart.

- The second hierarchical level is made by SCU organizations, that are connected upward with DPG, Formez PA/Intellera and Milan Polytechnic, and downward are connected with their sites, partners, certification and tutorship authorities. It is composed by 146 actors (5.45%).
- The periphery is made up of actors not densely tied to the cohesive group. They are operative, host and training sites, and many partners and certification and tutorship authorities, generally connected with just few nodes. They correspond to a total of 2529 actors (94.37%).

Given the high complexity, in the following paragraphs some filters will be applied to better explain its features.

For the network level analysis from the metrics produced by Gephi software, some interesting insights can be taken. These measures are presented in Table 18, both detailed for the overall network and filtered by the entities involved in the pilot call and PNRR call only.

Measures	Overall Network	Pilot phase	PNRR
Network Density	0.002	0.003	0.003
Network Diameter	7	6	7
Average Degree	5.445	4.561	4.258
Average Weighted Degree	15.873	12.49	13.414
Average Path Length	4.193	4.269	4.045

Table 18: Network Analysis Measures

First, Network Density is constant among the three analyses and can be considered low, with only 7296 links for 2680 nodes, meaning that stakeholders are not exploiting many useful linkages, which remain only potential and do not find any concretization in the reality with formal or informal agreements, reducing their communication flows and the probabilities of collaboration Solis et al. (2012).

This last aspect is declined in two sub-problems:

- As shown also graphically, from SCU organizations (i.e., the biggest nodes) no linkages depart towards other SCU organizations, unless there is a co-programming or a co-projecting action. However, only 46 co-programming and 17 co-projecting relationships are present, with an overlap of the SCU

organizations that co-program and co-projecting both in the pilot call and in the PNRR one.

- The lack of linkages is even more strong in the peripheral areas of the network, where sites of implementation and third parties lie and where diversity is protagonist.

This characteristic of the network has a two-fold effect:

- According to Guan et al. (2022), low density increases the diversity in the network at the expense of information spreading. The same happens in our case, characterised by many different actors, with distinct roles (partners providing ICT services, partners providing implementation services, etc.) and few connections (i.e., low density) among peers, especially in the most peripheral levels of the graph, reducing the possibility of exchange of best practices.
- Vargas et al. (2019) highlights that low density reduces stakeholders' democratic participation in the phases of the policy cycle – in this case the implementation one – and therefore also the probability to develop shared values, norms, and communication flows among stakeholders, which are fundamental factors for a good collaboration inside the policy network.

The relative isolation of peripheral actors is reflected also by the distance measure, represented by Network Diameter and Average Path Length.

Considering that the Digital Civilian Service collaborative policy network has a three-level hierarchical topology for most of the programs as presented in section 4.2.1, having a network diameter higher than 6 reflects higher distance between peripheral nodes of different SCU organizations, meaning that they are less likely to act in solidarity with other actors in the network (Bonvecchi et al., 2020). Moreover, according to the same authors, having a high shortest path (i.e., a long path on average to go from one node to another one) confirms that the few information exchanges in the network happen also slowly and in turn also reactions to changes.

Regarding network centrality, instead, a high centrality means that the network is structured hierarchically, while a low centrality (i.e., high de-centralisation) means that all the actors are basically equivalent in terms of power, whose distribution is more horizontal rather than hierarchical (deLeon et al., 2009). In our case, the network structure is an in-between hierarchy and horizontality.

This measure is decreased by the average degree of peripheral nodes, which constitute the majority of nodes in the network.

Even if partners' contribution is crucial, they are not usually shared among the organizations and there are no information or resources flows among each other, which in turn could favour better coordination and a better understanding on what is

timely needed for the implementation of the policy. Therefore, at the lowest level of the hierarchy the network present lot of structural holes, i.e., regions not connected among each other.

However, some cases exist where some third parties act as a bridge against structural holes in the network. At this regard, to ease the representation, sites of SCU organizations were removed in order to visualize 'bridges' in a graph (Figure 9). In particular, yellow circles are put on some parts of the graph to show how these entities usually act as a bridge among more programs (i.e., among more SCU organizations).

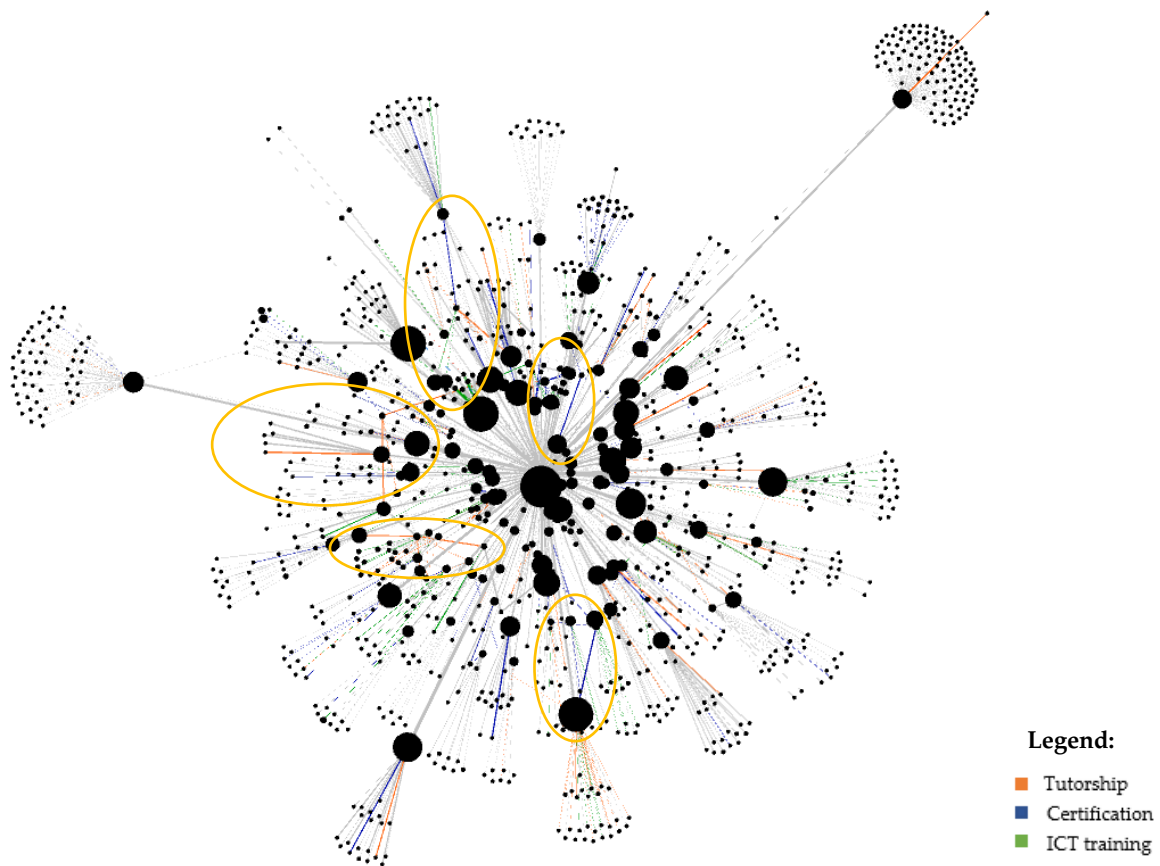


Figure 9: Examples of Bridges in the Network

We can argue that, at network level, no differences can be observed between the testing phase of the Digital Civilian Service policy and its implementation phase, represented respectively by the pilot and PNRR calls.

This is confirmed by two considerations:

- The indicators described for the full network are very similar in both the cases of pilot and PNRR calls. Therefore, the same considerations are valid.



- The topology of these networks, presented in Figure 10, visually look like the complete network, since most of the SCU organizations have taken part in both the calls, often collaborating with the same partners and certification and tutorship authorities, without also changing the typology of their relationships.

This can be explained by the fact that the implementation of the pilot projects was subjected to delays due to governmental issues, so that the PNRR call deadlines overlapped with the pilot implementation.

Therefore, the pilot phase in practice did not correspond to the policy testing phase suggested by Policy Analytics literature; indeed, there was no time to design PNRR projects based on pilot observed criticalities. By consequence, the organizations acting both on the pilot and PNRR rounds generally proposed similar projects with few changes, mainly related to the implementation sites involved.

In particular, Figure 10, on the left, shows the 1811/2680 (67.57%) nodes and the 4130/7296 (56.61%) links characterising the pilot call; Figure 10, on the right, shows instead the 1488/2680 (55.52%) nodes and the 3168/7296 (43.42%) characterising the PNRR call. Moreover, with a fewer number of relationships, it is possible to better recognise more nodes acting as a bridge between programs; therefore, they are highlighted with a yellow circle. These representations allow also to show some cases where third parties act as a bridge at sites level; this was basically impossible for the overall network given the vast number of nodes and linkages.

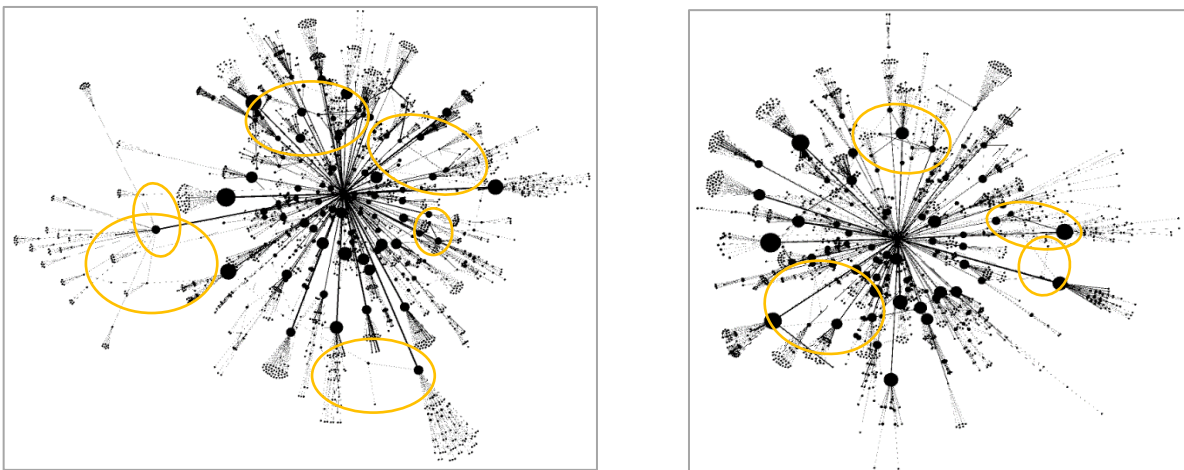


Figure 10: Pilot call (left) and PNRR call (right)

### 5.1.2. Node Level Analysis

At node level, we use different indexes of centrality to identify the importance in terms of actors' power and influence, namely on one side Degree, Betweenness, and Closeness centralities, that show similar results, and on the other side Weighted Degree centrality, providing different insights on the network. In particular, we

analyse the actors with the highest and lowest results, trying to understand the reasons behind them. Table 19 shows the top 10 actors for each measure considered.

Ranking	Organisation	DC	Organisation	WDC	Organisation	CC	Organisation	BC
1	DPG	188	DPG	3376	DPG	0.473	DPG	1,413,449,235.788
2	Milan Polytechnic	188	SU00321	1238	Milan Polytechnic	0.473	Milan Polytechnic	1,412,225,810.559
3	SU00240	179	SU00097	480	Formez PA	0.433	Formez PA	399,881,095.933
4	SU00480	133	SU00298	467	Intellera	0.415	SU00476	308,077,276.491
5	SU00060	117	SU00471	402	SU00476	0.331	Intellera	273,553,370.276
6	SU00321	107	SU00419	386	SU00240	0.328	SU00240	215,784,923.197
7	Formez PA	100	SU00465	374	SU00269	0.327	SU00269	197,824,881.818
8	SU00097	94	SU00300	363	SU00321	0.327	SU00020	169,647,900.623
9	SU00141	92	SU00490	362	SU00020	0.326	SU00277	168,401,622.196
10	Intellera	89	SU00258	359	SU00052	0.326	SU00321	157,955,066.386

Table 19: Top 10 Actors according to different Centrality Measures

First, we can notice that Degree centrality, Closeness centrality and Betweenness centrality show similar results in terms of the highest values. In fact, DPG, Digital Agenda Observatory of Milan Polytechnic, Formez PA and Intellera, are always included in the top 10 positions. This is due to the fact that they interact not only among each other, but also with all the 146 different SCU organizations involved, with some of them involved twice (i.e., both for the pilot testing and for the PNRR implementation). These nodes have the highest closeness centrality since their positions in the network makes it is easier for them to reach the other nodes with any information or resource flow. Moreover, the highest Betweenness centrality is on DPG and Milan Polytechnic, that act as a bridge for a huge number of possible shortest paths. Similarly, Betweenness centrality is also high for Formez PA, Intellera and all the SCU organizations; indeed, even if it is approximately three times lower, it still is a relevant figure.

The second category of actors that have elevated centrality values in all the three cases is composed by all SCU organizations, since they are linked to many sites and third parties, or third parties of projects proposed by organizations with a huge number of operative, host and training sites.

Central actors first and implementing agencies secondly are information and resources brokers in the network, but they can be also cut points, in the sense that they have

power and authority and so any meaningful path should involve at least one of them (Bonvecchi et al., 2020). This is indeed what is happening in Digital Civilian Service policy network since street-level bureaucrats and partners continuously interact with implementing agencies, that in turn connect with central actors. Indeed, *“the actor with high betweenness centrality represents the important position where other actors will depend on it to connect with other actors in the network and is likely to manage the resources flow in the network”* (Saip et al., 2018).

However, there is an exception at central level: DTD has the lowest Between Centrality since it is connected only to the DPG and Intellera and therefore it is on a limited numbers of shortest paths. This actor is formally relevant, but does not interact in the implementation phase, so that the nodes prefer creating more alternative paths to reach each other without passing through it. This centralises more the power in the hands of DPG, which consolidates its position as most relevant actor looking only at the centrality measures discussed until now.

Finally, a consistent group of nodes (2072/2680, 77.31%) has a Degree centrality lower than the average registered for the network (5.445). These actors are sites and third parties, mainly partners connected with a subgroup of sites of the implementing agencies. In fact, there are cases in which the partners of the same implementing agency differ based on the specific implementation site. This could be interpreted as a strategy of the institutions to be more capillary and more effectively respond to the needs of the local communities. On the other side, this choice increases network diversification at the expenses of actors' power, since these stakeholders both limit their influence to a lower portion of the network, and they are directly connected with nodes that have a lower weight.

These categories of nodes also have the lowest Closeness centrality since they often have to move in a longer path to reach each other. Indeed, if the peripheral nodes belong to two different not co-programming implementing agencies and there is not any certification or tutorship third party acting as a bridge, then the path connecting these nodes involves at least two SCU organizations, DPG, or Milan Polytechnic, and probably, in case of partners linked to specific sites, also two sites. This reasoning is coherent with the average path length of 4.193 calculated for the overall network.

Focusing on the Closeness centrality of the overall ranking, it ranges from 0.1633 and 0.4727. What is interesting to notice is that among the 2680 nodes in the network, there are 10 certification and tutorship authorities, whose Closeness centrality ranges from 0.2473 and 0.2522, ranked within the first 200 positions, since they are common to more programs. It is therefore easier to reach these actors than other peripheral ones, since they are act as a bridge, as highlighted by network topology. Surprisingly, such third parties common to more programs have low Betweenness centrality, as well as the other third parties, because probably there are better shortest paths. However, the

study of Closeness centrality and of the topology of the network helped us to highlight their relevance as a bridge, even if not on the shortest path as demonstrated by Betweenness centrality values.

Figure 11, on the left, highlights the centrality of the nodes according to the Degree centrality measure. In yellow are represented the nodes with lowest degrees, in green those with medium degrees and in blue those with the highest degrees.

The picture is coherent with all the considerations done on the data, but then if we look at the Weighted Degree things slightly change, as represented by Figure 11 on the right. This is due to the particular boundaries of the analysis, that encompass only the formal relationships about the circulation of human resources, materials, data, and services.

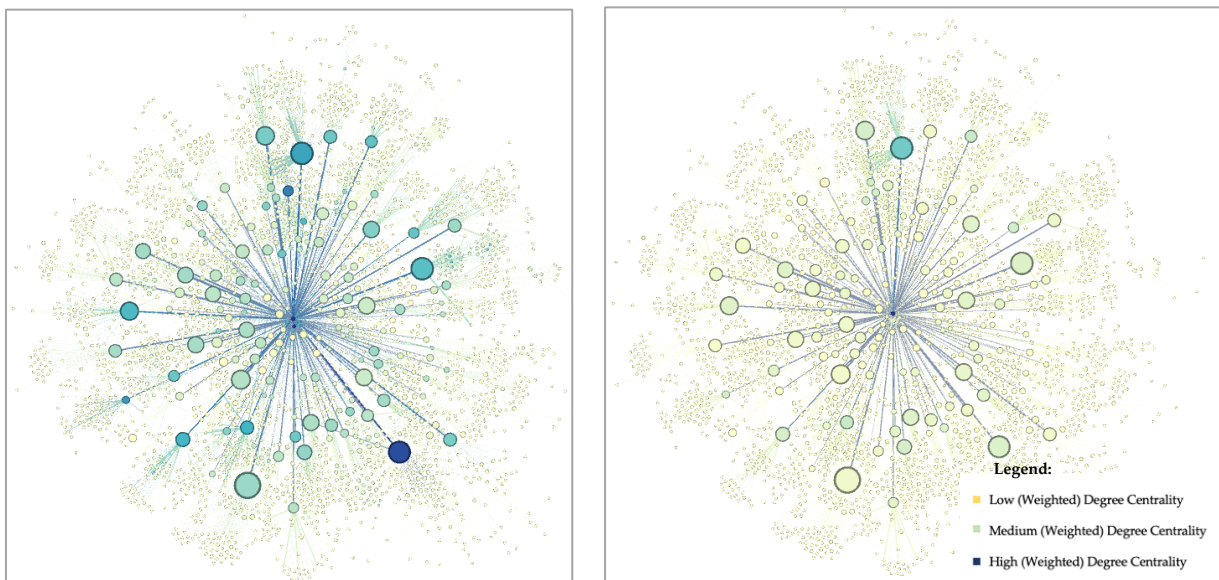
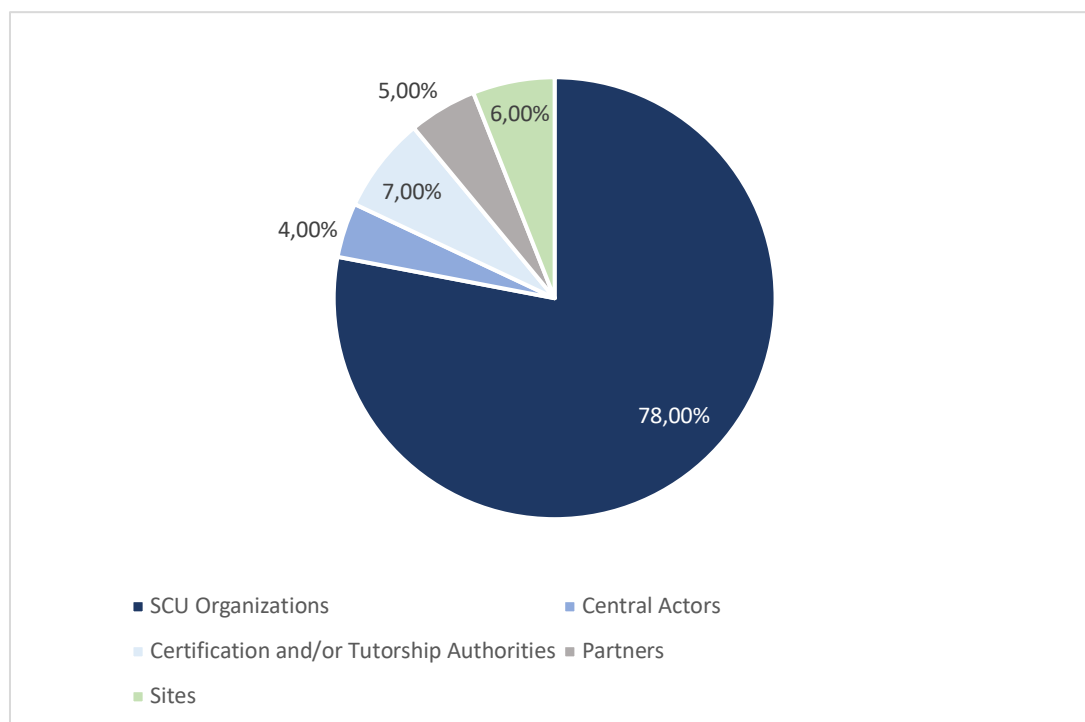


Figure 11: Degree Centrality Measure (left) and Weighted Degree Centrality Measure (right)

Considering the Weighted Degree centrality, that contemplates the weights of the relationships, the main actor confirms to be DPG, the blue point at the centre of the network. Indeed, its linkages towards SCU organizations are weighted based on the number of facilitators involved. In proportion, all the other actors' importance is reduced, so that they are mainly coloured with yellow shades.

Another change is visible in terms of numerical data. Indeed, apart from DPG, the highest Weighted Degree centrality figures are now the most relevant SCU organizations in terms of volunteers involved and the third parties adhering to more programs, instead of the central actors since their links have a lower weight. In fact, for the implementing agencies the relationships' weight depends not only on the number of their volunteers, but also on the number of their sites and of the third parties

to them connected. However, the Weighted Degree centrality of DPG is 3376, which is very high compared to the second actor, an SCU organisation whose value is quantified as 1238. In particular, the Weighted Degree centrality of the top 100 players is reflected in Graph 7.



Graph 7: Weighted Degree Centrality of top 100 players

Noticeably, thanks to the Weighted Degree centrality emerged the importance of certification and/or tutorship authorities for Digital Civilian Service collaborative policy network, whose percentage within the top 100 players is considerably high (7%), especially considering that certification and tutorship authorities displayed in the overall policy are 114 out of 2680 stakeholders involved, so only 4.25%.

### 5.1.3. Dyad Level Analysis

At dyad level it is possible to better understand the nodes' relationships that we have mapped following the schema in paragraph 4.2.2.

To start, Figure 12 represents the overall network strength of the edges. The links are coloured in yellow, green, and blue and their shades depend on the intensity of the relationships involved.

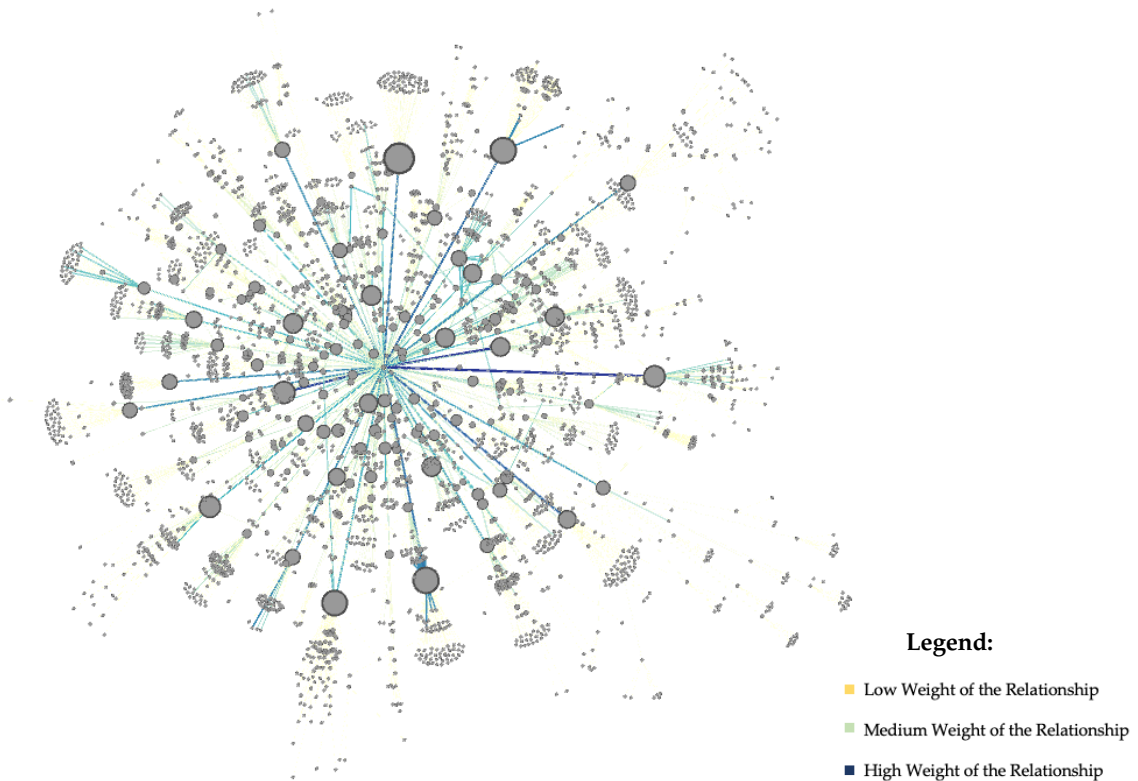


Figure 12: Intensity of Network Relationships

We can notice that the relationships with peripheral actors, with the exclusion of some exceptional cases represented by third parties linked centrally to the SCU organizations, are so weak in terms of weight that it is not possible to visualise any colour connecting the nodes, while the relationships between the central actors and the SCU organizations are mainly green or blue, reflecting the importance of their activities.

Gephi software produces also some interesting statistics concerning the typologies of linkages. Graph 8 highlights the relationships distribution in the Digital Civilian Service collaborative policy network, according to the classification provided in subparagraph 4.2.1.1, ordered from the most to the least observed.

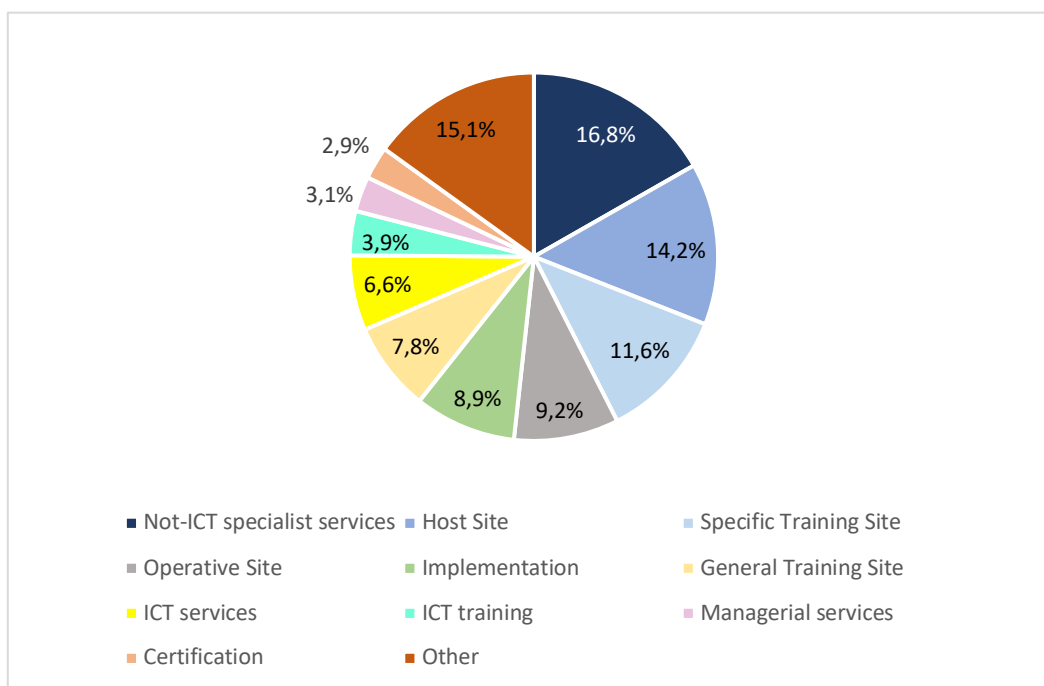
The following aspects emerge:

- 43.5% of the relationships in the network are constituted by service provision.
- The majority of links (16.8%) relates to '*Other not-ICT specialist services*'. Even if the core of the policy is to reduce second-level divide in Italy, it is interesting to note that most of the partners do not operate in ICT-related sectors. This is not an issue since the programs are generally complemented with partners working in the ICTs domain. Rather, these third parties may offer services that are nice

to have for policy recipients and eFacilitators, therefore we regard them critical success factors too.

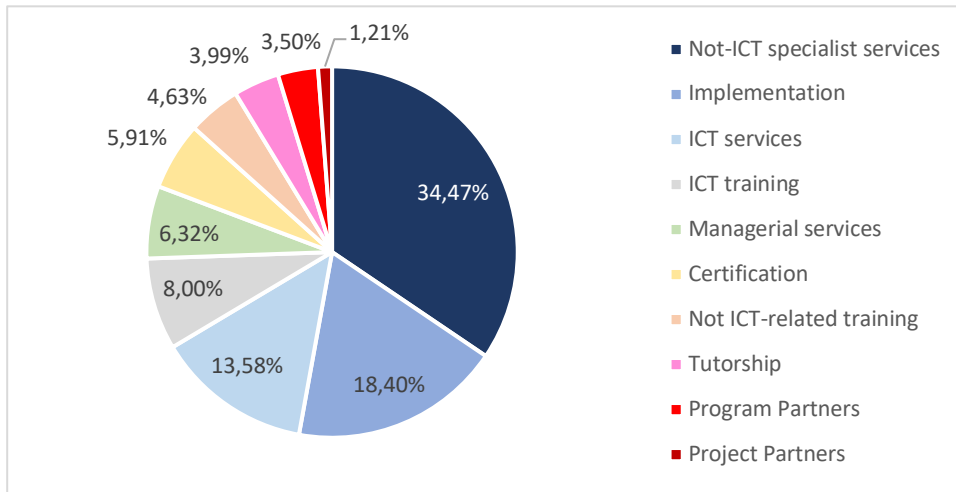
- The second most diffused links are those between SCU organizations and all their sites, independently from being host, training or operative.
- Finally, with a relative high percentage, there are partners offering operative support during implementation, those providing ICT services, ICT training, managerial services, as well as certification authorities.
- Among the Other, we find the provision of funds (2.6%), platform and general training (2.6%), and operative support (2.6%) coming from the central actors towards SCU organizations. This category also includes not ICT-related training (2.3%), tutorship (1.9%), co-programming (0.6%), co-projecting (0.2%) and co-ownership (0.01%).

In Others there are also partners whose role in the policy network is not specified, accounting for 2.3%.



Graph 8: Overall Network Relationships Typologies

In Graph 9 we further detail third parties relationships, ordered from the most to the least frequent. To be more precise, in Appendix B, the main categories of Graph 9 are visually represented into their components.



Graph 9: Third Parties Relationships Typologies

Based on Graph 9, more than a third of the total number of linkages involving third parties is represented by 'Other not-ICT specialist services' (34.47%).

In particular, policy communication has the highest frequency of links (75.7%), coherently with the high importance this action has to reach multiple disadvantaged targets, and it is even underestimated due to the choice to map only formal relationships. In fact, entities such as schools or churches, more grounded in the community, often act as informal intermediaries for communication, as additional channels to professional agencies and partners.

The provisions of materials (9.2%) and of generic spaces where to run the facilitation interventions (8.8%) follow in the second and third place for frequency. Indeed, such services ease the delivery of interventions to citizens.

Implementation activities are a consistent part of the third parties' linkages too (18.4%). They are fundamental to properly address the target, so they are crucial for the success of the policy.

At this regard, educational activities carried out on the target by third parties have a preponderant role (47.8%), followed by the beneficiaries' needs mapping actions (30.1%), to effectively tailor the interventions. 17.4% instead is reached by the partners offering support to the target, for example, helping to transport people with disabilities to the facilitation site, or assisting elderly using devices.

Then, the third highest percentage among third parties' relationships is reached by ICT services (13.58%), which are core for a second-level divide policy.

In this category, the most important relationship is the provision of hardware (52%), indeed, digital devices or rooms equipped with digital technologies are indispensable to provide tutorship to citizens in need.



The provision of digital skills experts to help volunteers and SCU organizations personnel develop further their competences and resolve potential issues is second in terms of importance (21%), followed by maintenance and technical assistance to guarantee the continuity of the service (16.1%) and provision of software (10.8%).

Then, ICT training follows with 8% of the total relevance. In particular, only a small percentage is constituted by training activities provided within the specific and general training boundaries, respectively equal to 12.7% and 1.1%, while the majority are required during the implementation period, as a support for the digital areas their program is built on. The not-ICT related training (4.6%) instead has a lower frequency and is mainly focused on facilitation and support to the target (53.66%) topics, but also concerns graphic and communication (14.63%) and project management (9.76%).

Despite managerial services should have a high importance, especially considering the new context in which SCU organizations are involved and their no prior experience in terms of digitalisation projects, they are overlooked in many cases, in fact they weight only for 6.3% of third parties relationships. In particular, SCU organizations have developed:

- 81.7% links concerning planning and organisation activities
- 12.2% links concerning monitoring activities
- 4.4% links concerning management and administration activities
- 1.7% links concerning the provision of human resources experts in managerial and coordination topics.

Lastly, from Graph 9 certification and tutorship authorities, counting for 5.91% and 3.99% of the linkages with third parties.

## 5.2. Research Question 2

The second research question focuses on how the distance between the policy formulation phase and its implementation can be determined by stakeholder priorities and characteristics, and is the following:

*RQ2: Which values stakeholders bring in a policy network?*

While the policy high level objective to increase the digital competences of disadvantaged categories of population and eFacilitators is common to all the programs and projects presented by SCU organizations, the structuring of the implementation phase is the result of stakeholders' knowledge of the local context and experience with communities where they operate, their technical expertise and judgements. In particular, they are left a certain degree of entropy in the following decisions:

- The targets of the interventions.
- The geographical dimension of influence.

- The specific digital competences areas to focus on.

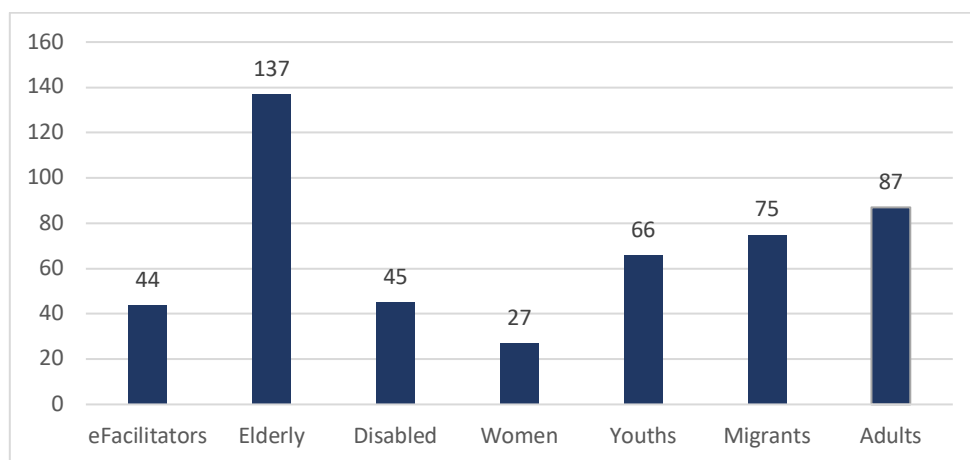
Therefore, despite in literature the role of Policy Analytics as value-driven definition of objectives and design is predominant in the initial phases of the policy cycle, and during the policy finalisation and implementation phases is limited to analysis of preliminary results and mapping of resistances and side effects as evinced from Table 5 (paragraph 2.2.3), we think that the scope of the approach could be expanded further in these stages. In fact, in those innovative settings where, by design, some randomness is left to be handled singularly by the involved organizations, Policy Analytics approach can be used to govern it, to extract how the objectives resulting from stakeholders emerge and evolve over time, as a result of the context and of the selected values.

The methodology followed in our work is to carry out a transversal analysis to map the priorities based on the institutions' proposal design and implementation specifically delineated in the forms submitted to respond to the Digital Civilian Service calls.

In particular, through the projects issued by the SCU organizations, we identify '*value regions*' in the network that correspond to their priorities in terms of targets, digital competences areas and geographical areas served. Then, we carry out a network and node level analysis for each of these three priorities, to understand if the structure of the network varies depending on them.

### 5.2.1. Target Analysis

Graph 10 shows the number of programs involving each target, considering programming and co-programming organizations in both the policy cycles (i.e., pilot and PNRR). Women, disabled, and facilitators result to be underrepresented.



Graph 10: Number of SCU Organizations detailed by Target Choices

More insights are given at network level, where Table 20 shows the network measures depending on the target considered.

Measures	Adults	Disabled	Elderly	Women	Youths	Migrants	eFacilitators
Network Density	0.003	0.005	0.003	0.011	0.004	0.004	0.005
Network Diameter	7	9	8	6	7	7	6
Degree	4.975	4.446	5.343	4.78	4.754	5.199	4.651
Weighted Degree	15.561	14.434	16.051	15.665	12.932	16.48	14.842
Average Path Length	4.124	4.057	4.116	3.982	4.305	4.144	4.261
# Visible Nodes	1461	848	2094	454	1184	1278	857
# Visible Edges	3639	1885	5597	1085	2708	3322	1993

Table 20: Network Measures detailed by Target

Looking at the numbers, two considerations surface:

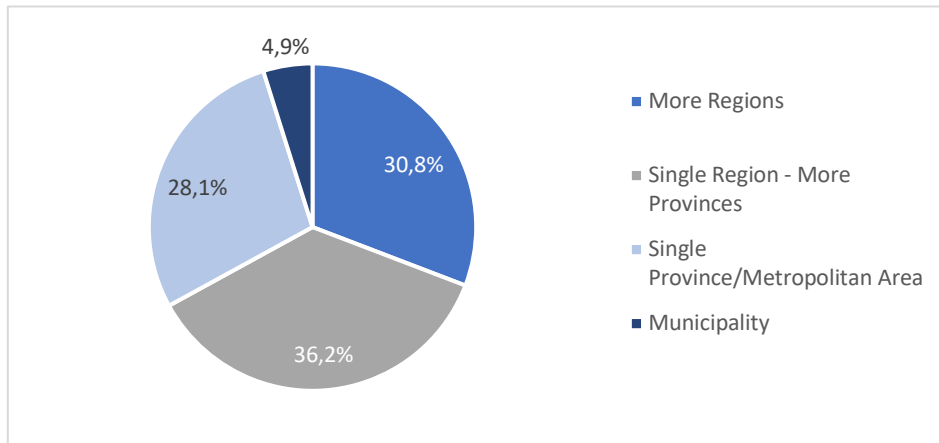
- Compared to the overall network (0.002), the density increases for all the categories, but still remains low, with stakeholders not exploiting more possible useful linkages. Significant differences are visible among the categories, with firstly women and then disabled and facilitators more than doubling the density of the network. This is because of their relative low representations inside the SCU organizations' programs, limiting their actual and potential linkages.
- The diameter is 9 for people with disabilities and 8 for elderly, respectively 2 and 1 points more than the same measure for the network. Contrarily, it is 1 point lower for women and eFacilitators.

This measure can be explained by the fact that programs involving people with disabilities or elderly have many partners connected to the implementation sites – and not at central level to the SCU organisation –, with few intermediaries acting as a bridge on all the possible paths in the network, while programs dealing with women and volunteers have less partners collaborating with sites and more third parties directly linked directly to the SCU organisation acting as implementing agency for that program.

- The Degree and Weighted Degree centrality is the maximum for elderly, followed by migrants and adults. This is due to their stronger presence in terms of operative and training sites, the higher number of volunteers involved, and the higher presence of partners linked to each site instead of centrally.

### 5.2.2. Geographical Analysis

Graph 11 represents the geographical coverage of the programming and co-programming organizations in both the cycles (i.e., pilot and PNRR calls), divided into four subcategories.



Graph 11: Percentage of SCU Organizations detailed by Geographical Coverage

From the graph, we can note that there are several organizations covering a wide geographical area, with inter-regional, regional, or provincial actions. Rather, only few implementing agencies act at the very local level of municipality. This classification influences the overall network structure, whose measures are shown in Table 21.

Measures	More Regions	Single Region – More Provinces	Single Province Metropolitan Area	Municipality
Network Density	0,004	0,006	0,01	0,06
Network Diameter	6	6	7	5
Degree	5,471	4,993	5,338	5,435
Weighted Degree	14,458	16,898	15,682	18,435
Average Path Length	4,334	3,937	3,994	3,182
# Visible Nodes	1307	800	559	92
# Visible Edges	3575	2002	1492	250

Table 21: Network Measures detailed by Geographical Coverage

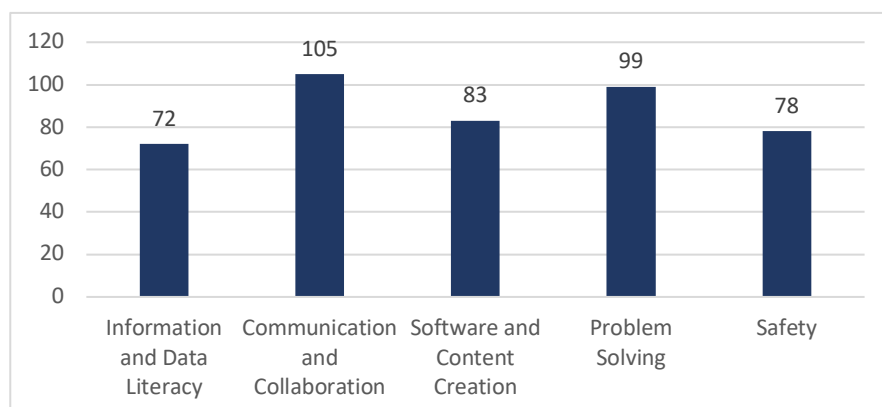
Network density increases by decreasing the level of geographical coverage; indeed, the actors become more capillary if focused on a limited territory.

In particular, implementing agencies at national or regional level seem not to exploit useful potential linkages with other sites and third parties.

Rather, SCU organizations at municipal level are very strong in terms of density, so they may tend to establish bonds with a proportional higher number of useful partners. However, this can be also a consequence of their lower representation as just shown in Graph 11. Indeed, being them only the 4.9% of the cases, they have less exploitable linkages to connect among each other, raising this measure. Moreover, these actors are characterised by a lower diameter, probably due to the lower number of nodes, since they have only few sites compared to the other SCU organizations, and therefore third parties are centrally linked.

### 5.2.3. Digital Competences Analysis

Graph 12 represents the digital skills areas coverage of the programs; with, also in this case, the data counted on the number of SCU organizations involved in programming and/or co-programming activities in both the policy cycles (i.e., pilot and PNRR calls).



Graph 12: Number of SCU Organizations detailed by Digital Competence Area

There is a quite homogenous distribution of SCU organizations dealing with all the digital competences, with communication and collaboration as well problem-solving being the most representative areas.

Table 22 represents the measures at network level filtered by competence area. The structure is not affected by the skills taught to facilitators and citizens. In fact, with the exception of the higher diameter observed for the network of actors involved in information and data literacy skills provision, and the lower diameter in the case of safety, no other interesting insights can be gathered from the network.

Measures	Information and Data Literacy	Communication and Collaboration	Software and Content Creation	Problem Solving	Safety
Network Density	0.003	0.003	0.003	0.003	0.004
Network Diameter	9	7	7	7	6
Degree	4.375	5.064	4.315	4.5	4.612
Weighted Degree	12.313	13.861	12.75	12.692	13.392
Average Path Length	4.228	4.214	4.185	4.159	4.157
# Visible Nodes	1290	1743	1420	1657	1314
# Visible Edges	2822	4418	3068	3733	3035

Table 22: Network Measures detailed by Digital Competence Area

#### 5.2.4. Priorities and specific objectives

RQ2d: *Which are other objectives indicated by the SCU organizations? How influential are the actors that suggested them in the network?*

Because of the freedom left to implementing agencies in policy implementation, on a total of 133 SCU organizations, presenting their projects for the Digital Civilian Service, 61 interpreted the high-level objective to increase digital competences into additional specific objectives that are linked to their priorities. In particular, 24 organizations suggested these objectives only for the pilot call, 17 only for the PNRR call, 20 for both.

The main secondary objectives and related indicators mentioned in the project forms have been analysed and categorised in the areas reported in Table 23, of which some examples have been provided to contextualise their meaning. Knowing these objectives is relevant for two major reasons:

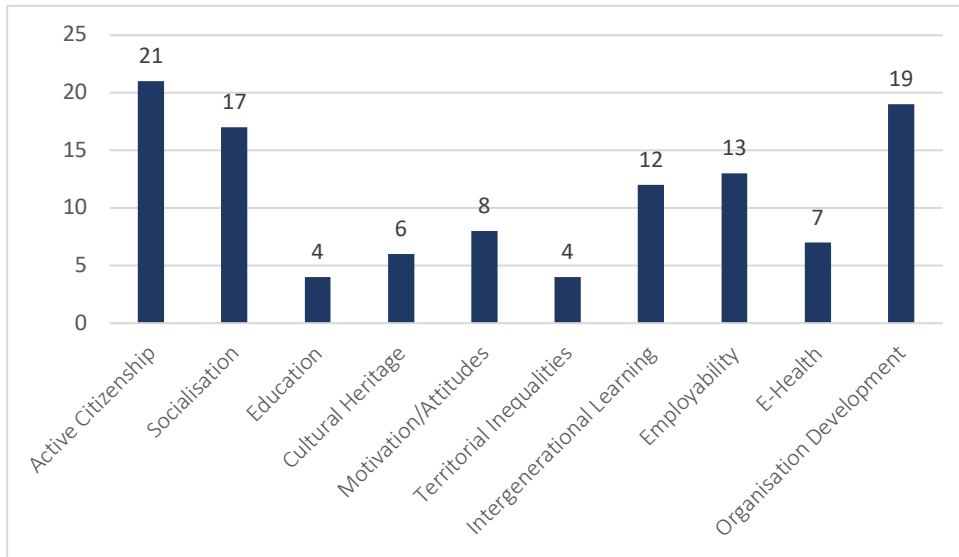
- They could represent the primary goal of an organisation, with the risk to deviate from the policy scope, and they have an impact on the approach adopted by each organisation.
- Knowing them in the initial stages of the policy cycle would have allowed policymakers to make a value-driven design of policy alternatives.

In this case, implementation could be favoured anyway, since a more robust analysis and monitoring of the results could be performed, considering the multiplicity of priorities.

Additional objectives	Examples provided by SCU organizations
<b>Active citizenship and inclusiveness</b>	<ul style="list-style-type: none"> <li>Promote democracy, equality, ethics, justice, and inclusion</li> <li>Promote the acquisition of active citizenship skills</li> <li>Reduce social inequalities</li> <li>Reduce the number of minors who are exposed to bullying and petty crime</li> <li>Know and recognise cultural differences</li> </ul>
<b>Promotion of socialisation</b>	<ul style="list-style-type: none"> <li>Help create inclusion and socialisation dynamics.</li> <li>Improve of relational skills</li> <li>Facilitate the process of socialisation and integration in the peer group</li> <li>Promote actions aimed at having a positive impact on the aggregation and educational paths of minors residing in the local context</li> <li>Activate formal and informal networks to favour learning and exchange of good practices in the digital field.</li> </ul>
<b>Promotion of education and schooling</b>	<ul style="list-style-type: none"> <li>Fight against educational poverty, early school leaving, promotion of youth participation and protection of foreign minors</li> <li>Strengthen the motivation for school commitment</li> <li>Intervention on behavioural, relational, emotional and/or cognitive problems leading to learning difficulties</li> </ul>
<b>Valorisation and digitalisation of the cultural heritage</b>	<ul style="list-style-type: none"> <li>Improve the accessibility and usability of museums, libraries, and cultural heritage through the digitization of part of the heritage.</li> <li>Increase the accessibility of the historical heritage even at distance</li> <li>Creation of a website with images, videos and virtual rooms in which users interact and enjoy the museum's heritage</li> </ul>
<b>Improvement of Motivation /Attitudes</b>	<ul style="list-style-type: none"> <li>Develop personal skills, attitudes, and values to have a positive impact on the adverse attitude shown by "late-born and digital immigrants"</li> <li>Encourage users to approach the digital world through individual support and guidance</li> <li>Stimulate interest and conscious use</li> </ul>
<b>Bridge territorial inequalities</b>	<ul style="list-style-type: none"> <li>Promote local development actions through the creation of networks</li> <li>Reduce the divide between capital cities and provinces</li> <li>Decrease the territorial digital divide</li> </ul>
<b>Intergenerational learning</b>	<ul style="list-style-type: none"> <li>Reduce the cultural gap between different generations</li> <li>Improve dialogue between generations</li> <li>Promote digital inclusion and the intergenerational exchange of skills</li> </ul>
<b>Increase employability</b>	<ul style="list-style-type: none"> <li>Introduce volunteers to the labour market</li> <li>Develop more structured work reintegration paths based on support in the digital transition</li> <li>Increase in the employability of recipients through individual digital inclusion paths</li> </ul>
<b>E-health</b>	<ul style="list-style-type: none"> <li>Improve the reception of the person who enters the hospital and consequent satisfaction with the service</li> <li>Improve access for users and family members considering the specificities of foreign users and people with disabilities</li> <li>Improve the relationship of staff dedicated to reception with the patient and his family</li> <li>Reduce complaints regarding access to services and hospitality in the hospital</li> <li>better use of ASL services</li> </ul>
<b>Organisation development and (social) innovation</b>	<ul style="list-style-type: none"> <li>Promote the digital skills of institutions</li> <li>Enhance co-planning between the bodies involved in the project in order to promote common and coordinated actions</li> <li>Strengthen the institution's presence on social media</li> <li>Activate an innovation workshop for the socio-health investigation activities</li> <li>Use of Open Data with a view to Social Innovation</li> </ul>

Table 23: Additional Objectives – Categories and Examples

For each group, in Graph 13 we have counted the number of times it was cited by each SCU organisation, to determine the most relevant categories.



Graph 13: Frequency of the Additional Objectives

Unexpectedly, organisation development is among the most cited objective, making another category of beneficiaries emerge: SCU organizations themselves. One interpretation of this result could be that the institutions perceive that they need to improve their digital performances to maximise the effectiveness of the intervention, making their workforce knowledgeable in terms of digital competences and using data coming from digital public services usage to carry out social innovation.

To discuss all the other objectives, it is useful to plot them in a pivot table to count for each target how many SCU organizations suggested them, as done in Table 24.

Objective	Adults	Disabled	eFacilitators	Elderly	Migrants	Women	Youths
Active citizenship	15	8	6	17	14	5	6
Bridge the territorial inequalities	3	3	0	3	2	0	1
E-health	2	3	3	4	4	2	1
Employability	9	5	5	5	9	3	6
Intergenerational learning	8	4	5	11	4	0	3
Motivation/Attitudes	4	4	3	7	2	1	2
Education and schooling	2	1	1	2	2	2	4
Socialisation	13	4	3	15	6	1	9
Cultural heritage	4	2	4	5	3	0	4

Table 24: Additional objectives frequency by target



To analyse the results, we precise that since each SCU organisation may act on more than one target in each of the program submitted, the same objective can be present for more than one target, resulting in appearing a higher number of times.

The most cited objectives are *active citizenship* and *socialisation*, which are mentioned by 21 and 17 institutions respectively. In particular, active citizenship mostly targets adults, elderly and migrants, while socialisation recipients are mainly adults, elderly and youths.

Then, some peculiarities emerge concerning objectives specific for a certain target.

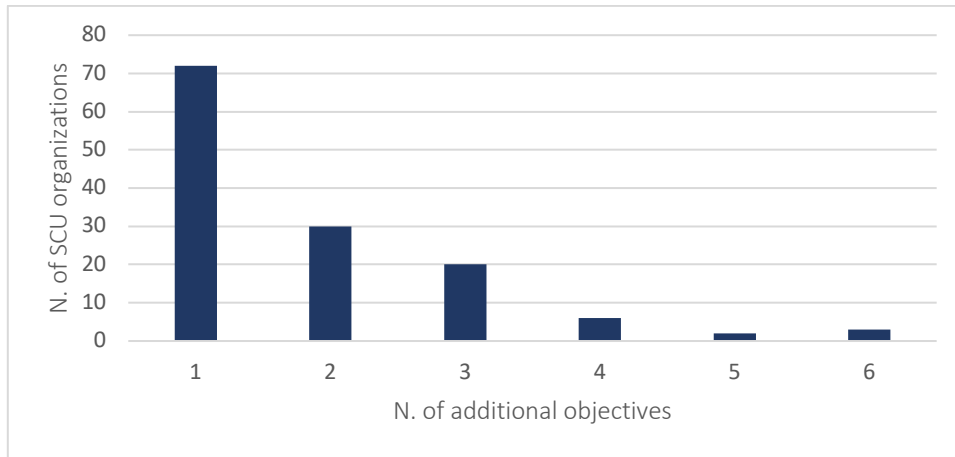
- Intergenerational learning is registered mainly for elderly and for adults.
- Promotion of education is mainly for youths who have left the school in view of empower them and making them more competitive in the future job market. However, the incentive to boost the educational level is not only peculiar to the school children, but organisation also encourage other targets to develop and improve their competences.
- Employability is mainly linked to people with disabilities, migrants and youths, to favour their entrance in the job market.
- Motivation and attitudes are specific for the elderly, which turn out to need encouragement and more effort is necessary to spark their interest.

Territorial inequalities, e-health and valorisation and digitalisation of the cultural heritage are equally represented and do not show particular peaks based on the target of the intervention in all the direct beneficiaries.

Overall, the categories less represented in terms of additional objectives are women and eFacilitators, with respectively less than 5% and 10% references compared to the total.

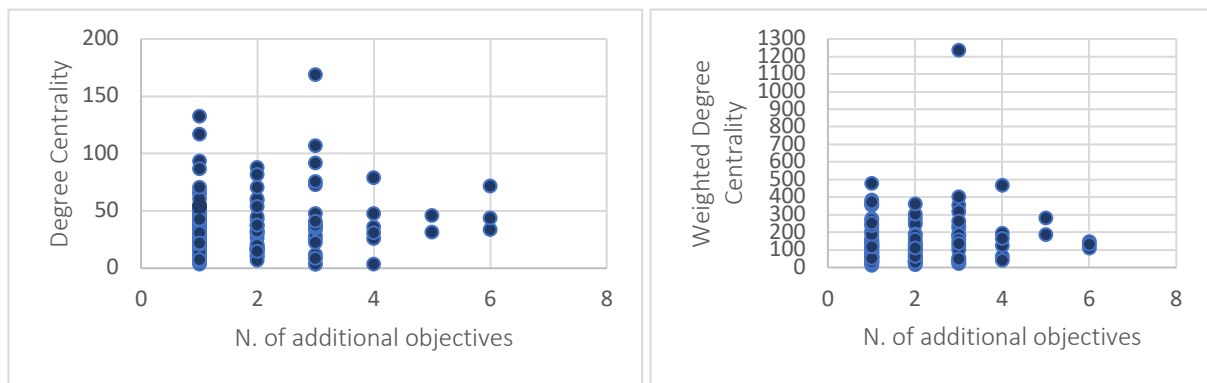
Graph 14 represents the number of objectives per SCU organisation, considering a total network made by 133 SCU players (i.e., programming and co-programming actors). It is observable that the number of organizations with additional objectives decreases with the increase of their number.

However, we are interested in analysing the Degree and the Weighted Degree centrality of the actors suggesting them, to understand if they are among the most influential organizations. Therefore, we run a regression analysis, based on the number of objectives pursued by each SCU organisation – including the declared one of increasing the digital competences of population – with respect to their centrality.



Graph 14: Frequency of Organizations on the Number of Additional Objectives

Graph 15 and Graph 16 represent the regression of points along the Degree centrality and Weighted Degree centrality dimensions.



Graph 15: Degree Centrality

Graph 16: Weighted Degree Centrality

The graphs have a similar distribution of data; therefore, the presence of additional objectives does not depend on the fact the network is weighted or not. In particular, we can see the presence of an outlier with the highest centrality measures and 3 objectives.

The average Degree Centrality of the organizations involved is 36.75; the average Weighted Degree centrality is instead 142.53; therefore, all the organizations with 5 or 6 objectives, as well as part of the ones with 3 or 4 objectives are above the average, meaning that these players are highly influential in the network. On the other side, even if the majority of actors has 1 (72) or 2 (30) objectives, their average Degree Centrality is 35.38 and 32.8 respectively; therefore, they have lower influence compared to the average network.

Hence, it is important for policymakers to know which the organizations suggesting these additional objectives are, since they are among the most influential players in the network.

### 5.3. Main Results

In this section we want to briefly recap the main results emerged in this chapter:

- Network density is low, meaning that, in a collaborative view, the actors are not exploiting sufficiently all their possible linkages, both for co-programming activities and partnerships;
- The bureaucratic actors and the implementing agencies are the most influential stakeholders in the network, given their high centrality;
- Certification and tutorship authorities are sometimes more influential than implementing agencies and act as bridges in the network;
- Most of these peripheral actors provide 'other not-ICT specialist services', followed by implementation activities and ICT services. Managerial services and training have instead a lower representation;
- The network measures are affected by stakeholders' priorities in terms of target of the intervention and geographical coverage, while they are less dependent on the digital competences taught;
- Considering other objectives mentioned by the actors, the implementing agencies themselves emerge as new beneficiaries category;
- The actors with a higher number of additional objectives are also those that have an influence higher than the average.



## 6 Discussion

### 6.1. Research Question 1

We have highlighted that one knowledge gap consists in a lack of focus on the stakeholders' dimension, that led to the emergence of the following research question:

*RQ1: How is a real collaborative policy network composed?*

The network and node level analysis show the importance of central actors and of implementing agencies for policy implementation. Without them, the policy will basically collapse for lack of common directions provided by competent authorities, lack of common instruments and of coordination at local level.

Even if the importance of such actors is widely recognised, the network has a low density, with most linkages not exploited, especially the ones among the SCU organizations. We regard this factor a weakness of Digital Civilian Service policy, since SCU organizations act as centers of expertise, grounded in the community. Collaboration may help in sharing practices and experiences in this new field of digital inclusion. Of course, this consideration is limited to the boundaries of the policy under evaluation and does not consider possible additional linkages exploited instead for the Universal Civilian Service.

In the case of Digital Civilian Service, the numbers give higher influence to certification and tutorship authorities compared to other third parties in the network, especially when they act as a bridge connecting implementing agencies lacking linkages. In fact, through the Weighted Degree centrality measure, certification and/or tutorship authorities are positioned even before many of the SCU organizations, located at a higher level in the hierarchy.

These authorities are not necessary for providing the facilitation intervention to citizens; as a matter of fact, some SCU organizations' programs do not engage any certification and/or tutorship authority, rather some of them prefer to do these activities by themselves or completely avoid them. However, these actors cannot be underestimated because they represent one of the possible incentives for volunteers to join the policy. They are necessary to attract young people towards the Digital Civilian Service since they will receive a certification concerning their digital competences spendable to be more competitive in the job market, and the help of a professional tutor to better orient in it.

In particular, on these actors there is a choice by bureaucrats between policy centralisation (i.e., standardisation of the service) and policy decentralisation (i.e., autonomy of the implementing agencies). With the Digital Civilian Service, policymakers adopted the second alternative, leaving freedom to SCU organizations to decide both whether to include this additional option or not and, in case, to which certification and/or tutorship provider relate. This resulted in some institutions not exploiting this opportunity or providing a not formally recognised diploma, with the risk of decreasing the attractiveness for volunteers to participate in the initiative. Therefore, policymakers should evaluate the opportunity to centralise these two key activities. This guarantees on one side that each volunteer has recognised the competences developed according to the same standard (e.g., DigComp) and on the other side they are all given the possibility to increase their employability by receiving professional tutoring services.

Lastly, the dyad level analysis highlights that almost half of the relationships in the network are made by service provision. We identified core service providers, whose services are linked to the main objective of the policy (i.e., increase digital competences), and ancillary service providers that are not fundamental for policy implementation, but may increase a lot its quality and effectiveness; for instance, offering transport to the location where the intervention is provided for elderly or disabled, offering psychological support to volunteers, etc. Surprisingly, the ancillary service providers account for the majority of the service relationships.

## 6.2. Research Question 2

The second knowledge gap focuses on how the distance between policy formulation phase and policy implementation can be determined by stakeholders' priorities and characteristics, that led to the emergence of the following research question:

*RQ2: Which values stakeholders bring in a policy network?*

In our work, stakeholders' values are proxied as priorities in terms of targets, geographical coverage, digital competences, and additional objectives. According to the literature on Policy Analytics, they influence the network structure, but few real-world examples are provided. Moreover, these few examples are mainly related to environmental policy or urban planning, where interventions are typically irreversible and capital-intensive.

Given these characteristics, the Policy Analytics literature so far has focused mainly on the initial phases of the policy cycle. Instead, Digital Civilian Service offers the opportunity to look at the value-driven logic of stakeholders also during the implementation phase, since policymakers have left degree of freedom and personalisation of the interventions to SCU organizations grounded in the territory.

In particular, this value driven logic of the Policy Analytics approach affects the overall network. Targets (i.e., policy beneficiaries) and geographical dimension have higher influence on the structure of the network than the digital competence area taught. Moreover, we have highlighted differences also inside the same priority. For instance, network density more than doubles when considering people with disabilities, women or eFacilitators, because underrepresented by the SCU organizations involved, and the same happens for the municipality geographical dimension.

Even more interesting is the emergence of additional objectives brought by the implementing agencies during the implementation phase. At this regard, we highlighted how they tend to be suggested by organizations with centrality measures higher than the average, and how many times they are linked to the targets of the program; therefore, it is important to look at them, because there is the risk to deviate from the focus of the policy, not achieving its main objective of empowering citizens with digital competences.

## 6.3. Contributions

In this section, we present the theoretical contributions our thesis could add to the existing literature. Moreover, we offer some policy implications and managerial recommendations concerning the Digital Civilian Service as well.

### 6.3.1. Theoretical Contributions

This work provides three main contributions:

1. We apply Bullock et al. (2021) framework on stakeholders' roles during the policy implementation phase to the Digital Civilian Service case, in order to confirm the effectiveness of the existing actors' sub-types classification to map a real case setting, and to verify the necessity of new categories, suggesting additional improvements of the framework.
2. We provide guidelines to run a value-driven Social Network Analysis, to respond to one of the main shortcomings of Policy Analytics approach, that is the lack of clarification in the academic research on how to translate its theoretical principles into actionable ones.
3. Based on the systematic literature review analysis concerning additional objectives in second-level divide policies, and on our classification on the basis of the target, we compare them with the objectives stakeholders mentioned in the Digital Civilian Service, to confirm existing literature and add new potential aims.

### 6.3.1.1. Stakeholders' Roles

We have seen that both literature stakeholders and the ones of our case do not fit perfectly on Bullock et al. (2021) non-exhaustive framework of actor sub-types that intervene in the implementation phase of the policy cycle.

While the categories of Dente (2014) are representative of the typologies of actors involved in the different phases, they fail to encompass in a complete way the complexity of the implementation one. In fact, Bullock et al. (2021) framework already identifies the necessity to insert an additional category to the ones proposed by Dente (2014), that is classified as '*Other*', since it comprehends actors whose role is not core with respect to the policy objective but is still relevant to achieve a widespread adoption, and – for now – comprehends only the '*Media*', intended as '*Individuals and organizations that communicate information through a variety of channels, including formal media outlets and social media outlets*'.

Despite this attempt, from the analysis of papers on second-level digital divide policies, some groups of actors that do not perfectly coincide with the one proposed, – or are not covered at all – emerged. In particular, we have mentioned the suppliers of hardware and software, as well as certification authorities that gave participants the possibility to receive a certification for basic network technology skills.

This consideration is even more evidently confirmed by the Digital Civilian Service case, where even additional typologies of actors with respect to those identified in literature emerge. From Table 25 it is possible to see that partners, certification authorities and tutoring authorities do not find a match in the actor sub-types provided by Bullock et al. (2021). Rather, the classification of the actors' sub-types is effective to capture the role of central actors, and SCU organizations and their sites.

Therefore, we propose to include *certification authorities* as a new actor sub-type in the *Experts* group, since it is generalisable to other contexts, such as environmental certification authorities, and finds a strong presence in a real setting. We will tackle tutoring authorities instead later.

A second limitation of Bullock et al. (2021) framework is that service providers are not mapped. In the Digital Civilian Service, they are identified in the '*Program partners*' and '*Project partners*', that do not find some correspondence in the actor sub-types.



Actors	Bullock et al. (2021) actor correspondence	Bullock et al. (2021) actor sub-type correspondence
Digital Transformation Department	Bureaucratic actors	Executive departments
Department for Youths Policies and Universal Civilian Service	Bureaucratic actors	Executive departments
Digital Agenda Observatory of Milan Polytechnic	Experts	Scientists / researchers Intermediaries and technical assistance providers
Formez PA	Experts	Intermediaries and technical assistance providers
Intellera	Experts	Intermediaries and technical assistance providers
SCU organizations	Special interests	Implementing agencies
Program partners	Special interests	Not mapped
Project partners	Special interests	Not mapped
Certification authorities	Experts	Not mapped
Tutoring authorities	Other	Not mapped
Host and Operative sites	Special interests	Street-level bureaucrats
Training sites	Special interests	Street-level bureaucrats

Table 25: SCD actors and their correspondence in Bullock et al. (2021) framework

The sub-type from Bullock et al. (2021) that most closely matches this category is *‘Intermediaries and technical assistance providers’* that are defined as “*organizations, programs, or individuals that work “in between” policymakers, funders, and front-line implementers, to facilitate effective implementation drawing on expertise in implementation*”, but in this case assistance means to provide guidance to implementing agencies in particular on the implementation process, and therefore activities such as coaching, decision support, monitoring and evaluation. This role could be represented by the national public training agency Formez PA since it is in charge of providing general training to SCU organizations, or by the Digital Agenda Observatory of Milan Polytechnic university centre, that is in charge of supporting SCU organizations during their capacity building phase on digital topics and of monitoring the impact of the policy, even if it is partially overlapped with the role of scientists/researchers. This is due to the fact that the Digital Agenda Observatory both acts with a higher-level scope, that is gaining and sharing new knowledge and contributing with its expertise in each phase of the policy cycle, and, at lower level, operationally supports implementing agencies with the aim of providing monitoring and outcome results.

While it is quite natural to think, at this point of the discussion, to include the '*Core service and material providers*' in the '*Actors with special interests*' category, since they are deeply affected by the selected policy alternative, from the dyad level analysis, it emerges that the majority of links relates to not-ICT specialist services even if the core of the policy is to reduce second-level divide in Italy.

Therefore, we propose two new categories:

- *Core service and material providers*, to represent all those entities that provide services that enable the operative implementation of the high-level policy objective based on a service agreement. In the case of the Digital Civilian Service, they are reflected by all the ICT service providers and implementation actors identified in paragraph 4.2.4, such as provision of human resources expert in digital competences and provision of software.
- *Ancillary and collateral service providers*, to map all those entities that provide services that are not strictly necessary but complementary to the operative implementation. Even if with a minor predominance, their role can affect the effectiveness of the policy and the widespread adoption. They should be included in the '*Other*' category mapped by Bullock et al. (2021). In this class we can find for example the '*Other not ICT-specialist services*', such as psychological support, domain advisory services, aimed at provisioning specific competences related to the beneficiaries or as an assistance to eFacilitators, and provision of human resources experts in fields different from the recognised core one. In this sense, *tutoring authorities* reflect this definition, as it is a secondary activity whose presence and structure is at discretion of each single organisation. We intend to include under this area also '*Media*', as it is only one of the different services that can be incorporated.

We must clarify that '*Intermediaries and technical assistance providers*' act at central level to provide guidance and coordination in the implementation phase thanks to their expertise, while '*Service providers*' act to operatively support implementing agencies. Therefore, these two categories work on two different hierarchical levels.

Table 26 shows the adaptation of Bullock et al. (2021) accordingly.

Actor	Subtype	Definition
Actors with Special Interests	Implementing Agencies	Organizations responsible for implementing the laws or policies developed; locations where most of the implementation takes place
	Street-Level Bureaucrats	Agencies whose workers interact with and have wide discretion over the dispensation of benefits
	Insurers	Organizations that manage risks, providing a coverage against them to a group of individuals
	Donors/Foundations	Organizations that raise and allocate funds based on a specific mandate that they identify
	Government Corporations	Organizations or businesses that are run independently from government but are still ultimately accountable to them
	Unions	Associations of workers created to promote and protect their interests in the workplace
	Core service and material providers	Organizations that provide services that enable the operative implementation of the high-level policy objective based on a service agreement
Experts	Scientists/Researchers	Individuals that systematically gather, analyse, and use research and other evidence through processes, such as theorizing, synthesizing, and hypothesis testing, to gain and share understanding and knowledge
	Field or Practice Leaders/Champions	Individuals that act as champions for an innovation and its implementation
	Patients or Persons with Lived Experience and Families/Carers	Individuals who bring personal knowledge or experience of a problem, condition, or service and who are the intended beneficiaries or ultimate targets of implementation, like families or caregivers
	Innovation Developers and Disseminators	Organizations or individuals who have developed a process, program, or product to be implemented
	Intermediaries and Technical Assistance Providers	Organizations or individuals that work in-between policymakers, funders, and front-line implementers, to facilitate the effective implementation
	Certification authorities	Organizations certifying the achievement of a standard
Other	Ancillary and collateral service providers	Organizations that provide services that are not strictly necessary but collateral to the operative implementation

Table 26: Bullock et al. (2021) Updated Framework

### 6.3.1.2. Guidelines for a value-driven Social Network Analysis

As mentioned, one of the main limitations of Policy Analytics is the lack in academic research of actionable frameworks that guide its operationalisation. In this regard, as second contribution we provide a proposal of process that can help using the Social Network Analysis as a value-driven tool.

In particular, the following questions guided us to transform the data collected from SCU organizations proposed programs and projects into a social network:

1. Which are the main actors involved in the implementation phase of the policy cycle?

The first phase is needed to understand who the stakeholders are, and which are their roles within the policy boundaries, to have a clear understanding of policy functioning. This information also helps to define possible hierarchies in the network – as in our case with the three levels.

2. *Which typologies of relationships do the actors have?*

In the second phase, the degree of autonomy or collaborations the actors have in the network can be evaluated by first understanding what the planned activities and actions during the implementation phase are, and then determining how deeply they rely on external parties to accomplish them.

Once obtained all the different typologies of relationships based on the activities previously identified, they can be grouped into more abstract categories that are relevant to gather insights because they simplify the SNA.

3. *How can the importance of an actor and of its relationships be determined?*

In this phase, a possible perspective that can be assumed is the circulation of resources one. In this case, each actor and the related relationships are weighted based on the number of resources managed or transferred, such as the number of human resources or technical resources involved, or the number of sites actors interact with.

4. *How can the value dimension of Policy Analytics be incorporated in the SNA?*

The addition of value dimension through Policy Analytics lenses, allows to highlight in the overall network some '*value regions*', based on the chosen segmentation of answer of organizations. They can be approximated with different priorities in terms of target, geographical coverage, typology of interventions etc. Based on the context, other dimensions can be utilised to see if the structure of the network changes and how.

The practical determination of value regions is done by filtering systematically actors through Boolean labels on actors and relationships.

Figure 13 highlights the whole procedure with these four questions and the related sub-questions.

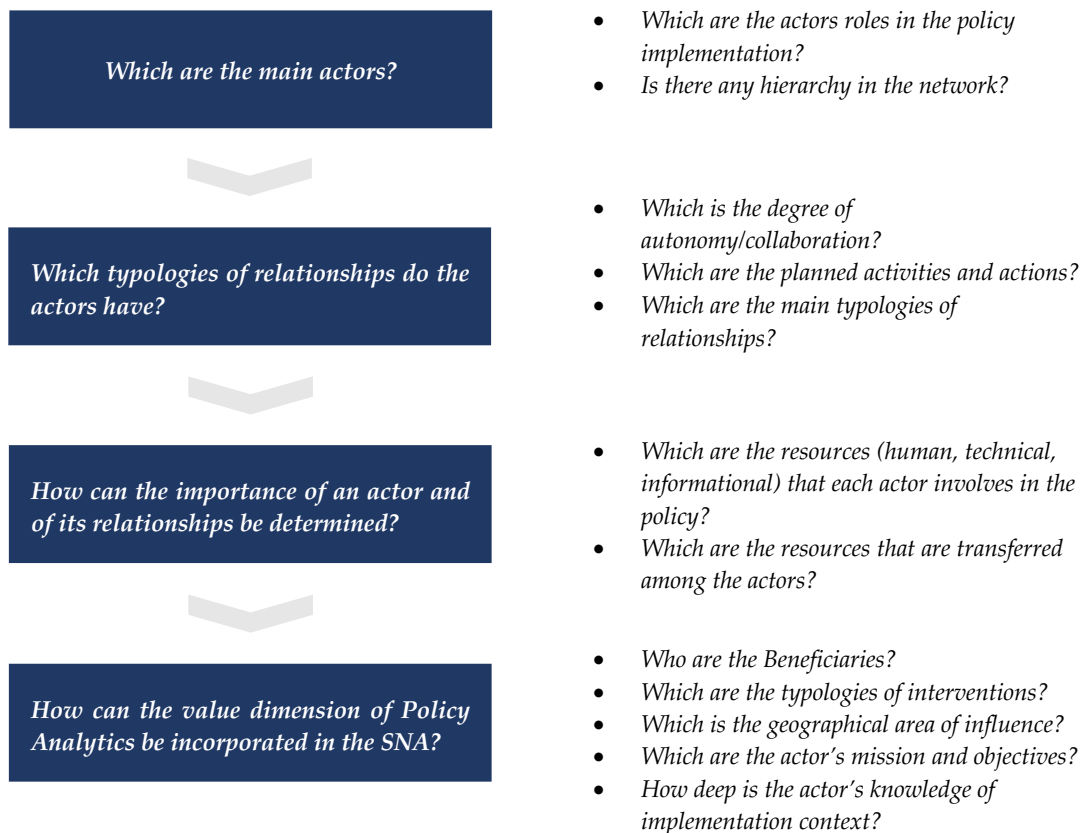


Figure 13: Guidelines for a Value-Driven Social Network Analysis

### 6.3.1.3. Objectives

Our last theoretical contribution concerns instead the additional objectives that may emerge regarding a second-level divide policy. Indeed, the objectives highlighted with the Digital Civilian Service are not always the same with respect to those obtained from the literature review (Table 13 in paragraph 2.4.9). In particular, three new objectives emerged:

1. Increase the quality of the e-health services for patients, mainly suggested by hospital stakeholders.
2. Valorisation and Digitalisation of Cultural Heritage, mainly suggested by organizations operating in the field of culture and tourism, and by some municipalities around Italy.
3. Organisation development and (social) innovation for the improvement of the implementing agency itself.

We want to focus more on this last objective. This is a clear example of how the implementation phase of the policy cycle can be distant with respect to the design phase. In fact, SCU organizations, which act as implementing agencies, in reality

position themselves as beneficiaries too. This is probably a consequence of their perceived priority to undergo a digitalisation path themselves, to strengthen their digital channels and improve the competences of their personnel. This phenomenon is called '*displacement effect*' in the impact literature (Karlan et al., 2016), with displacement meaning how much of one outcome (related to the main policy objective) is displaced by other outcomes (related to additional objectives). Displacement can be both positive or negative; in our case we must wait for a long-term to evaluate its consequences.

With the exception of the reduction of the gender pay gap, all the other objectives of the literature are confirmed by the Digital Civilian Service case. This lack may be explained by the very low representation of women in the programs analysed, and by the fact that, when present, they are not the unique target and so the intervention is not completely tailored on them.

Moreover, while for some targets (i.e., general population, elderly and youths) the objectives overlap quite perfectly in both literature and our case, this is not the case of people with disabilities, migrants, eFacilitators and women.

Regarding the first two categories – people with disabilities and migrants – we have shown how the papers target them only collaterally, because more focused on other categories of beneficiaries. Therefore, only few specific objectives (i.e., socialisation for people with disabilities, and employability for migrants) could be highlighted. Rather, with the Digital Civilian Service, we have seen how stakeholders can exploit a second-level divide policy to pursue also other objectives; in particular:

- Active citizenship, employability, and motivation and attitudes for people with disabilities.
- Active citizenship, socialisation, and promotion of education and schooling for migrants.

Regarding eFacilitators, instead, we have two other objectives not highlighted in the literature. Beside pursuing active citizenship, we also see programs aimed at increasing their employability and promoting intergenerational learning. First, employability is not deviant from the policy itself; indeed, it works with certification and tutorship authorities to help eFacilitators enter the job market. Second, being elderly the target of most of the programs, intergenerational learning is a coherent objective, since by doing facilitation activities, volunteers can be enriched by the stories and experiences of life older adults may tell them, also outside the ICT domain.

Lastly, women do not find a perfect match between the literature and our case, because they are underrepresented by both these analyses. Therefore, more research should be done concerning this topic.

### 6.3.2. Policy Implications

Lastly, our work provides useful policy implications, to suggest policymakers possible improvements of the Digital Civilian Service policy:

- *Objectives Definition:* We have seen that in our case values emerge also in the implementation phase, coherently with the reversibility of the decisions in the digital policy field. However, the most influential players in terms of centrality in the network are also the ones that propose additional objectives. Therefore, policymakers should carefully monitor them, because there is the risk to deviate from the main goal (i.e., increase citizens digital competences), and should try to anticipate them in the first phases of the policy cycle for what concerns eventual future Digital Civilian Service calls, to better design the interventions based on the stakeholders' knowledge of the local context.
- *Stakeholders' Roles:* the policy involves 2680 different actors in its two first calls (i.e., pilot and PNRR), leading to a wide network complexity. In order to improve the accuracy of the insights that can be obtained from the SNA instrument and simplify the data collection procedure, policymakers should require SCU organizations to explicitly mention the host and operative sites used for the implementation phase, as well as general and specific training sites, since we mainly derived them from the updated documentation that institutions published on their websites. Moreover, they should require SCU organizations to be more precise in specifying the role of each actor they interact with, since for the 2.3% of the partners relationships it was still not clear, and to map to which host and operative sites third parties are linked. This last consideration can be useful to evaluate the strategic choices that institutions make in terms of centralisation or decentralisation of the services. Finally, since one of the possible causes of policy failure could be the low adoption due to wrong – not suitable for the beneficiaries of the interventions – or insufficient communication strategy, government should also uniformly collect data concerning informal relationships, due to the fact that most implementing agencies rely on them to approach the target.
- *Centralisation of Certification and Tutorship Authorities:* since these authorities act as incentives to attract and retain eFacilitators – the key resource to implement facilitation activities – policymakers should evaluate the opportunity to centralise them. In this way, volunteers will receive the same opportunities and a homogeneous service delivery, their competences will be certified according to the same standard – possibly DigComp 2.2, which is valid at European level – and they will be followed by a professional tutor to assist their entrance in the job market. In this way, cases where one or both of these authorities are missing are avoided for the future Digital Civilian Service calls.
- *Targets:* some targets are underrepresented by the programs considered. This is the case of people with disabilities and even more of women.

Policymakers should better focus their attention on designing specific interventions for them, especially considering that 1 out of 4 European adults is affected by some forms of disabilities, and that 1 in 3 STEM graduates and 1 in 6 ICT specialists is female. Moreover, for the last category, there are only few organizations suggesting projects that are sufficiently gender sensitive, so it will be more difficult to achieve an increase in their competences and outcomes such as a major employability or a reduction of gender gap. Therefore, policymakers should focus their attention on involving the right stakeholders to increase the number of nodes in the network that act on these target groups, and promote the relationships among them, to improve their centrality and their influence.

- *Critical Success Factors*: each target has different needs and barriers that prevent the adoption of digital technologies. Therefore, we identified the main critical success factors for a successful second-level divide policy implementation (Table 13 in paragraph 2.4.9). We suggest policymakers and implementing agencies to take them into consideration when designing their intervention.

### 6.3.3. Managerial Contributions

The network is highly diversified in terms of targets, actors, and typologies of relationships. Moreover, we must remark that SCU organizations are not acquainted to digital projects; in fact, Digital Civilian Service represents their first experience in this field. Therefore, they may not have previous knowledge and they may be subjected to many potential doubts and issues, especially when the network is highly diversified and the complexity they need to manage increases.

At this regard, managerial services and co-programming and co-projecting activities are fundamental. However, from the dyad level analysis, it emerged that the managerial services category is underrepresented, as it is limited to 3.1% of the total amount of relationships. Moreover, the implementing agencies do not often co-program or co-project the interventions. These two conditions could lead respectively to:

- Planning and coordination difficulties given the multiple nature and aims of the stakeholders' involved.
- Few information and best practices sharing among the SCU organizations, which in view of a collaborative policy network should increase to pursue even better the common goal of increasing citizens digital competences.

Therefore, not only implementing agencies should strengthen their bonds to share possible best practices, discoveries, and problems – as they already do in the Universal Civilian Service – but they should also stipulate contracts with more third parties specialised in providing managerial services, to facilitate the planning of their activities and the coordination of all the actors involved in a new environment.



Another consideration is that organizations should also have real competences in the specific area in which they operate in the network. Despite the fact that stakeholders are generally more grounded on the territory than policymakers, the knowledge of the local digital context turned out to be frequently generic, as we derived from the project characteristics section from data collection, and specifically from the context description field.

Finally, if public organizations aim to apply a Policy Analytics approach, they should review their policy management processes and digitalise some of the procedures ex-ante, to guarantee the interoperability of datasets and applications. In fact, data integration and standardisation is one of the main requirements that limit the applicability, given the multiple nature and sources of data.



## 7 Conclusions

Our work is an attempt to apply the Policy Analytics approach to a practical case in the digital inclusion policies field, which is relatively distant with respect to the traditional environmental and urban policies fields in which it was born.

First, it is worth mentioning that this is not a stance of preference of Policy Analytics with respect to the traditional Evidence Based Policy-Making approach, since they can give different insights, but the second is not able to capture the complexity of collaborative policy networks. We focused on the first in order to discover new knowledge on the role that this approach could have in the implementation phase of the policy cycle and try to increase its operationalisation. At this regard, we provided a methodology with practical guidelines to collect, organise and evaluate data to run a Social Network Analysis concerning all the policy's stakeholders and their relationships. In this way, it was possible to model and study the collaborative network of the Digital Civilian Service policy during its implementation phase.

Another key message that emerged is that, when dealing with the digital inclusion policies field, it is necessary, according to the digital inequality literature, to consider the multi-dimensionality of the concept, such as *"the availability of material, cultural, social and mental resources and personal factors such as gender, intelligence, ability, ethnicity, age and health"* van Dijk (2005). Therefore, digital inclusion needs to be paired with social inclusion. This means that different targets may have different needs and barriers that prevent them to approach the digital world, as evinced from the literature review, that should be removed.

In order to do so, policies and stakeholders use additional objectives with respect to only increase the digital competences. In fact, according to Policy Analytics approach, stakeholders involved in policymaking are the bearers of ground experience of the local context and communities where they operate and have better knowledge on how to customise the intervention based on the beneficiaries groups targeted.

The network analysis highlighted how the policy configuration can be dependent on stakeholders' values. Especially in collaborative networks, stakeholders do not simply bridge the gap between policymakers and recipient, but shape the policy with their own priorities, background, and values.

Finally, in the specific context of the Digital Civilian Service, characterised by high innovation at least from the viewpoint of SCU organizations, additional objectives may

emerge also in the final phases of the policy cycle. However, in the next calls, it is better to consider them since the beginning of the cycle to increase the effectiveness of the intervention and to exploit the stakeholders' developed experience.

## 7.1. Limitations

The main limitations of our work concern the methodology followed to build our collaborative policy network:

1. The boundaries of the analysis are limited to the Digital Civilian Service, therefore we did not include possible existing relationships among the SCU organizations in the traditional Universal Civilian Service area, which may influence the network structure too.
2. Even if present in some cases, we mapped only formal relationships and not informal ones, due to the different levels of details of the information discretionally provided by the institutions. In fact, according to Schneider et al. (2003), "*the formal and informal interactions have the potential to increase policy effectiveness*", therefore they can be considered as equally important.
3. The network does not detail flows among stakeholders such as information or expertise, to map the net producers and net recipients of information. At this regard, specific interviews with SCU organizations would be necessary.
4. For simplicity, the level of detail used in the analysis is the program level, that may comprehend multiple targets not distinguished based on the project considered. This could have had an impact on some parameters, but we expect it to be minimum.

## 7.2. Future agenda

This is a first attempt to highlight the importance and influence of values in a policy network during its implementation phase. However, the literature is still scarce concerning Policy Analytics and mainly focuses on policy fields characterised by non-reversible interventions and a relatively low importance of human and social factors. Therefore, future research should try to explore more how values emerge in other phases and in other fields, such as education, labour, social policy, health.

Moreover, the Policy Analytics approach requires further efforts towards its operationalization. Scholars should try to develop guidelines concerning how to incorporate stakeholders' values also in the other tools Policy Analytics relies on, for instance computer simulation, geographic information systems, statistical analysis, or machine learning techniques, in order to define replicable value-driven procedures.

Not only research should progress on this approach, but it should also progress in terms of second-level divide. Indeed, lot of open points are left behind, especially

concerning women empowerment interventions, policies targeting people with disabilities and migrants, studies on training on facilitators and study on facilitation long-term effects (i.e., impact) on beneficiaries. Moreover, the papers we have analysed lack of impact quantification, without concentrating on the long-term effects the policy has on its beneficiaries. Probably this is due to a lack of feedback and assessment data, with policymakers running few monitoring activities. Instead, thanks to the involvement of Milan Polytechnic with competences in this field, and of Formez and Intellera providing a platform for data collection, we think that the Digital Civilian Service policy may configurate as a beginner to evaluate impacts of digital inclusion policies.



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# A Appendix Second-level Divide Policy

Authors	Paper	Country	Policy	Objective
Lev-On et al.	<i>The long-term effects of digital literacy programs for disadvantaged populations: analysing participants' perceptions</i>	Israel	Lehava Project (2001-)	Increase digital literacy and knowledge of disadvantaged populations
Lim et al.	<i>Use of ICT for bridging digital opportunity: A Korea's case</i>	South Korea	Information Network Village (INVIL) (2001-)	Increase the availability of e-Government services and the income level of rural regions local residents
Kambouri et al.	<i>Adult learners and ICT: An intervention study in the UK</i>	UK	Skills for Life Strategy (2001-)	Increase adult ICT literacy, language and numeracy (LLN)
Hsiu et al.	<i>Bridging the digital divide with information technology in Taiwan: A community and public policy approach</i>	Taiwan	Digital Application Promotion Project in Remote Areas (2005-)	Increase access to information and digital services in remote areas, and expand their range and recipients, favouring the development of local industries
Chao et al.	<i>How to overcome the digital divide? An empirical study of Taiwan's DOCs</i>			
Willis	<i>Making a 'Place' for ICTs in rural communities the role of village halls in digital inclusion</i>	UK	Rural Development Programme for England (RDPE) (2007-2020)	Improve the digital inclusion of rural areas (accessibility, use and quality of ICT)
Mirke et al.	<i>Adults' readiness for online learning in the Czech Republic and Latvia (digital competence as a result of ICT education policy and information society development strategy)</i>	Latvia	Father's Third Son (2009-)	Provide training to librarians to acquire knowledge and skills, in order to offer digital skills learning opportunities for libraries' users.
Becker et al.	<i>How to Design an Intervention to Raise Digital Competences: ALL DIGITAL Week – Dortmund 2018</i>	European Union	ALL DIGITAL Week (2010-)	Increase awareness of ICTs, digital literacy and digital skills
Schou et al.	<i>Digital by default? A qualitative study of exclusion in digitalised welfare</i>	Denmark	Agency for Digitisation (2011-)	Encourage the usage of government digital platform
Aires et al.	<i>Mediating towards digital inclusion: The monitors of internet access places</i>	Portugal	National Internet Access Places (IAP) (2011-)	Favour social development, through the promotion of digital skills and free open Internet access

Garcia Aguilera et al.	<i>Actions of social and labour inclusion with ICT: an assessment of the Velez-Malaga urban area</i>	Spain	Digital Agenda of the Government of Spain (2012-)	Provide basic ICT skills and train new ICT professionals to increase employability
Kowalska-Chrzanowska et al.	<i>Digital competences of residents in Kuyavian-Pomeranian Voivodeship in the light of the polish training project "E-active"</i>	Poland	Digital Poland Operational Program (2014-2020)	Promote Internet usage and improve digital literacy and competencies, necessary to efficiently use the digital media for the professional, educational and recreational purposes

Table A. 1: Papers dealing with General Population in High-Income Countries

Authors	Paper	Country	Policy	Objective
Lam et al.	<i>Digital inclusiveness - Longitudinal study of internet adoption by older adults</i>	Hong Kong	Opportunities for the Elderly (1999-2002)	Promote IT awareness and accessibility to elder citizens (over 55) establishing training courses and public computer facilities
Del Prete et al.	<i>Overcoming generational segregation in ICTs: Reflections on digital literacy workshop as a method</i>	European Union	Equal Community Initiative (2000-2008)	Reduce the generational gender digital divide in rural and semi-rural areas
Hill et al.	<i>Older people and internet engagement: Acknowledging social moderators of internet adoption, access and use</i>	Wales	Strategy for Older People in Wales (2003-2004)	Introduce elder individuals, with little or no experience, to the Internet and the World Wide Web
Chang et al.	<i>Factors influencing women's attitudes towards computers in a computer literacy training program</i>	Taiwan	Bridging Digital Divide for Women Project (2007-)	Develop adult and older women basic digital skills and support the adoption of a positive and anxiety free attitude towards computers
Mączik et al.	<i>Ict training as a tool for supporting professional activity of people over 50: Case study</i>	Poland	Digital Poland of Equal Opportunities (2007-2013)	Increase the participation in social and professional life of older adults (50-67) and reduce their anxiety and fear of technologies.
Tomczyk	<i>Lighthouse Keepers of Digital Poland of Equal Opportunities – information about nationwide educational program</i>	Poland	Digital Poland of Equal Opportunities (2007-2013)	Encourage the people from the 50+ generation to make the first step into the digital world, thanks to young 'digital lighthouse keepers'
Tomczyk et al.	<i>ICT, digital literacy, digital inclusion and media education in Poland</i>			
Nyce et al.	<i>"Lose your time in a useful way": Digital inclusion of the elderly at a pensioners' club in Romania</i>	Romania	Biblionet – Global Libraries Romania (2009-2015)	Increase access to ICTs to underserved and train librarians to offer digital skills learning opportunities for pensioners using libraries

Abad	<i>Media literacy for older people facing the digital divide: The e-inclusion programmes design</i>	European Union	Grandparents and Grandchildren Program (2012)	Involve young students from vocational colleges and secondary schools with the role of “digital facilitators” who individually assist older people, guiding them in the use of Internet and e-mail
De Carvalho et al.	<i>Digital information access for ageing persons</i>	European Union	Lifelong Learning Programme (2014-2015)	Leverage processes of independency and individual empowerment of senior citizens (over 50) using mobile devices
	<i>Technology Enhanced Learning for Senior Citizens</i>			
	<i>Overcoming the silver generation digital gap</i>			
Robinson et al.	<i>Digital Inclusion Across the Americas and Caribbean</i>	Uruguay	Plan Ibirapita (2015-)	Promote digital inclusion among socio-economically disadvantaged older adults, and reduce the barriers related to skills
Cid et al.	<i>Tablets for deeply disadvantaged older adults: Challenges in long-term care facilities</i>			
Suchowerska et al.	<i>Governance networks that strengthen older adults’ digital inclusion: The challenges of metagovernance</i>	Australia	Digital Literacy for Older Australians Strategy (2016-2020)	Increase the digital literacy, confidence and online safety of older people (over 50) to enable them to participate online and access the fundamental social and economic benefits of Internet technologies

Table A. 2: Papers dealing with Elderly in High-Income Countries

Authors	Paper	Country	Policy	Objective
Meiners et al.	<i>Empowering women? Engaging a technology grant for social change</i>	USA	Women’s Studies Program (2000-2003)	Increase confidence and ICT competences of women attending the course
Del Prete et al.	<i>Overcoming generational segregation in ICTs: Reflections on digital literacy workshop as a method</i>	Spain	Equal Community Initiative (2000-2008)	Reduce the generational gender digital divide in rural and semi-rural areas
Rabayah	<i>Why do women in rural areas seek ICT training? an evaluation of ICT training initiative targeting women in rural area in palestine</i>	United Nations	Sabaya Program (2004-2008)	Promote social and economic empowerment, acquire entrepreneurial capabilities, and develop the community
Chang et al.	<i>Factors influencing women’s attitudes towards computers in a computer literacy training program</i>	Taiwan	Bridging Digital Divide for Women Project (2007-)	Develop adult and older women basic digital skills and support the adoption of a positive and anxiety free attitude towards computers

Berger et al.	<i>Training in basic Internet skills for special target groups in non-formal educational settings - Conclusions from three pilot projects</i>	Germany	Internet Erfahren (2009-2011)	Set up a training curriculum on digital literacy to develop basic Internet skills and improve women's performances at their place of employment
Mariscal et al.	<i>Bridging the Gender Digital Gap</i>	United Nations	Global Digital Gender Equality Action Map (2014-)	Improving women and girls' digital technology access, connectivity and security, supporting development of STEM skills of women and girls and promoting decision-making roles for women within the ICT field

Table A. 3: Papers dealing with Women in High-Income Countries

Authors	Paper	Country	Policy	Objective
Cohen Zilka	<i>Reducing the Digital Divide among Children Who Received Desktop or Hybrid Computers for the Home</i>	Israel	Computer for Every Child Project (1996-)	Reduce the digital divide between affluent and disadvantaged populations by giving children the same opportunities that their peers have
Assadi et al.	<i>Computers in homes (CIH): Enabling community access to internet and ICT?</i>	New Zealand	Computers in Homes (CIH) Programme (2000-2017)	Provide devices to underserved families to enhance their performances at school and at work
Crump et al.	<i>Secret level: Evaluation of a New Zealand community ICT project</i>	New Zealand	New Zealand Digital Strategy (2005-2010)	Increase positive opportunities for youth development so that young people can become resourceful, responsible, socially aware, interactive and positive
ChanLin et al.	<i>Online after-school learning for bridging the digital divide</i>	Taiwan	Digital Application Promotion Project in Remote Areas (2005-)	Bridge the digital divide and learning gap among children in remote areas
Hsiu et al.	<i>Bridging the digital divide with information technology in Taiwan: A community and public policy approach</i>			
Loureiro et al.	<i>Competences for collaboration and knowledge sharing in digital society – a case study with an Erasmus intensive programme</i>	European Union	Lifelong Learning Programme (2007-2013)	Provide students with information and communication technologies (ICT) skills for a digital society
Loureiro	<i>e-Skills IP – Mastering the 21st Century Skills</i>			
Jewitt et al.	<i>Technology and learning at home: Findings from the evaluation of the Home Access Programme pilot</i>	UK	Home Access Programme (HAP) (2008-2011)	Provide free Internet connectivity to families to help address social inequity and increase awareness of the ICTs related economic and social benefits, increasing both children and parents' digital engagement

Moreno-León et al.	<i>The Europe Code Week (CodeEU) initiative</i>	European Union	Europe Code Week (2014-)	Attract young people to computer science and develop basic coding skills, increasing awareness about careers in ICT and addressing the mismatch in digital skills in the European labour market
Baranowski	<i>The case study of Erasmus+ programme. Project's influence on participants' digital competence. Youth, multilingualism and work perspectives in Europe 2015-2017</i>	European Union	Erasmus+ (2014-)	Encourage students to develop key skills to enter the workplace, like developing digital skills and foreign language competences
Cabello et al.	<i>Public policies for digital inclusion among young people in Chile: reflections on access, opportunities, outcomes and rights</i>	Chile	Digital agenda for 2020 (2015-2020)	Provide community access to ICTs to children and young people

Table A. 4: Papers dealing with Young People in High-Income Countries

Authors	Paper	Country	Policy	Objective
Berger et al.	<i>Training in basic Internet skills for special target groups in non-formal educational settings - Conclusions from three pilot projects</i>	Germany	Internet Erfahren (2009-2011)	Increase digital inclusion of disadvantaged population categories
Becker et al.	<i>How to Design an Intervention to Raise Digital Competences: ALL DIGITAL Week – Dortmund 2018</i>	European Union	ALL DIGITAL Week (2010-)	Increase awareness of ICTs, digital literacy and digital skills
Manžuch et al.	<i>Digital comics reading program for reducing the digital exclusion of people with hearing impairments</i>	Lithuania	Connected Lithuania Project (2019-)	Reduce digital divide and increase everyone digital skills

Table A. 5: Papers dealing with People with Disabilities in High-Income Countries

Authors	Paper	Country	Policy	Objective
Assadi et al.	<i>Computers in homes (CIH): Enabling community access to internet and ICT?</i>	New Zealand	Computers in Homes (CIH) Programme (2000-2017)	Provide devices to underserved families to enhance their performances at school and at work
Chang et al.	<i>Factors influencing women's attitudes towards computers in a computer literacy training program</i>	Taiwan	Bridging Digital Divide for Women Project (2007-)	Develop adult and older women basic digital skills and support the adoption of a positive and anxiety free attitude towards computers

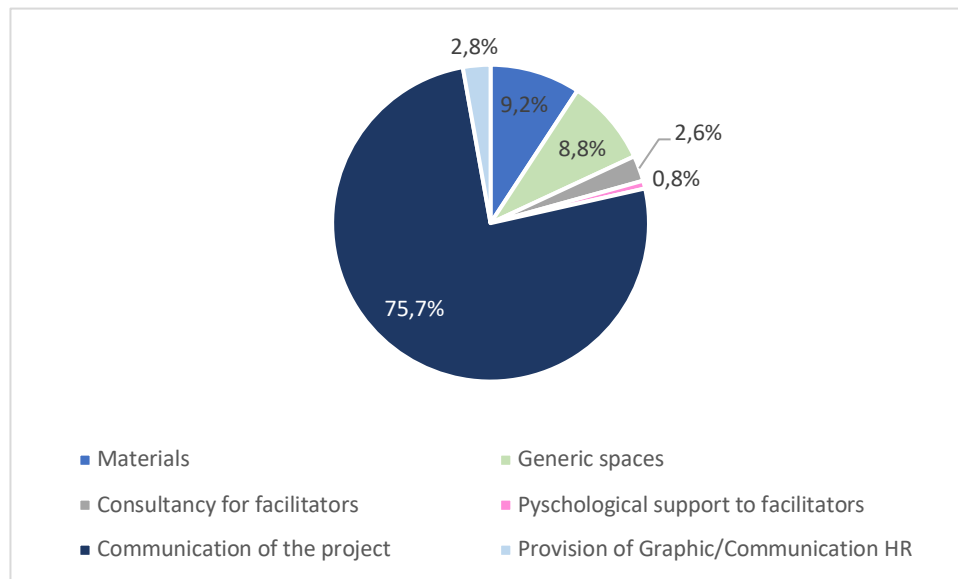
Berger et al.	<i>Training in basic Internet skills for special target groups in non-formal educational settings - Conclusions from three pilot projects</i>	Germany	Internet Erfahren (2009-2011)	Increase digital inclusion of disadvantaged population categories
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Table A. 6: Papers dealing with Migrants in High-Income Countries

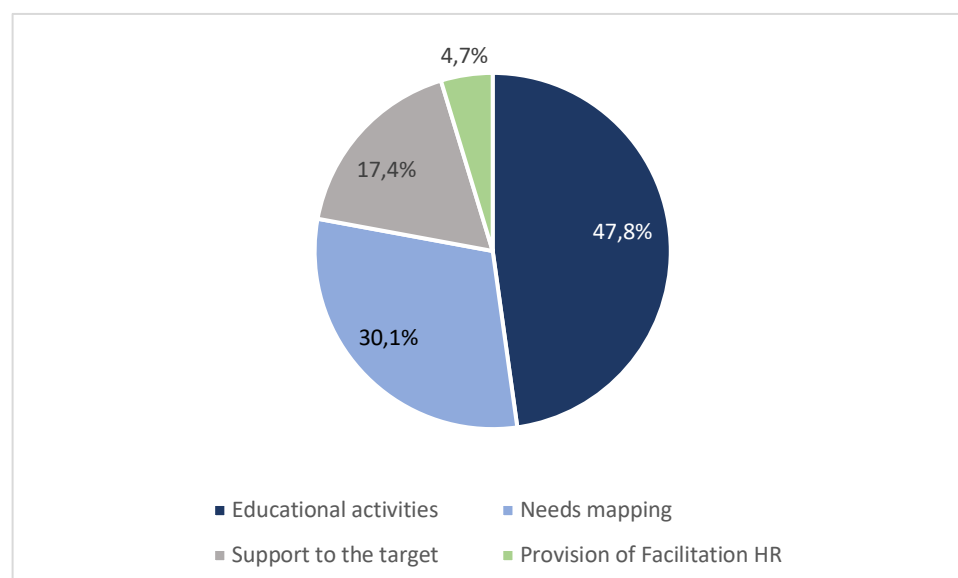
Authors	Paper	Country	Policy	Objective
Tomczyk	<i>Lighthouse Keepers of Digital Poland of Equal Opportunities – information about nation-wide educational program</i>	Poland	Digital Poland of Equal Opportunities (2007-2013)	Encourage the people from the 50+ generation to make the first step into the digital world, thanks to young ‘digital lighthouse keepers’
Tomczyk et al.	<i>ICT, digital literacy, digital inclusion and media education in Poland</i>			
Mirke et al.	<i>Adults’ readiness for online learning in the Czech Republic and Latvia (digital competence as a result of ICT education policy and information society development strategy)</i>	Latvia	Father’s Third Son (2009-)	Provide training to librarians to acquire knowledge and skills, in order to offer digital skills learning opportunities for libraries’ users.
Walterova et al.	<i>Digital local agenda: Bridging the digital divide</i>	European Union	CESMDI Project (2010-2011)	Provide training for civil servant empowerment in multi-media service delivery ICT-enabled
Abad	<i>Media literacy for older people facing the digital divide: The e-inclusion programmes design</i>	European Union	Grandparents and Grandchildren Program (2012)	Involve young students from vocational colleges and secondary schools with the role of ‘digital facilitators’ who individually assist older people, guiding them in the use of Internet and e-mail
Gladkova et al.	<i>Exploring digital inequalities in Russia: an interregional comparative analysis</i>	Russia	Digital Economics Program (2018-2024)	Train ‘digital curators’, i.e., specialists who will be advising people on the use of digital technologies and particularly state e-services

Table A. 7: Papers dealing with eFacilitators in High-Income Countries

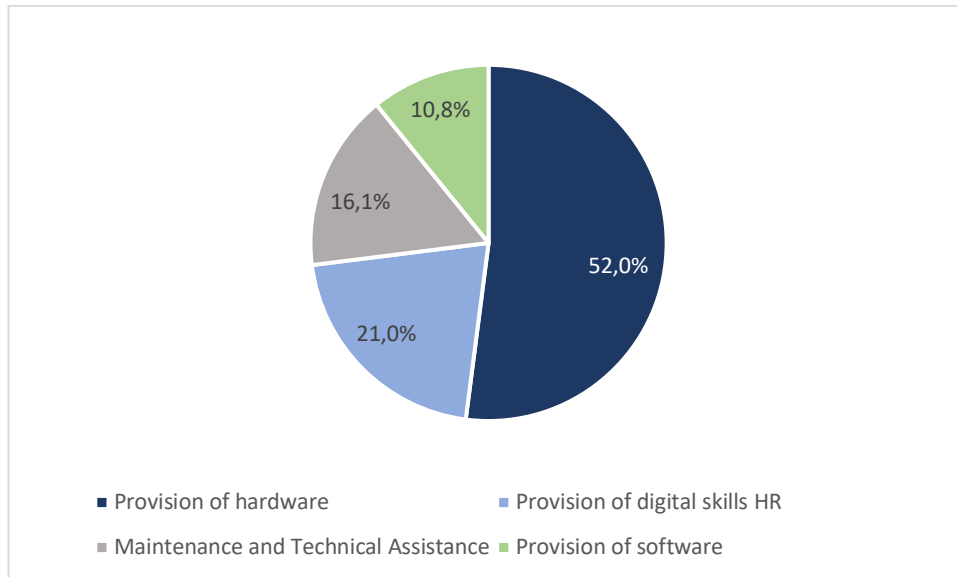
## B Appendix Dyad Level Analysis



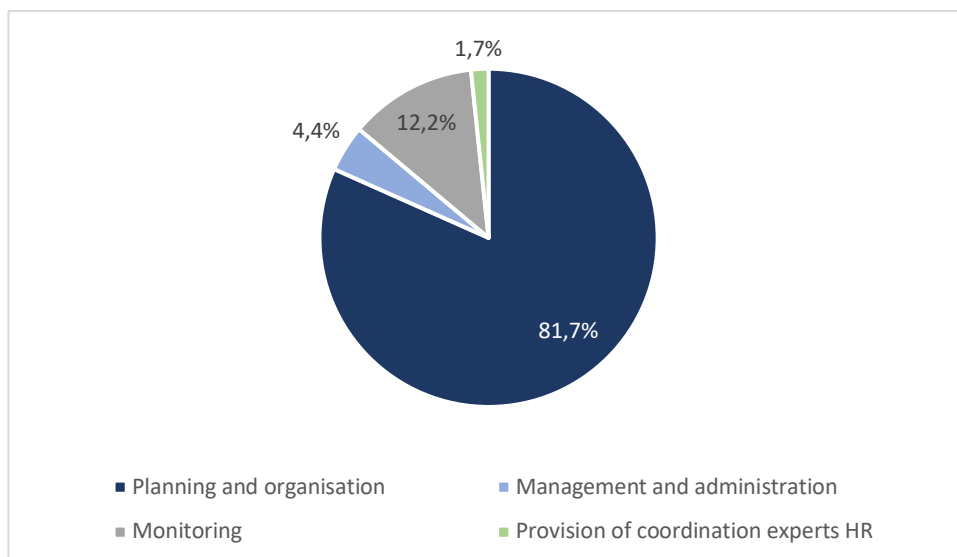
Graph B. 1: Other not ICT-specialist Services Categories



Graph B. 2: Implementation Activities Categories

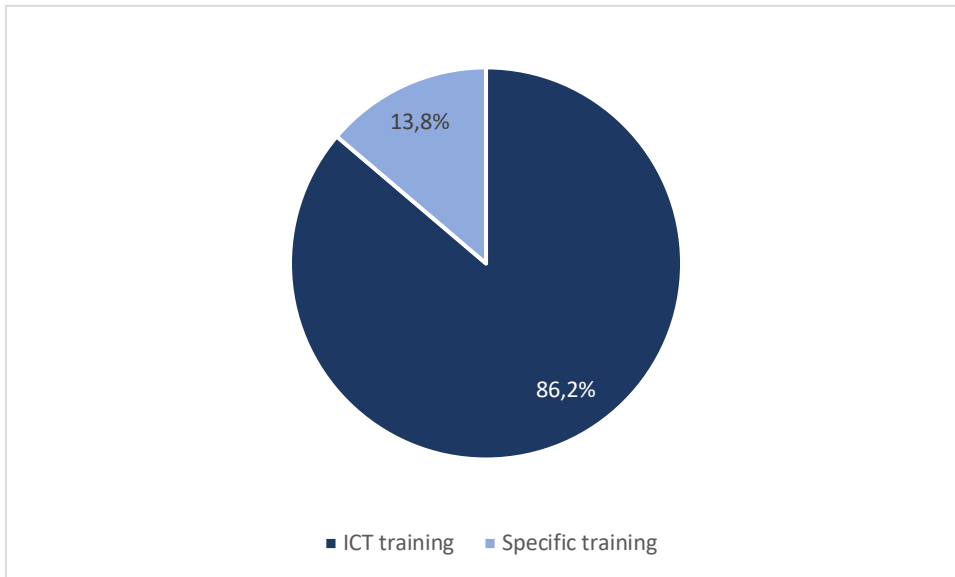


Graph B. 3: ICT Services Categories

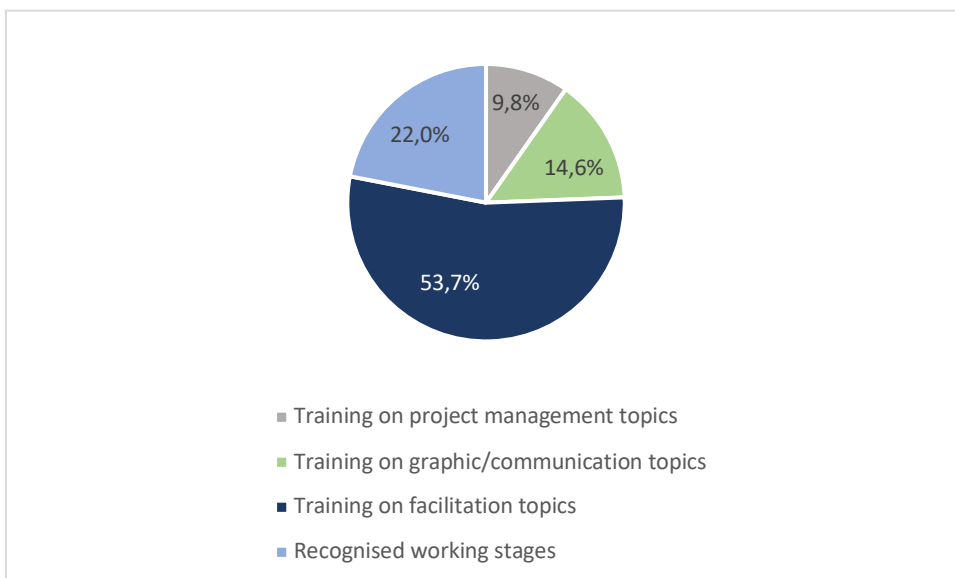


Graph B. 4: Managerial Services Categories





Graph B. 5: ICT-related Training Categories



Graph B. 6: Not ICT-related Training Categories



## List of Figures

Figure 1: Prisma Model Section 2.2– State of the Art: Policy Analytics .....	13
Figure 2: Prisma Model Section 2.4 – State of the Art: Second-level Divide Policies ..	13
Figure 3: Arnstein's Scale (Source: Dell'Ovo et al., 2020) .....	25
Figure 4: Stakeholders' Participation in Policymaking Process (Source: Dell'Ovo et al., 2020).....	26
Figure 5: A Wheel of Policy Instruments to Bridge the Digital Divide (Source: van Dijk, 2020).....	33
Figure 6: Exemplificatory Network Configuration .....	74
Figure 7: Top Level Actors Relationships .....	75
Figure 8: SCD Network detailed by Hierarchical Levels.....	83
Figure 9: Examples of Bridges in the Network .....	86
Figure 10: Pilot call (left) and PNRR call (right) .....	87
Figure 11: Degree Centrality Measure (left) and Weighted Degree Centrality Measure (right).....	90
Figure 12: Intensity of Network Relationships .....	92
Figure 13: Guidelines for a Value-Driven Social Network Analysis .....	115



## List of Tables

Table 1: Determinants of Human Capital Dimension (Source: DESI 2022) .....	2
Table 2: Main Dimensions of Pilot and PNRR Digital Civilian Service Calls .....	6
Table 3: Papers' Quality per Target.....	15
Table 4: Context Papers Quality .....	16
Table 5: The Role of Policy Analytics in the Policy Cycle (Source: Tsoukias et al., 2013) .....	21
Table 6: Differences between Evidence-based Policymaking and Policy Analytics ...	22
Table 7: Types of Policy Actors identified in Implementation (Source: Bullock et al., 2021).....	27
Table 8: The DigComp Conceptual Reference Model (Source: DigComp 2.2).....	31
Table 9: Typologies of Interventions and Correspondence to the van Dijk Wheel Framework .....	34
Table 10: Summary Dimensions of the Papers Identified .....	35
Table 11: Main Agencies and their Roles in Policy Implementation .....	55
Table 12: Targets and Communication Channels.....	58
Table 13: Main Findings detailed for Targets.....	59
Table 14: Summary Structure of Data Collection .....	70
Table 15: Partners Relationships with Universal Civil Service Organizations.....	77
Table 16: Network measures, definition, and scope .....	82
Table 17: Node measures, definition, and scope .....	82
Table 18: Network Analysis Measures .....	84
Table 19: Top 10 Actors according to different Centrality Measures .....	88
Table 20: Network Measures detailed by Target .....	97
Table 21: Network Measures detailed by Geographical Coverage.....	98
Table 22: Network Measures detailed by Digital Competence Area.....	100
Table 23: Additional Objectives – Categories and Examples.....	101
Table 24: Additional objectives frequency by target.....	102

Table 25: SCD actors and their correspondence in Bullock et al. (2021) framework. 111  
Table 26: Bullock et al. (2021) Updated Framework..... 113

## List of Graphs

Graph 1: Geographical Coverage of the Case Studies .....	14
Graph 2: Countries Involvement in the Case Studies .....	14
Graph 3: Geographical Coverage of Policies .....	53
Graph 4: Geographical Level of the Policies Implemented.....	53
Graph 5: Ministries involved in Digital Competences Policy Implementation by Target .....	54
Graph 6: Organizations involved as Street-level Bureaucrats .....	56
Graph 7: Weighted Degree Centrality of top 100 players .....	91
Graph 8: Overall Network Relationships Typologies.....	93
Graph 9: Third Parties Relationships Typologies.....	94
Graph 10: Number of SCU Organizations detailed by Target Choices.....	96
Graph 11: Percentage of SCU Organizations detailed by Geographical Coverage.....	98
Graph 12: Number of SCU Organizations detailed by Digital Competence Area .....	99
Graph 13: Frequency of the Additional Objectives .....	102
Graph 14: Frequency of Organizations on the Number of Additional Objectives ....	104
Graph 15: Degree Centrality .....	104
Graph 16: Weighted Degree Centrality .....	104





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