Ekonomická fakulta
Faculty of Economics
Jihočeská univerzita v Českých Budějovicích
University of South Bohemia in České Budějovice

University of South Bohemia in České Budějovice

Faculty of Economics

Department of Regional Management and Law

Master thesis

Digitization in the territory and differences between selected rural areas: the example of Grand Est region, France

Author: Numa Parment

Tutor of master thesis: doc. Ing. Martin Pělucha, Ph.D.

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ASSIGNMENT OF DIPLOMA THESIS

(project, art work, art performance)

Name and surname:	**Numa PARMENT**
Personal number:	**E20029I**
Study programme:	**N6237 Regional and European Project Management**
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Work topic:	**Digitization in the territory and differences between selected rural areas: the example of Grand Est region, France**
Assigning department:	**Department of Regional Management and Law**

Theses guidelines

Subject: The diploma thesis is focused on an in-depth research analysis of the issue of digitalization in the territory, identifying different types of problems according to different types of rural areas by using the experience of local actors. This thesis in particular will examine the experience of municipalities and local actors regarding digitalization in the Grand Est region, which corresponds to European Union NUTS 1 region FRF and NUTS 2 regions FRF1, FRF2 and FRF3.

In the theoretical part, an in-depth research analysis of previous works and data concerning the issue of digitisation of rural areas will be conducted. On the one hand, it will consist in using scientific publications. On the other hand, the analysis will focus on the different institutional sources and competent authorities in the field, such as: OECD at the international level, the European Commission, ESPON and the European Investment Bank at the European level, the INRIA, ARCEP and national ministries at the national level and the Grand-Est Region, the Directions Départementales des Territoires (DDT) and the Réseau Rural Grand-Est at the regional level. This multiscalar approach will allow to observe the different priorities perceived by the different institutional levels.

In the practical part, the work conducted in this thesis will consist of an empirical verification of the issues encountered by the different local actors involved in the digital transition. Using questionnaires/surveys submitted either electronically or from phone interviews, rural actors will voice their experience with digitisation, outline the main issues they encounter or encountered and assess the impact of digitisation on their activities. Rural actors will be comprised of representants of municipalities, union of municipalities and LAGs, as they are invested in territorial development and are more likely to represent the interests of local residents. Questionnaire questions will focus on digital skills and the access to institutional support. The results from the practical part will be compared with the results from the theorical part.

Aim of the thesis: The main purpose of this thesis is to give a comprehensive overview of the issue of digitalization in rural areas by giving a voice to rural actors of different types and with different locations who are affected by the issues of digitalization. Firstly, the rural actors will be submitted to a questionnaire to identity the main issues they encounter. Secondly, the results of the questionnaires will be compared with regional, national and european policies and surveys on digitalization and territorial development. The final goal is to assess the discrepancy between the experience of the actors on the ground and the perspective of the public authorities.

Extent of work report:	**50 – 60 pages**
Extent of graphics content:	**as necessary**
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ESPON (2017). The territorial and urban dimensions of the digital transition of public services. ESPON, Luxembourg, October 2017, ISBN: 978-99959-55-14-4

Nieto, E. (2019). Smart Villages: A new concept for rural development. The Scitech Europa, 17th May 2019. On-line article available at: https://www.scitecheuropa.eu/smart-villages-rural-development/95112/

OECD (2010). Strategies to Improve Rural Service Delivery. OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264083967-en

OECD (2014), Innovation and Modernising the Rural Economy. OECD Rural Policy Reviews. Paris: OECD Publishing.

Sept, Ariane. (2020). Thinking Together Digitalization and Social Innovation in Rural Areas: An Exploration of Rural Digitalization Projects in Germany. European Countryside. 12. 193-208. 10.2478/euco-2020-0011.

Zerrer, Nicole & Sept, Ariane. (2020). Smart Villagers as Actors of Digital Social Innovation in Rural Areas. Urban Planning. 5. 78-88. 10.17645/up.v5i4.3183.

Riccio, Pierre-Michel & Bonnet, Daniel. (2019). Stratégie numérique et développement des organisations.

Vincent, Boly & Marche, Brunelle & Monticolo, Davy & Camargo, Mauricio & Hörlesberger, Marianne. (2021). BE DIGITAL AND RESPONSIBLE : THE CASE OF GRANDEST TERRITORY IN FRANCE. 1151-1164. 10.52202/060557-0088.

Supervisors of diploma thesis: **doc. Ing. Martin Pělucha, Ph.D.**
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JIHOČESKÁ UNIVERZITA V ČESKÝCH BUDĚJOVICÍCH
EKONOMICKÁ FAKULTA
Studentská 13
370 05 České Budějovice
IČ 600 76 658, DIČ CZ600765

doc. Dr. Ing. Dagmar Škodová Parmová
Dean

doc. PhDr. Miloslav Lapka, CSc.
Head of Department

In České Budějovice March 21, 2022

Statement

I hereby declare that, in accordance with Article 47b of Act No. 111/1998 Coll. in the valid wording, I agree with the publication of my master thesis, in full form to be kept in the Faculty of Economics archive, in electronic form in publicly accessible part of the IS STAG database operated by the University of South Bohemia in České Budějovice accessible through its web pages. Further, I agree to the electronic publication of the comments of my supervisor and thesis opponents and the record of the proceedings and results of the thesis defence in accordance with aforementioned Act No. 111/1998 Coll. I also agree to the comparison of the text of my thesis with the Theses.cz thesis database operated by the National Registry of University Theses and a plagerism detection system.

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Numa Parment

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1 INTRODUCTION

During the first years of digital, information and communication technologies (ICT) were analyzed on a technical prism, often reserved for specialists. The implications of the technology were not yet known, and it was mostly about developing practical applications to the scientific inventions. Today, it is common to say that we live in the digital age. Indeed, the digitization of our societies must be considered as an underlying megatrend (OECD, 2018), one of the long-term structuring changes in our lifestyles, an event with enormous influences on our past, present and future lives. This is not just the appearance of a new technology but a gigantic paradigm shift. The recent COVID crisis has been decisive in bringing out these structural changes, since it has forced populations to adapt at an unprecedented pace and the uses of digital to compensate for the loss of social and economic interactions have been multiplied.

However, digitalization does not happen at the same pace for everyone. While some populations have been able to quickly benefit from digital advances, great inequalities exist on a planetary scale. These inequalities are divides which separate the population: between the ones that are digitally literate and the ones that aren't, between the ones that can access stable and fast internet connection and the ones that can't. It would be simplistic to reduce the digital divide to a simple comparison between regions of the world or countries. In reality, this divide exists within countries themselves and is a growing issue as technologies develop and digital takes an ever more important place in the economy and human society. It can be a geographic digital divide, between regions benefiting from high-speed infrastructure and regions where old technologies have not yet been deployed, or even a human digital divide, between a population who have little mastery of digital means and a young population who use it on a daily basis. The long-term risk if the digital divide is not reduced is a growing isolation or even social and economic exclusion of the populations does not master the digital tool, in a world where this tool becomes central and essential. The present study is interested in this field of study which is the digital fracture in populations.

1.1 Objectives

The aim of this thesis is to compare the experiences of municipalities in rural areas with the various rural development and digital deployment policies that exist and should

normally aim to solve the problems encountered by local actors, be it the municipalities themselves or the citizens. This thesis covers the entire Grand Est region, a region of France that includes 10 sub-divisions. The empirical analysis is aimed in particular at municipalities in less densely populated rural areas from Grand Est region and preferably at mayors and elected officials, who are the main interest. The research is essentially focused on a perspective from public authorities: the central themes are the digitization of public services, the accessibility of public services, digital skills in rural areas and the existing or desired support from governments. Some economic issues are not addressed, in particular the business perspective is not addressed here.

This thesis fits both in the very broad field of the study of digitalization, and in the much smaller field of study of the digital divide and digitalization issues in rural areas. The question has already been addressed in previous works and is still a recent topic of study, whether university research (Attour & Chaupain-Guillot, 2020 ; Birnbaum et al, 2021 ; Navarro et al, 2020 ; Mbarek, 2019 ; Pělucha 2019) or reports from national and/or international institutions (ARCEP, 2022a ; Council of the European Union, 2020 ; European Commission, 2021b ; European Network for Rural Development, 2018). However, there is a lack of research that focuses in particular on the role of municipalities, on the impact of government policies on digitalization, on the specificity of rural areas compared to other municipalities. This thesis comes to reinforce the research initiatives by bringing a new targeted case study and by providing a research method as well as empirical data that can perhaps be extended to other studies in similar geographical areas and with similar actors. In order to provide the empirical data, two methods will be used: firstly a questionnaire adressed at municipalities from rural areas, secondly an analysis of websites from rural municipalities.

The central research question of this thesis is whether municipalities in rural areas are sufficiently supported in their digitalization efforts by their government and whether the public policies envisaged to improve the digitalization of rural areas are in line with their demands. A secondary research objective is to estimate how important the size of municipalities is in their digitalization experience and whether municipalities of different sizes in rural areas have similar or different experiences.

The thesis starts with a literature review section in an attempt to overview the policies from the different layers of government (European Union, national, regional and local) which are pertinent regarding the issue of the digital divide. The first part focuses on the

geographical context in France and in the Grand Est region and explore some of definitions that will be used throughout the study. The second and third parts are reviews of the rural development and digital transition policies from the different layers of government from an historical point of view as well as the current strategies. The method section then describes the process of selection, collection and analysis of data that was used for this thesis. This section details in particular the two empirical research tools that were designed, the questionnaire and the web analysis. The results section present the results of the conducted empirical studies which are then reconnected to the original topic in the discussion section.

2 LITERATURE REVIEW

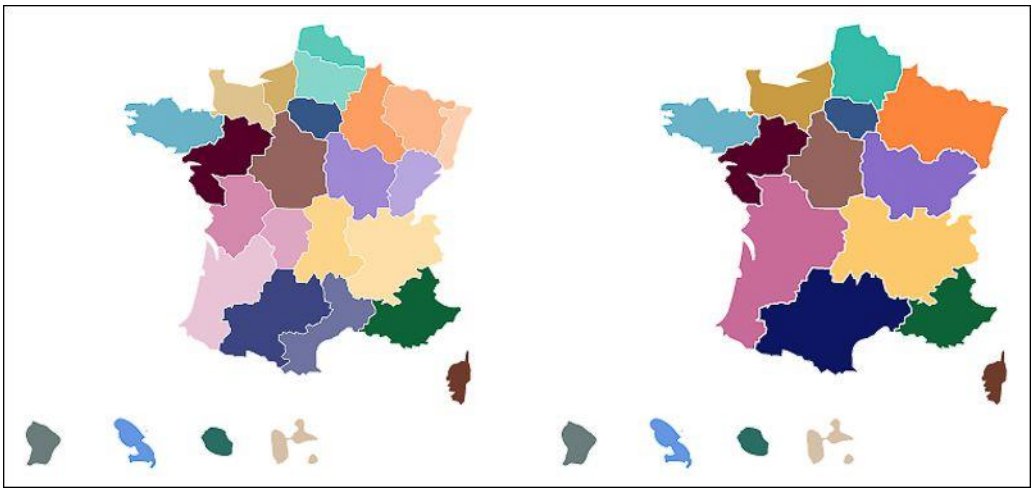
2.1 Typology of territories & administrative layers

France administrative layers

In 2014, the French government decided to reorganize the mainland national territory by reducing the number of administrative regions from 22 to 13 (Bonnet-Pineau, 2016). This includes Corsica, region with special status. In addition, France also has 13 overseas territories located far from mainland France and which have special status, halfway between departments and regions, but the overseas territories will not be discussed in this thesis since their configuration is unique. French territorial organization works on 3 levels, from biggest to smallest scale: the *région* (region), the *département* (subregion) and the *commune* or *municipalité* (municipality). All the geographical nomenclature is detailed in the *Code géographique officiel* (Official code of geography), the latest version of which came into force on January 1, 2021 (INSEE, 2021). This code results from a collaboration between the National Institute of Statistics and Economic Studies (INSEE), the national statistics bureau of France, and the National Institute of Geographic and Forest Information (IGN), the main national institution providing geographical information in France. For the purpose of that thesis, the English names "region, department, municipality" will be used interchangeably with the French names as they are the closest "region, département, municipalité". The *régions* are the most recent creation as their official status was settled only in 1981. They are the bridges between local population and national state, as well as working closely with the European Union

in the frame of European Structural and Investment Funds (ESIFs). Each region is governed by a *préfet de région*, working from the regional *préfécture* (a municipality that was chosen as the regional administrative center) (Assemblée Nationale, nd).

Figure 1: Map of French region, previous (left) and new (right)



Source: Bonnet-Pineau, 2016

The *départements* stem from 1789 French national revolution and subsequent 1792 proclamation of the French First Republic. Originally making a bridge between local population and national state, they are now designed as a bridge between local population and *régions* from the administrative level above. Each department is governed by a *préfet*, working from the local *préfécture*. All departments were assigned a two-digit number by INSEE to identify them, from 1 to 95 in alphabetical order or regrouped for historical and geographical reasons (ex: Marne 51 and Haute-Marne 52). Notable exception once again, the special status region of Corsica is divided into two parts identified as 2A and 2B instead of number 20. French 6 oversea territories were given three-digit numbers from 971 to 976. Local residents commonly use that number to refer to their department (ex: "le 30" stands for "le Gard") (INSEE, 2021). To see the current French departments, see annex 1 "Map of Departments".

The *communes* (or *municipalité*) also stem from 1789, but they are in fact much older as the French Republic based them on the previously existing *paroisses*, territorial units created by the Catholic Church that were subdivisions of *diocèses*. Today, each commune is governed by a mayor. Unlike *préfets*, mayors are directly elected by local inhabitants during municipal elections (every 6 years). Municipalities represent the smallest scale of territorial units. Each municipality has been given a five-digit number by INSEE to

identify them. The first two digits of the INSEE code always include the department code: for instance, the municipality of Mittelbronn has the code 57468. 57 stands here for Moselle, the department in which Mittelbronn is located. Most of municipalities are also part of an *établissement public de cooperation intercommunale* (EPCI), more commonly kown as *intercommunalité*. In 2022, there are 1 254 EPCI in France and these intermunicipalities regroup on average 28 municipalities (INSEE, 2022d).

Compared to the French system, the European Union system is quite different but they share a common origin. NUTS stems from French *Nomenclature des unités territoriales statistiques*. NUTS classification was created at the same time as Eurostat in order to provide a working framework for the collection of data. In the first years, the NUTS regions were classified through numerous "gentlemen's agreements" between each of the member states and the Eurostat office. The first European-wide regulation of NUTS classification was issued in 2000, then adopted in 2003 with regulation EC No 1059/2003 (European Parliament, 2003).

Département roughly correspond to European NUTS 2021 classification (as of 1 january 2021) as NUTS 3 level. The existence of "intermediary level" subdivision of the national territory like départements, as called by OECD classification, isn't the norm. In fact, only 5 of the 27 EU member-states include intermediary level subdivision: Belgium (*province/provincie*), Germany (*Landkreis*), Poland (*powiats*), Spain (*provincia*) and France. It should however be noted that intermediary level subdivision are not necessarily equivalent in different countries: number, size, organization, administrative status, competencies may vary greatly from a country to another. The only common characteristic really is that particular situation, forming a bridge toward national authority and the municipalities/local populations. Other countries may also not have regions and be constituted solely of a national state and a given number of municipalities. It is usually due to relatively small territory and/or national population. In the European Union, these countries are: Bulgaria, Cyprus, Estonia, Ireland, Latvia, Lithuania, Luxembourg, Malta and Slovenia (OCDE, 2018 p.3).

Old French *régions* (before 2014 changes) roughly correspond to NUTS 2 classification, whereas new French *régions* (after 2014 changes) roughly correspond to NUTS 1 classification. The notable exception being the region Île-de-France where lies the capital city of Paris: previously a NUTS 2 region only, it was divided into 3 parts: a NUTS 1 region (named Île-de-France), a NUTS 2 region (also named Île-de-France) and a NUTS

3 region (named Paris). The main reason is statistical, as the number of inhabitants is significantly higher than the typical French NUTS 2 regions as well as typical European Union NUTS 2 regions: Île-de-France concentrates more than 12 million inhabitants, around 90% living inside Paris urban area (Gascard & Lu, 2019). The existence of intermediary level subdivisions that were aligned with the different levels of Eurostat NUTS classification made it significantly easier to implement them: in most of the member states, NUTS regions had to be created out of nothing, since there weren't administrative entities corresponding to all levels of NUTS classification. In the case of France, most of the NUTS classification was simply based on the pre-existing régions (old and new ones) and départements. It should be assumed that it makes the collection of data easier, as each of NUTS newly formed regions already have their own offices and data (INSEE, 2018).

French municipalities and intermunicipalities

As of 2022, there were 13 *régions*, 101 *départements* (94 mainland, Corsica + 6 overseas) and around 36 000 c*ommunes* in France. This means that France has by far the highest number of municipalities in any European Union member-state, as the number of French municipalities represent around 40% of all EU municipalities (around 87 000) (OCDE, 2018 p.3). This can be easily explained by the fact that more than half of French municipalities have less than 500 inhabitants. Latest statistics were collected in 2013: at that time, 46% of municipalities had more than 500 inhabitants, 28% had between 200 and 500 inhabitants, 16% had between 100 and 200 inhabitants and 10% had less than 100 inhabitants. The number of municipalities is quite stable, as it diminished only from 37 700 in 1968 to 36 000 in 2022: a decrease of 4.5% in more than 50 years. No creation of new municipalities occurred in that span of time; however, some previously existing municipalities can occasionally be recreated. Variations of number are explained either by the disappearance of previously existing municipalities due to housing vacancies (population down to 0), or the fusion of several municipalities into one (INSEE, 2015).

With a total population of around 68 million inhabitants in 2021 (INSEE, 2022b), it means that the average municipality of France represents roughly 1 800 inhabitants. Meanwhile, the official estimated population of the Europe Union in 2021 was of around 447 million inhabitants, which means that the average municipality of Europe represents roughly 5 138 inhabitants. The average municipality in France was therefore 63% less populated than the average municipalities in Europe. If we exclude France from the statistics, then

the European population was of about 379 million inhabitants and the number of municipalities was about 50 000, making an average population in European municipalities of 7580 inhabitants. Therefore, the average municipality of France was around 75% less populated than the average of the rest of the European Union. Only Czech Republic would obtain lower results, as with a population of around 10 million inhabitants and around 6 250 municipalities registered, the average population per municipality is 1712 inhabitants, 9% lower than France's average (European Commission, 2021c).

This peculiarity makes France stand out in the statistics and complicates comparison with other countries at the municipal level. Indeed, if we are only interested in the municipalities then France will appear to be a much more rural country than its neighbors and the Member States of the European Union. However, this does not mean that the French population is more rural, but rather that the administrative units are organized differently. In the context of this thesis, the statistics could be strongly impacted: given its small size, we can assume that the average municipality in France will probably have limited financial, material and human resources compared to the average municipality in the European Union.

To compensate for the relatively small size of the municipalities, France has an extremely developed network of inter-municipalities. Indeed, French municipalities now have the obligation to join an intermunicipal organization (the deadline was set for 2014). The notion of intermunicipality has a long history in France since it dates from 1884, with the creation of the intermunicipal syndicate. The current system, however, results from the 1992 law known as the law "relating to the territorial administration of the Republic", which established the legal nature of the intermunicipalities as well as their powers and their organizational model, later revised and supplemented by the Chevènement law of 1999 (Assemblée Nationale, 1992). In particular, this law provides for the co-existence of 3 types of intermunicipalities (also known as *EPCI* for "public establishments of intermunicipal cooperation"):

- *Communauté de communes* (CC): This is the most basic and common structure. The number of municipalities as well as the size in number of inhabitants is variable. The minimum population is set at 5,000 inhabitants in areas of very low population density (see p.54 for a definition of low density) and 15,000 inhabitants in the rest of the territory. It has its own budget. Its existence is justified by at least one of the following optional competencies: environment, housing/living environment, roads, cultural and sports facilities, pre-elementary and elementary

education. The CC municipalities also have compulsory competencies: the creation of a local inter-municipal urban plan (PLUI), the collection and treatment of waste and the supply of water.

- *Communauté d'agglomération (*CA*):* It is a more complex structure with a wider range of competencies. A CA must cover a continuous territory comprising at least 50,000 inhabitants and structured around one or more urban centers of at least 15,000 inhabitants. There are 6 compulsory competencies for a CA: economic development, development of community space, urban transport, social balance of housing, city policy and management of aquatic environments and flood risk. The agglomeration community must also exercise three of the following optional competencies: roads, sanitation, water, environment, living environment, cultural and sports facilities.
- *Communauté urbaine (*CU*):* The last intermunicipal structure is the largest: to be able to constitute a CU, it is necessary to justify a territory of at least 250,000 inhabitants in a continuous area. These are generally municipalities located on the edge of large urban clusters. The conditions applied to the CA also apply to the CUs. Additionally, new compulsory competencies are added: the fight against air pollution, the management of slaughterhouses, the management of markets, the promotion of tourism, the management of cemeteries. All competencies are mandatory, there are no optional competencies in the case of a CU (Géoconfluences, 2022).

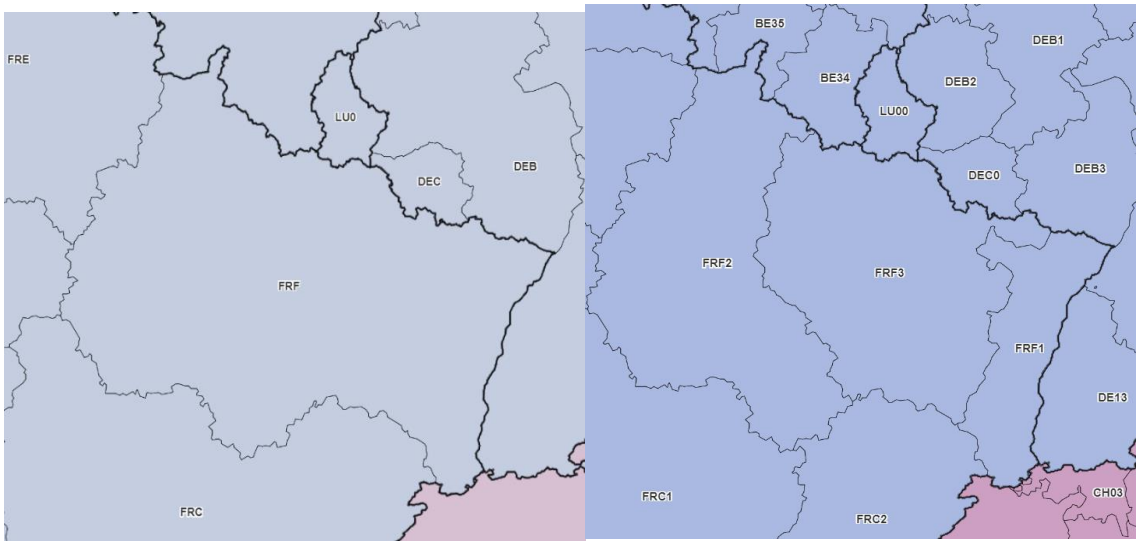
The French territorial network is completed by the creation of metropolises in 2015. This is a special administrative status granted to certain urban areas which provide them with new exclusive competencies. The metropolises are based on EPCIs of more than 400,000 inhabitants and must cover a total population of more than 650,000 inhabitants in the urban area. This concerns the municipalities of Bordeaux, Brest, Grenoble, Lille, Montpellier, Nantes, Rennes, Rouen, Strasbourg and Toulouse. Additionally, Paris, Aix-Marseille and Lyon enjoy a special status due to their size (more than 1 million inhabitants) (Géoconfluences, 2016).

Intermunicipalities are therefore an intermediate structure between the municipality and the department or the region which makes it possible to reduce the disadvantages linked to the relatively small size of French municipalities. The common organization makes it possible to group financial, material and human resources without sacrificing the French particularity of its large number of small municipalities. An EPCI is managed by a syndicate council, a community council or a metropolitan council. The particularity of these councils is to have the obligation to represent each municipality, independently of their size, and to ensure a relative equity of votes to allow the smallest municipalities to participate in the decisions.

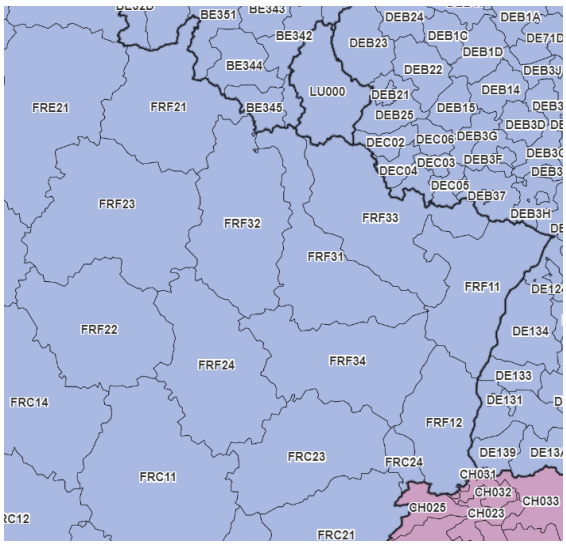
The Grand Est region

As the rest of the currently existence French regions, the Grand Est region was born from the 2016 reform. Previously, three administrative existed: Alsace (with Bas-Rhin and Haut-Rhin departments), Lorraine (with Meurthe-et-Moselle, Meuse, Moselle and Vosges departments) and Champagne-Ardenne (with Ardennes, Aube, Marne and Haute-Marne departments). If these 3 regions stopped existing in the French administrative system, they still exist in the European NUTS system. In this system, the Grand Est region bears the NUTS 1 code FRF. Alsace corresponds to NUTS 2 FRF1, Champagne-Ardenne corresponds to NUTS 2 FRF2 and Lorrain corresponds to NUTS 2 FRF3.

Figure 2: Grand Est NUTS 1, NUTS 2 and NUTS 3 regions



Source: Eurostat, NUTS and territorial typologies



Grand Est region is composed of 10 départements : Ardennes (08), Aube (10), Marne (51), Haute-Marne (52), Meurthe-et-Moselle (54), Meuse (55), Moselle (57), Bas-Rhin (67), Haut-Rhin (68) et Vosges (88).

Ardennes corresponds to NUTS 3 FRF21, Aube corresponds to FRF22, Marne corresponds to FRF23, Haute-Marne corresponds to FRF24, Meurthe-et-Moselle corresponds to FRF31, Meuse corresponds to FRF32, Moselle corresponds to FRF33,

Bas-Rhin corresponds to FRF11, Haut-Rhin corresponds to FRF12 and Vosges corresponds to FRF34.

The prefectures of each départements are respectively Charleville-Mézières (08105), Troyes (10387), Reims (51454), Chaumont (52121), Nancy (54395), Bar-le-Duc (55029), Metz (57463), Strasbourg (67482), Colmar (68066) and Epinal (88160). Strasbourg is the prefecture of the Grand Est region and therefore coordinates the departmental prefectures, making the bridge between local governments and the national government (Assemblée Nationale, 2015).

Figure 3: Grand Est region with departments and prefectures

Source: Numa Parment 2022 (base map INSEE)

The 1st january 2021, Bas-Rhin and Haut-Rhin were merged to form the Collectivité européenne d'Alsace (CeA), a new territorial collectivity roughly corresponding to the historical region of Alsace, that was also a region prior to the 2016 reform. This initiative was officialized in the law n°2019-816 of the 2nd august 2019. Creation of CeA didn't replace the previously existing *départements*, but rather created an additional,

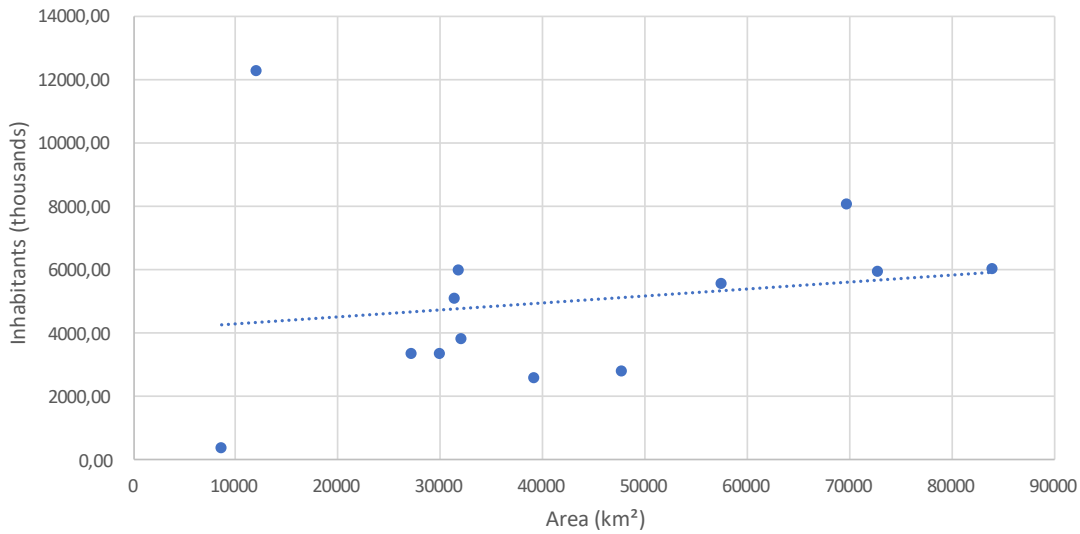
intermediate layer between départements and Grand Est region, with additional competencies such as linguistic policy, transborder cooperation, tourism and transportation (Assemblée Nationale, 2019b). Bas-Rhin and Haut-Rhin still exist for administrative purposes, as most national institutions still work with the prefectures: Strasbourg and Colmar are still recognized as prectures, even though Strasbourg has been designated to represent the CeA and host its central administration. This is particularly important regarding statistics, as INSEE and other governmental databases only recognize Bas-Rhin and Haut-Rhin. As this is a rather recent occurrence, the situation might evolve in the following years. The French government has not yet spoken about the future of Bas-Rhin and Haut-Rhin, because they are still on-going debates on the regional scale. The origin of this unprecedented political act comes directly from the Alsatian identity: Alsace is a region halfway between France and Germany, which belonged to both countries during the last century. The identity is essentially structured around Alsatian, a Germanic dialect. There is a lack of official statistics regarding the number of current speakers. A probable factor is the mistrust of the French State towards regional languages, a particularly sensitive subject in Alsace because the teaching of French was built in opposition to local languages to integrate these German-speaking populations into the national whole. According to a private survey conducted for the OLCA (an office created and funded by Bas-Rhin and Haut-Rhin départements to promote and develop the use of Alsatian), as much as 43% of the population self-declared as Alsatian-speaking (OLCA, nd). That particular identity leads the local population to massively reject the 2016 region reform, from the elected officials to the citizen associations. Despite the special status obtained by the territorial collectivity, there is still a political debate concerning the exit from the Grand Est region and greater autonomy for Alsace (Vergne 2019, p.25-27). That serie of political events places the CeA in a specific situation, as the political action tends to be decided on the subregional level more than the rest of départements. It can hypothesized that this may potentially influence the results of the study, given that Alsace can carry out larger-scale policies: on the one hand because it has greater powers, on the other because it concentrates more human and financial resources. The creation of the CeA also represents an unprecedented event in the French territorial landscape and was commented as a possible process of regionalization: the CeA might be a blueprint for the “Girondin pact” wished by president Emmanuel Macron (note: in French political culture, Girondin relates to the support of regionalization as opposed to centralization of power. This term emerges from the political debates

following the 1789 French revolution between Girondins (regionalists) and Jacobins (centralists) (p.25).

Population

According to latest census, as of the 1st of January 2019, 5 556 219 inhabitants lived in Grand Est region (INSEE, 2022c). That makes Grand Est the 6th most populated region of France, between Provence-Alpes-Côte d'Azur (5 055 700 inhabitants) and Hauts-de-France (5 962 700 inhabitants). This roughly corresponds to 8% of the French population. Grand Est covers an area of 57 440,9 km². That makes Grand Est the region with the 4th biggest area, between Bourgogne-Franche-Comté (47 784 km²) and Auvergne-Rhône-Alpes (69 711 km²). Given that the area of continental France is 543 965 km², then Grand Est represents around 10.6% of that area. With a density of population of 96 inhabitants per km², Grand Est region is the 6th less densely populated region, between Occitanie (81 inhabitants per km²) and Normandie (110 inhabitants per km²). That number is significantly lower than the national average, as the average density in continental France stands at 119 inhabitants per km²: thus, the Grand Est region is 24% less densely populated that the continental average (INSEE, 2020).

Figure 4 Correlation between region area and population



Source: INSEE, Estimations de population, 2022 (realization: Numa Parment)

Observing these numbers, we can deduce that the delimitation of regions in France isn't designed to have a balanced repartition of the national population. Both the size and the

number of inhabitants (and thus the density of population) vary greatly between two selected regions. The most extreme examples being Île-de-France with a density of 1 022 inhabitants per km² (8.6 times the national average) and Corse with 40 inhabitants per km² (1/3 of the national average). The correlation quotient between the area of a French region and its population is only 0.17, which is not very significant.

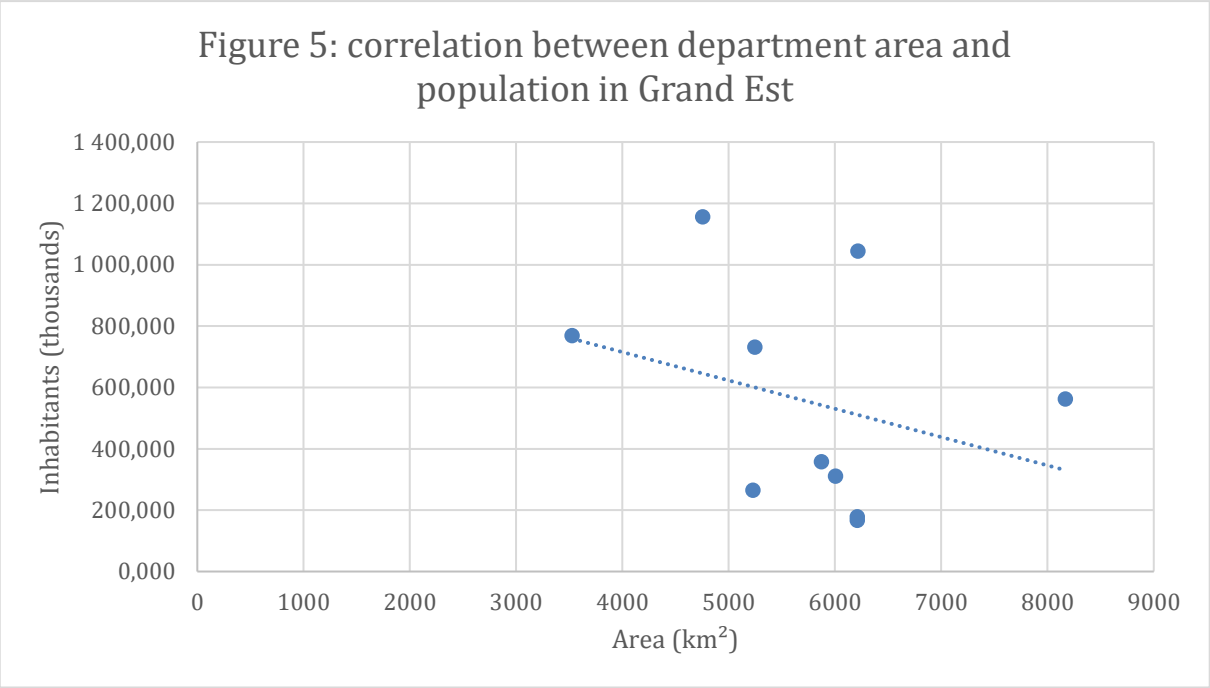
Likewise, the population also varies greatly between departments of the same region. The population is very unequally distributed across the regional territory of Grand Est. According to the latest estimation of population, Bas-Rhin and Moselle were the departments with the highest population and the only ones in Grand Est with more than 1 million inhabitants, respectively 1 156 546 and 1 044 398 inhabitants, with Strasbourg concentrating 45% of Bas-Rhin population. On the contrary, Haute-Marne had the smallest population with 166 343 inhabitants. In comparison, the other departments had less than 800 000 inhabitants and the average of population across all the departments of region Grand Est was 554 209 inhabitants, less than half the population of Bas-Rhin and Moselle (INSEE, 2022a). The department with the biggest area was Marne with 8169 km² while the department with the smallest area was Haut-Rhin. Once again, no positive correlation can be found between the size of a department and its population, thus the repartition appears to be very unbalanced. In fact, there is a significative negative correlation in the Grand Est of -0.31 (see figure 5). This result seems to indicate a stronger urbanization in some departments with much higher density of population.

Table 1: Population and area of Grand Est department, 2022

Department	Area (km²)	Inhabitants (thousands)
Ardennes	5229	265,285
Aube	6004	311,083
Marne	8169	562,545
Haute-Marne	6210	166,343
Meurthe-et-Moselle	5245	731,006
Meuse	6211	178,156
Moselle	6216	1 044,398
Bas-Rhin	4755	1 156,546
Haut-Rhin	3525	768,557

Vosges	**5873**	**358,175**

Source: INSEE, Estimations de population, 2022 (realization: Numa Parment)



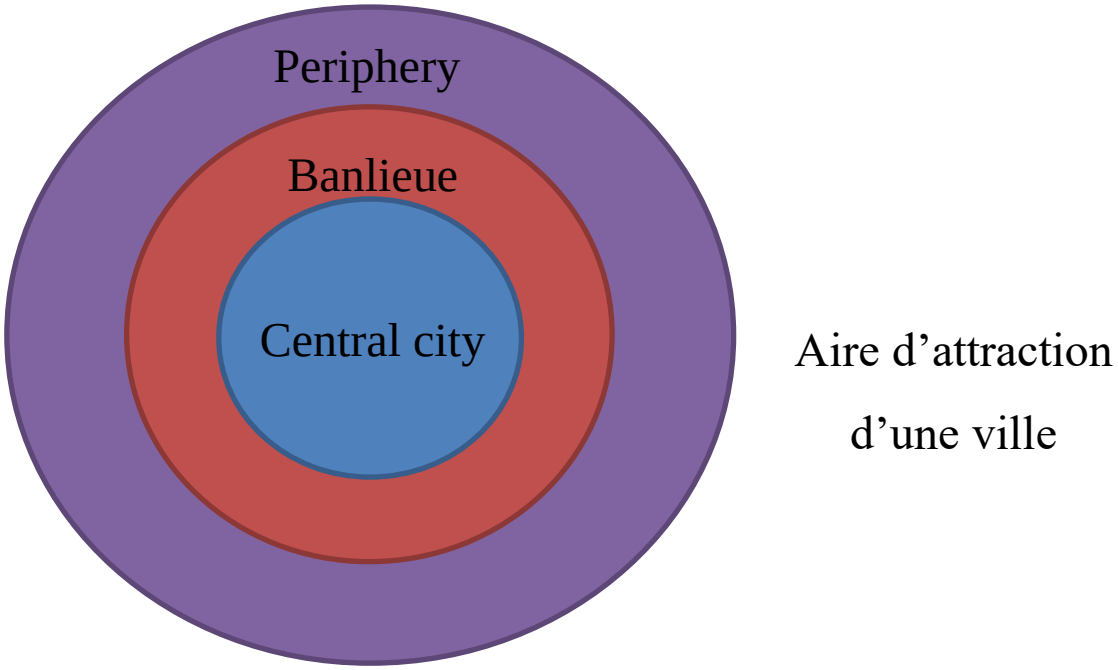
Source: INSEE, Estimations de population, 2022 (realization: Numa Parment)

Urbanization

As it is the case in every French region, in Grand Est population appears to be highly concentrated around urban clusters. To designate urban clusters, INSEE uses the terminology *aire d'attraction d'une ville* (AAV), literally translated as "catchment area of a city". Typologically, urban clusters are defined beyond a certain threshold of population, population density and number of jobs. For example, a rank A urban cluster must have a population of at least 50,000 inhabitants (including at least 50% of the population of the cluster), a density of at least 1500 inhabitants per km² and offer at least 10,000 jobs. Rank A corresponds to the highest level of the density grid according to INSEE. Geographically, these clusters must cover a continuous inhabited area, without rural or agricultural enclaves. An urban cluster has three components: two are mandatory and one situational. Firstly, a central city which constitutes the centre of gravity of the urban pole and around which the other municipalities are organized. Secondly, the periphery which corresponds to all the communes polarized around the central city. An additional category can be observed, intermediate layer between the central city and the

periphery: the suburbs (*banlieue*). This corresponds to an immediate periphery which has become an extension of the central city. Suburbs mostly exist around the biggest urban clusters, sometimes called metropoles, and are a consequence of the phenomenon of *métropolisation*: the polarization and the urban sprawl around a central city might be so strong that the central city ends up absorbing the surrounding municipalities. These municipalities might keep their previous names, but tend to become de facto districts of the central city (INSEE, 2022e).

Figure 6: AAV Diagram



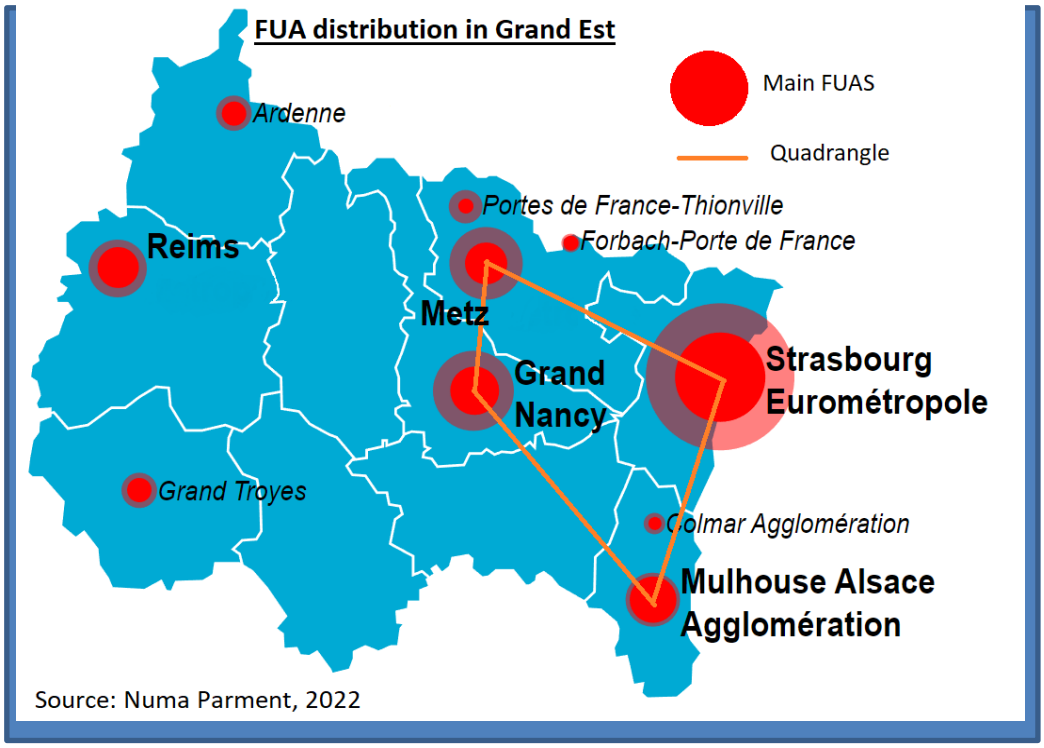
In France, there are 699 AAVs according to the INSEE classification. More than 9 out of 10 people live in an AAV, including 51% in a central city and its suburbs, and 43% in a peripheral municipality. They are classified by population threshold: urban clusters with more than 700,000 inhabitants (metropolises), urban clusters between 700,000 and 200,000 inhabitants (large urban clusters), urban clusters between 200,000 and 50,000 inhabitants (medium-sized urban clusters) and urban clusters with less than 50,000 inhabitants (small-sized urban clusters). Paris is classified apart because of its exceptional size (Paris's AAV concentrates approximatively 20% of French population). The vast majority of AAVs are those of smaller dimensions: 512 of the 699 AAVs have less than 50,000 inhabitants (73%). With a total population of 8,126,000 inhabitants, this makes an

average of 16,000 inhabitants per AAV of less than 50,000 inhabitants, a significant difference even with the category directly above. The INSEE counts 8,932 municipalities that are not part of any AAVs, ie 25% of French municipalities. This is a possible definition of rurality in France (Bellefon et al, 2020).

The INSEE typology has been adapted in order to be able to integrate with international typologies and to compare national data with data from other countries. Thus, the AAV corresponds to the Functional Urban Area (FUA) which is in force both in the statistics of the OECD and in the statistics of the European Union (Eurostat). These institutions generally use the term "commuting zone" to describe the peripheral municipalities. The thresholds used are identical. This typology has been applied to all the countries of the European Union as well as 33 member countries of the OECD, thus making it possible to have a consistent and interoperable database for analysing the phenomena of urbanization in developed countries, without being hindered by the different existing typologies in national and regional institutions. The terms AAV and FUA can therefore be used interchangeably (Dijkstra, Poelma & Veneri, 2019).

In Grand Est region, there is a clear imbalance between the western and the eastern part of the region in regard to urbanization and concentration of population. In the west, there is only one FUA with more than 200,000 inhabitants: the FUA of the city of Reims. The vast majority of the population as well as the FUA are concentrated in the east of the region. It includes Strasbourg, a metropolis with an FUA of more than 700,000 inhabitants, as well as Nancy, Metz and Mulhouse, 3 FUA between 200,000 and 700,000 inhabitants. The FUAs of these 4 cities represent nearly 2 million inhabitants, or 34% of the population of the Grand Est. These four cities form a quadrangle which concentrates not only a large part of the population, but also the majority of economic activity. Indeed, this part of the Grand Est is part of a transnational area sometimes called the Rhine axis in France, which is itself part of the European megalopolis, or the "economic heart" of the European continent. Some municipalities in the Grand Est are therefore integrated into the FUAs of neighbouring countries, for example those of Saarbrücken in Germany and Luxembourg in Luxembourg (Deboudt, Greiner, 2017).

Figure 7: Urbanization structure in Grand Est



The rest of the population is spread over the rest of the territory in municipalities that are often significantly less densely populated. In 2018, nearly 40% of the inhabitants of the grand est would thus live in municipalities located in rural regions and 16% live far from all the employment areas identified in the territory of the Grand Est. The peri-urban municipalities represent 23% of the population. The INSEE classification, the Grand Est region appears to be a particularly rural region, even for French standards, as shown in the table below:

Table 2: Urban-rural typology in France and Grand Est

	GRAND EST	France
TYPOLOGY	Share of population	Share of population
Very low density	3,70%	2,30%
Low density	12,50%	11,30%
Intermediate	22,70%	19.1%
Urban	61%	67,20%

Source: Isel & Villaume 2021, INSEE analyses Grand Est

Rural municipalities in Grand Est region are characterized by a significant net migration deficit (-0.3% of the population per year on average) while peri-urban municipalities are attractive (+0.3% of the population per year) (Isel & Villaume, 2021). These results therefore indicate a very significant inequality in living conditions and in the attractiveness of territories, both between departments and within departments. The

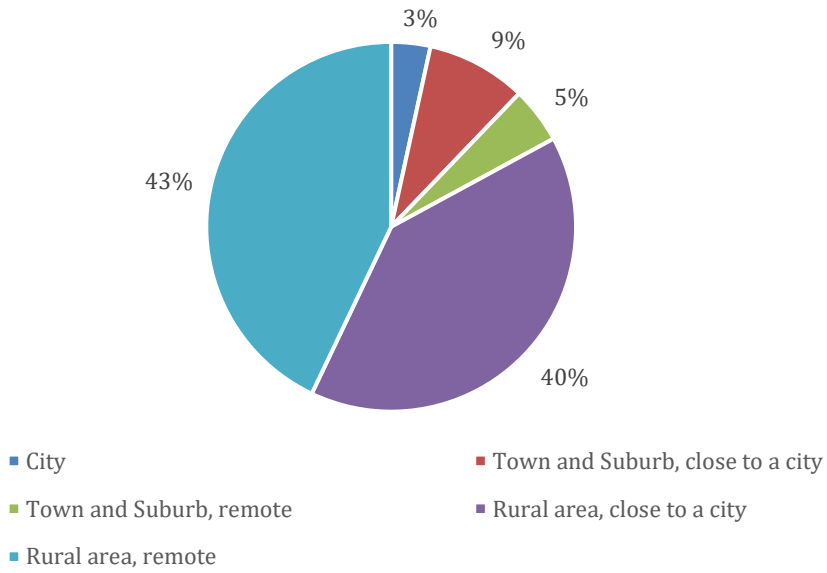
Grand Est region is a contrasting region, mostly rural but with strong urban polarities, which present dense territories like almost empty territories, mountainous or very far from urban poles. Beyond the simple demographic balance, it is the question of socio-economic inequalities within the territories and the problem of rural development that arises.

2.2 Rurality and rural development policies

Rural development in the European Union

According to the European Commission 2014-2019 strategy entitled "A long term vision for the EU's rural areas", rural areas covered 83% of the total EU area in 2018, mostly agricultural land, forest and other natural areas. Around half of that area was in proximity of a city and half considered remote. Around 30.6% of EU population lived in these areas (European Commission, 2021b).

Figure 8: EU land area share, 2018



Source: European Commission Joint Research Centre, 2018

From its inception in 1962 to the 1996 Declaration of Cork, the European Union Common Agricultural Policy (CAP) focused solely on supporting the EU agricultural market through agricultural subsidies. That economic mechanism is colloquially known as the first pillar of the CAP, officially named the European Agricultural Guarantee Fund (EAGF). The first crucial evolution happened on 7-9 November 1996 in Cork, Ireland. Mr. Franz Fischler, Commissioner responsible for agriculture and rural development,

organized a conference with over 500 stakeholders from the European Union to decide upon the future of CAP for the upcoming century. He declared that "the EU must decide what price it is willing to pay to maintain or reinvigorate the economic and social fabric of rural areas, or indeed what price it will have to pay for the economic and social implications of the urbanization which will inevitably arise due to rural depopulation" (European Commission, 1996). For the first time, a concern for the future of rural areas is expressed at the European level and rural problematics are presented as a policy focus. The conference ended with the Cork Declaration, a non-binding agreement summing-up the views of the participants. In particular, ten points were announced to serve as basis for future rural development policy:

1. **Rural preference**: "Sustainable rural development must be put at the top of the agenda of the European Union"; "reversing rural out-migration, combating poverty, stimulating employment and equality of opportunity"; "fairer balance of public spending, infrastructure investments and educational, health and communications services between rural and urban areas".
2. **Integrated Approach**: "rural development policy must be multi-disciplinary in concept and multi-sectoral in application"; "based on an integrated approach, encompassing within the same legal and policy framework: agricultural adjustment and development, economic diversification, the management of natural resources, the enhancement of environmental functions, and the promotion of culture, tourism and recreation"
3. **Diversification**: "focus on providing the framework for self-sustaining private and community-based initiatives: investment, technical assistance, business services, adequate infrastructure, education, training, integrating advances in information technology"
4. **Sustainability**: "promote rural development which sustains the quality and amenity of Europe's rural landscapes (natural resources, biodiversity and cultural identity), so that their use by today's generation does not prejudice the options for future generations"
5. **Subsidiarity**: "rural development policy must follow the principle of subsidiarity, as decentralised as possible and based on partnership and co-operation between all levels concerned (local, regional, national and European). The emphasis must be on participation and a 'bottom up' approach"
6. **Simplification**: "Rural development policy, notably in its agricultural component, needs to undergo radical simplification in legislation"
7. **Programming**: "rural development programmes must be based on coherent and transparent procedures, and integrated into one single programme for rural development for each region"
8. **Finance**: "The use of local financial resources must be encouraged to promote local rural development projects"; "Greater participation by the banking sector (public and private) and other fiscal intermediaries must be encouraged."

9. **Management**: “The administrative capacity and effectiveness of regional and local governments and community-based groups must be enhanced, where necessary”
10. **Evaluation and Research**: “Monitoring, evaluation and beneficiary assessment will need to be reinforced in order to ensure transparency of procedures, guarantee the good use of public money, stimulate research and innovation, and enable an informed public debate”

This declaration therefore raised a major point: the CAP was not sufficient to ensure equitable development of rural areas by supporting agriculture. In order to ensure the harmonious development of the territory and to guarantee a decent quality of life for all citizens, it seemed necessary to broaden the prerogatives of the CAP and to provide it with new instruments of economic policy. As a result, EU policy-makers created the second pillar of CAP in 1999 and added a new entire dimension: rural development. Officially, the second pilar is named the Rural Development Policy (RDP) and covers the article 38 to 44 of the Treaty on the Functioning of the European Union (TFEU) (European Parliament, 2016a). If we look at the 6 priorities of rural development in the period 2014-2020, we see that agriculture-based activities are still at the centre of the policy and considered the main factor of socio-economic development whereas the direct support to rural population is less present, being relegated only to the 6th and last priority:

1. Fostering knowledge transfer in agriculture, forestry and rural areas
2. Enhancing the competitiveness of all types of agriculture and enhancing farm viability;
3. Promoting food chain organization and risk management in agriculture;
4. Restoring, preserving and enhancing ecosystems dependent on agriculture and forestry;
5. Promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors;
6. Promoting social inclusion, poverty reduction and economic development in rural areas.

The RDP is a complex instrument because it is not a simple financial tool but rather general guidelines which leave a large margin of action to the Member States. Each country is free to set up its own rural development policy by drawing from a catalogue of measures that have been defined by the European Commission. Only the agri-environmental measures, directly integrated into the legislation in force, are obligatory. The first version (2000-2006) proposed 22 measures. The 2014-2020 version proposed 44 measures. Once again, in the catalogue provided the rural development seems secondary compared to the support of agricultural activities. The only measures that don’t

directly quote agriculture are the “transfer of knowledge and information measures “, and the „basic services and revitalisation of villages in rural areas (broadband, cultural activities, tourist facilities, etc.) “. Similarly, there is no obligation as to the scale of rural development policies that can be developed at national, regional or local level. In order to avoid an excessive concentration of financing in certain measures, major axes have been defined and minimum shares of the distribution of financing have been established since 2007: thus, the improvement of the quality of life in rural areas must correspond to at least 10% of RDP funding (Lataste et al, 2012).

Despite the political declarations and the objectives initially announced for the RDP, the second pillar of the CAP remains regularly criticized because the limit with the first pillar often remains vague and in practice, the activities financed by the second pillar are very largely agricultural, whereas this is the objective normally associated with the first pillar. Consequently, it is not so much rural development that is targeted but rather agricultural development. Thus, in an analysis of 2022 concerning the agricultural development policies declared by the Member States for the period 2023-2027, Becker, Grajeweski and Rehburg highlight the fact that the bulk of the financing is still directed towards agriculture and the environment, regardless of whether one studies the first or the second pillar of CAP. The strategies remain very heterogeneous, which the authors identify as being the consequence of the subsidiary nature of the CAP, but broad outlines still emerge concerning the national policies (Becker, Grajeweski and Rehburg, 2022).

In order to focus more specifically on the needs of rural areas, the European Union has developed a development program based on a local bottom-up approach: the LEADER programme, from French *Liaisons Entre Actions de Developpement de l'Economie Rurale* (Links Between Rural Economy Development Actions). This new instrument is part of the RDP but is not mandatory. The LEADER program is based on the creation of local action groups (LAGs) which form a territorial network on a European scale: the LAGs are structures of a varied legal nature which are the recipients of European LEADER funds and must promote cooperation between public actors (such as local administrations), private actors (such as companies) and citizen actors (such as associations). LEADER programme is integrated into the Community-Led Local Development (CLLD), an umbrella term that can include other funding programmes from the European Union with bottom-up approaches. Today there are more than 2800 LAGS across the European Union which covers around 60% of the rural population. LEADER

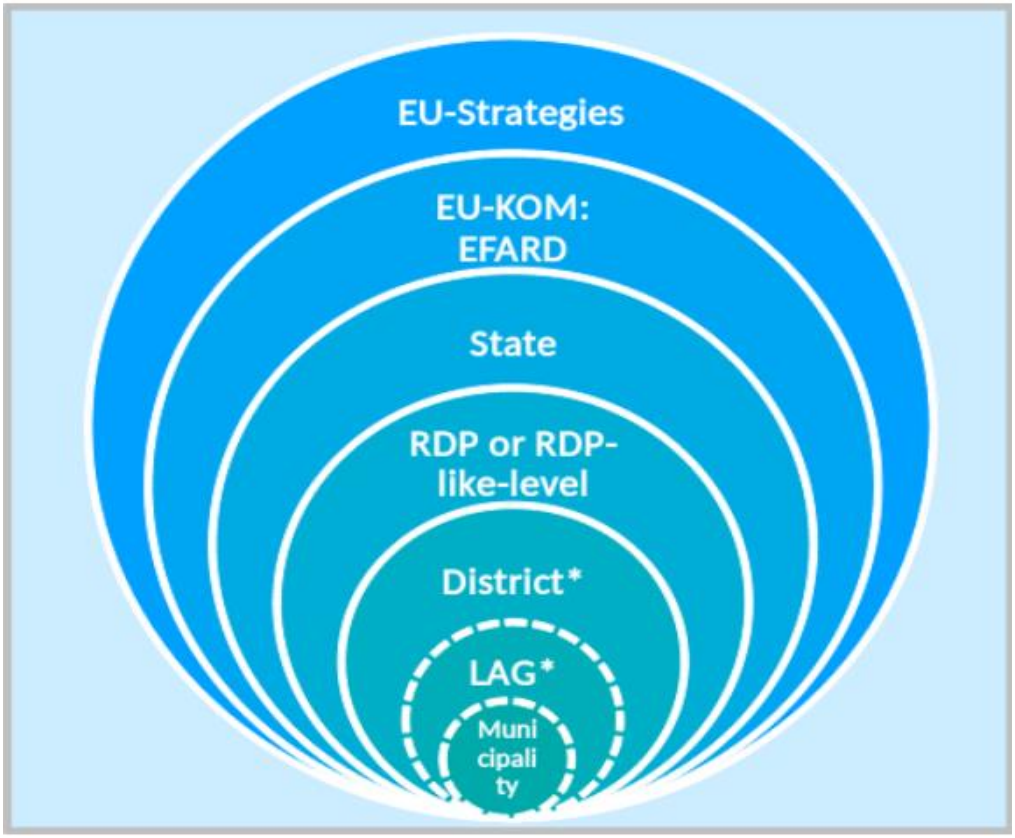
programme has the ambition of proposing a unique framework who can deal with the unique characteristics of rural areas and answer the problematics. The particularity of the LEADER program can be summarized in its 7 key features (European Network for Rural Development, 2021):

1. **Bottom-up approach**: LAGs must be committed to integrating the actors of local life, whether public or private, and must take into account their needs and their projects to develop their own rural development strategy.
2. **Area approach**: LAGs cover a territory which presents a certain homogeneity, with its identity, a feeling of belonging or common needs. The LAGs must be able to develop a coherent strategy which covers all the particularities of the territory and will benefit a maximum of actors. The territorial population should be between 10 000 and 150 000 inhabitants.
3. **Local partnership**: Local actors should no longer be seen as simple beneficiaries of local policies but as stakeholders. They must participate into the decision process. Public actors shouldn't represent more than 49% of membership of the LAG local partnership.
4. **An integrated and multisectoral strategy**: Local strategies must ensure that all of the needs of populations and stakeholders are covered and not just focus on one activity.
5. **Networking**: A LAG represents in itself a network of local actors, but the benefits of networking extend far beyond the local horizon: regional, national and international networks can also benefit local populations. In particular, all Member-states established National Rural Networks (NRN) through their RPD.
6. **Innovation**: The LAGs must concentrate as much as possible on bringing new elements and new solutions to the development of its territory. The LEADER funding lever should enable the creation of new actions.
7. **Cooperation**: Each LAG must set up at least one cooperation project. More than a network, it is a real joint work that includes other territories as partners in order to have new perspectives and insights.

The LEADER program enjoys great popularity in the Member States and is present in all national territories. The bottom-up approach of Community-Led Local development differs greatly from traditional top-down approaches. The organizational models of the LEADER program LAGs can vary greatly depending on the country chosen because each state has different administrative systems with their own layers (figure 9 shows the relevant layers regarding the LEADER programme). The European Union provide main guidelines, the national state may impose additional conditions and securities (like the control of conflict of interests), whereas the LAGs generally include specific implementation for the local municipalities. Because of multiple layers and different organization models between the layers, conflicts may arise: for instance, elected officials sometimes contest the legitimacy of LEADER stakeholders, local municipalities may

have a disproportionate impact in the decisions or regional/district governments might attempt at weighting more in the LAGs strategies, which goes against the basic principles of LEADER programs (Pollermann et al, 2020 ; Navarro, Woods and Cejudo, 2015).

Figure 9: Layers of governance framework for LEADER



Source: Berriet-Solliec et al. 2015

Within the European Union, territorial policies are overseen by the European Observation Network for Territorial Development and Cohesion (ESPON). This research and statistics program aims to advise EU Member States in their planning and territorial development policy. In the second half of 2020, Germany held the Presidency of the Council of the European Union. In this capacity, Germany led the drafting of the Territorial Atlas 2030 which summarizes key data for European regions in 2020 and gives them advice for the next 10 years. A number of observations and remarks are made about the problems encountered in rural areas (ESPON, 2020):

- populations are increasingly concentrated in cities, even in rural areas (p.16)
- the emigration rate is on average higher in rural areas and the migration rate is on average lower (p.20)
- there are more elderly people in rural areas (p.24) and in the same way, there are more people dependent on other people (particularly due to age) (p.26)

- there is a higher unemployment rate among young people and a greater number of young people without a diploma in rural areas (p.32)
- air transport is more restricted in rural areas (p.44)
- - rural regions have a lower capacity for economic adaptation and are more vulnerable to climate risk (p.58)
- access to the Internet at speed and the deployment of new communication technologies is lower in rural areas (p.78)

In addition to ESPON, a network for rural areas at the scale of the European Union was introduced for the period 2007-2013: the European Network for Rural Development (ENRD), which connects the national rural networks at the member-state level together. The ENRD encourages cooperation as well as the share of information and good practices, and promotes positive policies for the development of rural areas. It also releases research articles and reports, sometimes in cooperation with the European Commission (Peters and Gregory, 2014).

Rural development in France

The foundation stone for rural development policy programs in France was laid with the creation of the *Délégation Interministérielle à l'Aménagement du Territoire et à l'Attractivité Régionale* (Interministerial Delegation of Land Planning and Regional Attractiveness or DATAR), created in 1963 under the government George Pompidou. Since the 1950s, policies aimed at reducing taxation in rural areas and promising bonuses to companies setting up in regions considered critical had been put in place, but the French State was not endowed with a directing or coordinating body. At the time, the notion of rural development did not exist. Most of the discussions are made around the notion of territorial planning instead. It is above all the French system that is criticized: France is often described as a very centralized country around its capital, Paris, which seems to absorb the majority of economic activity and political decision-making bodies, to the detriment of the "province", a colloquial term used to designate regions other than the Ile-de-France (Paris region). Thus, in 1947 Jean-François Gravier published the pamphlet "Paris and the French desert". Having become popular since its reissue in 1958, the central thesis of the book is that Paris acts as a monopolistic agent within the French territory, which seems to extend indefinitely and concentrate ever more activity by emptying the other territories of their capacities. Although not really based on scientific bases, the book will have a great political impact, read and commented on by President Charles de Gaulle, quoted in the Senate and in Parliament. Beyond the controversy against Paris, it is the beginning of an awareness in the strong inequalities that exist within the French territory

and in the need to rebalance the balance to offer a similar standard of living to all citizens (Marchand, 2001).

The DATAR was initially designed as an advisory advisory body, which did not change the administrative organization of the time and was directly attached to the Prime Minister. It is a small-scale structure that will grow over time and grow from around thirty agents in the 1960s to more than 300 in 2005. The purpose of DATAR is above all to offer new forms of governance of local authorities and to study the possibilities of new political concepts and new technologies in territorial planning, with the objectives of proposing new methods of development that suit the characteristic of the territories. Its first major action is to support the territorial reform of 1964 and the creation of regional economic development commissions, which are precursors in the deployment of local development policies. Among other examples, the DATAR will be responsible for the development of contemporary regions in France, but also for the creation of the system of “metropolises”, the qualification of "medium-sized cities" or even the "*pays*" (the predecessor of the intermunicipalities currently existing). The DATAR is also the first body to develop territorial networks on a national scale by connecting the various institutional actors (Bodiguel, 2006).

In 2014, DATAR merged with other agencies linked to local authorities to form the General Commission for Territorial Equality. In 2020, it was renamed the National Agency for Territorial Cohesion. The National Agency must serve as a one-stop shop for all elected officials and promoters of local projects, in particular municipalities and inter-municipalities. Its action primarily targets territories characterized by geographical constraints, demographic, economic, social, environmental difficulties or access to public services. This new agency designs the CRTEs, a new development model for the territories which is based on direct dialogue with the State to seek new funding and must be based on ecological transition and territorial cohesion (Assemblée Nationale, 2019a).

Since the implementation of the second pillar of the CAP, theEuropean rural development policy tends to replace French rural development policy. The French State has produced several versions of its RDP corresponding to the programming periods 2007-2013, 2014-2020 and 2023-2027. Since 2007, the French RDP are named PDRH (for Hexagonal rural development program, the “hexagon” being a colloquial term used to call France). The PDRH is broken down into DRDR (Regional Rural Development Documents) for each region. Local authorities are involved in the development of DRDRs, to which they

contribute financially and undertake to implement some of these measures. Since the programming period 2014-2020, the DRDRs are no longer drawn up in a dialogue between the regions and the French State, but in a direct dialogue between the regions and the European Commission. They were renamed Rural development plan (PDR, to not be confused with RDP which are at the member-state level). The PDRs remain framed by a political and legislative framework at the national level, but the French State no longer intervenes in the deliberative process. The French State had for instance defined the following 3 objectives for the period 2014-2020: design new production methods (with a priority on agroecology), promote generational renewal and protect the natural environment and natural resource (Pham & Berriet-Solliec, 2018).

Since its start has been postponed by two years to 2023 due to the COVID-19 health crisis and the signifcant extension of the duration of negotiations at European level, the RDPs of the Member States for the new programming period of the CAP must be submitted at the beginning of 2022 to be studied and accepted by the European Commission. A first version of the French RDP was submitted at the end of 2021, but the report was not presented to the public. According to a press release from the Ministry of Agriculture, the French State intends to make the response to climate change the major issue, in accordance with the European Green New Deal. If some agricultural initiatives have been presented (development of the production of leguminous, doubling of the organic farming area, the development of agricultural hedges, etc.), the question of rural development has not yet been addressed (Ministère de l'Agriculture, 2022).

Rural development in the Grand Est region

As the last CAP programming period dates from before the 2016 regional reform which led to the creation of the Grand Est region, there is still no rural development policy at Grand Est level. The first PDR in the Grand Est region should be proposed for the 2024-2027 programming period, once the European Commission has validated the French State's strategy. In order to study the PDRs of the Grand Est region, it is therefore necessary to look at the PDRs published by the previously existing regions: the Champagne-Ardenne region, the Lorraine region and the Alsace region.

Champagne-Ardenne PDR was officially approved by the European Commission on the 30th of October 2015. A total of €319.16 million is available for the period 2014-2020, including €201.76 million from the EU budget and €117.40 million from the national

contribution. Around €202 million will be directly attributed to FEADER for rural development. In particular, the Champagne-Ardenne PDR is structured around 6 priorities (annex 2):

1. Encourage the transfer of knowledge and innovation in the sectors of agriculture, viticulture, forestry, agri-food as well as in rural areas (€12.08 million, 5.98%)
2. Improve the competitiveness of all types of agriculture and strengthen the viability of agricultural holdings (€46.70 million, 23.12%)
3. Promoting the organization of the food chain and risk management in the agricultural sector (€6.05 million, 3%)
4. Restore, preserve and enhance ecosystems dependent on agriculture and forestry (€88.19 million, 43.66%)
5. Promoting the efficient use of resources and supporting the transition to a low-carbon and climate-resilient economy in the agricultural and food sectors, as well as in the forestry sector (€17.50 million, 8.66%)
6. Promoting social inclusion, poverty reduction and economic development in rural areas (€28.22 million, 13.97%)

Lorraine PDR was officially approved by the European Commission on the 24th of November 2015. A total of €553 million is available for the period 2014-2020, including €329 million from the EU budget and €224 million from the national contribution. Around €329 million will be directly attributed to FEADER for rural development. In particular, the Lorraine PDR is structured around 14 measures, among which the most significant are (annex 3):

- Measure 4: Physical investments for the modernization of agricultural holdings (€104.11 million, 20%)
- Measure 7: Basic services and village renewal in rural areas (€54.08 million, 10%)
- Measure 10: Measures for agro-environment and climate protection (€83.90 million, 16%)
- Measure 13: Payments for areas with natural constraints or other specific constraints (€147.98 million, 28%)

Alsace PDR was officially approved by the European Commission on the 23th of October 2015. A total of €180.5 million is available for the period 2014-2020, including €119.2 million from the EU budget and €61.3 million from the national contribution. Around €119.24 million will be directly attributed to FEADER for rural development. In particular, the Alsace PDR is structured around 16 measures, among which the most significant are (annex 4):

- Measure 4: Physical investments for the modernization of agricultural holdings (€36.98 million, 20%)

- Measure 7: Basic services and village renewal in rural areas (€22.75 million, 13%)
- Measure 10: Measures for agro-environment and climate protection (€41.33 million, 23%)
- Measure 13: Payments for areas with natural constraints or other specific constraints (€24.85 million, 14%)

2.3 Digitalization and digital transition policies

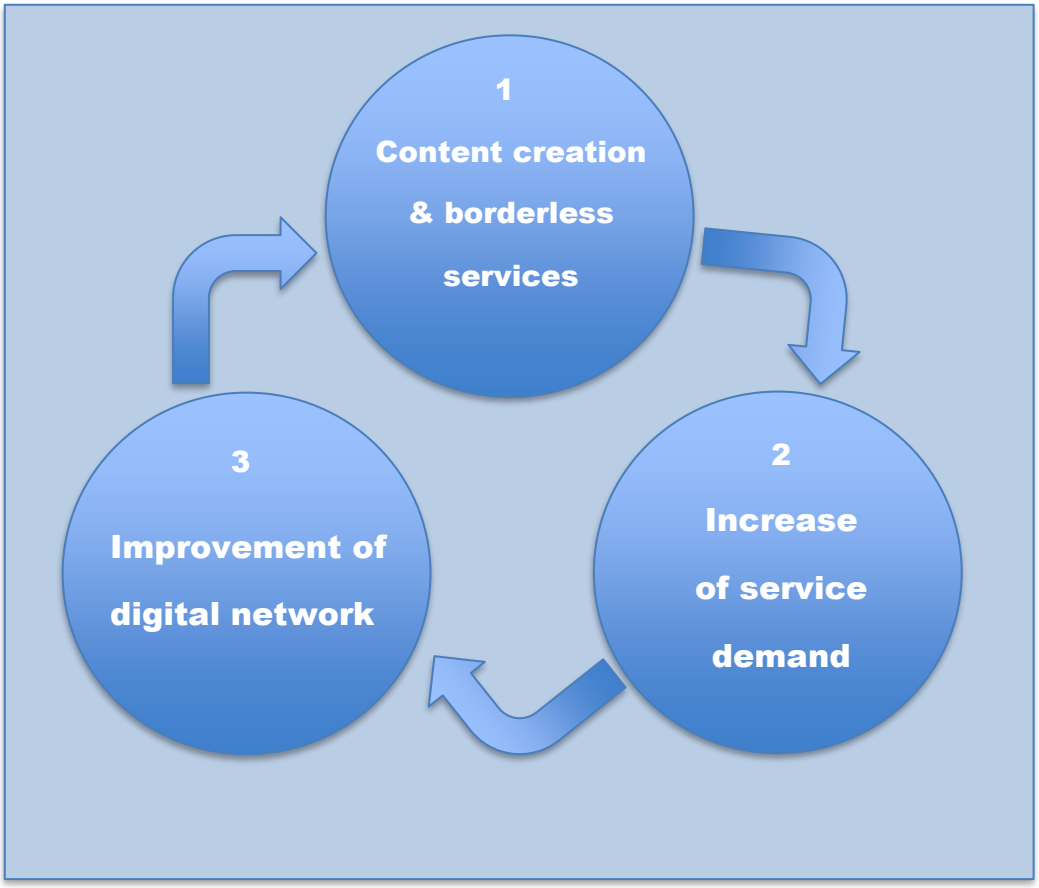
The very idea of the digital divide is a recent concept. If the deployment of the Internet for the general public began in the early 90s, the concept of digital divide only appeared in the 2000s and solidified in the following year. The first studies are carried out on a global scale, in particular with the participation of the International Telecommunication Union, a United Nations agency whose aim is precisely to assist in the development and deployment of ICTs. The ITU is developing a first index of digital inclusion which is broken down into 5 variables: equipment in telecommunications infrastructure, financial accessibility, level of education, quality of ICT services and use of the Internet. Hammond (1997) offers among the first studies of the question on the scale of the United States. In general, research is mainly concentrated in the United States and in English-speaking countries (United Kingdom, Canada, Australia, etc.) and there is as yet no study applicable to the rest of the world (Cullen, 2001). Alfonso Molina (2001; 2003) is one of the first European researchers to look into the question, basing his work in particular on OECD reports and taking the example of Rome and Stockholm as digital cities.

The digital strategy of the European Union

After the end of the so-called Lisbon strategy, which structured European policy from 2000 to 2010, the Member States met again to define the key elements of a strategy capable of meeting European challenges from 2010 to 2020, or "Europe 2020 strategy". On March 3, 2010, the European Commission summed up the strategy as being that of “smart, sustainable and inclusive” growth. On 19 May 2010, the Commission communicates to the European Parliament, the Council of Europe and the Committee of the Regions a new strategic document concerning the digital future of the European Union, entitled "A digital agenda for Europe". This is one of the 7 components of the Europe 2020 strategy. The Commission develops the idea that the digital transition should not simply be a tool like any other, but indeed a central element of a policy of technological, economic and social development on a European scale which is able to

meet the needs future. In a Europe that has just emerged from the economic crisis that occurred in 2008, the digital transition appears to be a solution for reviving economic activity, creating wealth and employment and increasing the competitiveness of European companies. To get out of the crisis, the Commission not only declares that there are only 3 possibilities; work harder, work longer or work smarter, but also that only this third option will raise the living standards of Europeans. The digital transition is described as the engine of a virtuous cycle (see figure): the development of interoperable and quality services in an Internet space without borders (1) must stimulate an increase in demand for services from citizens and companies (2), which pushes companies to invest in the development of digital infrastructure (3). These new, more efficient infrastructures are then the basis for enabling the development of higher quality services which opens the way for a new cycle (European Commission, 2010).

Figure 10: Virtuous cycle of digital economy



Source: European Commission, 2010

In its recommendations, the European Commission has identified a number of threats that prevent or slow down the virtuous cycle of the digital economy:

- **Fragmented digital market:** Europe is a heterogeneous assembly of national digital markets; a homogenization of regulations is therefore necessary to allow the free circulation of digital products and services.
- **Lack of interoperability:** There are no digital standards at European level and coordination between the different levels of public authorities remains limited
- **Cybersecurity:** The global increase of digitalization also leads to a global increase of cybercrime; thus, it is necessary that European member-states answer the threat with adequate cybersecurity answers
- **Lack of investments in networks:** The deployment of very high-capacity networks (VHCN) is limited and not every European citizen can access fast and reliable internet, both fixed and wireless
- **Insufficient research and innovation efforts:** More efforts should be done to fund digital-based research as well as support companies (especially SMEs) that provide innovation in the ICT sector
- **Lack of digital literacy and skills:** Europe suffers from professional ICT skills shortage as a digital literacy deficit in the population, which means that citizens are being excluded from the digital society
- **Missed opportunities in addressing societal challenges:** ICT can be a possible answer to societal challenges such as climate change, ageing population, health coast, efficiency of public services, integrating people with disabilities, preserving cultural heritage, etc

In 2014, the European Commission reassessed its priorities and decided to take a new step in the digitization of Europe following the start of the Juncker presidency. In a report entitled "A new start for Europe" and published on July 15, 2014, Jean-Claude Juncker lists digitization as the second priority and cites in particular the need to abolish roaming charges in Europe. In May 2015, the new digital strategy for Europe is published. It is no longer a question of a simple political agenda for digitization, but of the concrete implementation of the Digital Single Market which should ultimately unify the digital markets of the 27 Member States (28 in 2015) into one coherent and interoperable entity. According to the new strategy, the deployment of the digital single market should be based on three pillars (European Commission, 2015):

- **Better online access for consumers and businesses across Europe:** barriers preventing cross-border digital activities must be abolished and an appropriate framework for e-commerce must be defined at European level

- **Creating the right conditions for digital networks and services to flourish:** unify the regulations applied to the telecommunications company in order to ensure a uniform and egalitarian deployment of VHCN on European territory;

encourage competition to offer lower prices and better service quality; ensure sufficient cybersecurity is provided across the territories

- **Maximizing the growth potential of our European Digital Economy:** in order to stimulate digital economic growth, new interoperability standards must be proposed; investment in research and digital innovation must be necessarily encouraged, whether public institutions or companies; education and training measures must be proposed in order to increase the number of ICT specialists in Europe and to improve the digital skills of the population (in particular by fighting against digital illiteracy)

As the digital transition has become a priority in the European Union, political initiatives are multiplying. The European rural development strategy is also affected by the growing share of digital, which will lead to a new-iteration of Cork Declaration. 30 years later, on 5-6 September 2016, around 300 stakeholders from the European Union met again in Cork for European Conference on Rural Development, in to discuss the current and future challenges of agricultural and rural areas in the spirit of 1996 declaration (see p.19). Taking notes on the latest developments in the field of digitalization, the report expects that "the rural economy and rural businesses will depend increasingly on digitisation as well as knowledge workers who make the most of the digital transformation and enhance rural production in a sustainable manner" (p.4). This idea is developed in the point 7 "Boosting Knowledge and Innovation ": the rural communities should be stakeholders of the digital economy instead of being excluded, because the digital technologies provide new opportunities for rural areas. Thus „rural business of all types and size must have acesss to appropriate technology" and the political focus should be put on „on social innovation, learning, education, advice and vocational training" in order to develop the digital skills that are needed in the population to be part of the digital economy and the digital society. The creation of networks is strongly encouraged among farmers and rural entrepreneurs. Finally, researchers should also try to assess the "needs and contributions of rural areas" regarding digitalization and work together with civil society and public authorities to "better exploit and share opportunities arising from scientific and technological progress" (p.8). The digital questions were absent of the previous report and shows an evolution of priorities decades later (European Commission, 2016).

During the Estonian and German presidencies of the European Union, the importance of digitalization to provide equal opportunities to European citizens regardless of member

state or region of residence is reiterated in the Talinn and Berlin declarations. These declarations focus on particular on the development of digital public services and the creation of eGovernment. On the 6th of october 2017, ministries of EU member-states and EFTA countries met in Tallin in the frame of the Estonian presidency of Europe. Every country signed the eGovernment Declaration, committing toward the establishment of high quality, widespread accessible and personalized digital public services that should be made available to every European citizen, as well as creating crossborder bridges between the member-states to ensure cooperation between the administrations and transnational public services for businesses. Within the subsequent declaration, there isn't any mention of the digital divide nor the geographical specificities of the digitalization. The only mention of the local scale is regarding the interoperability of service from national to regional to local scale (Council of the European Union, 2017).

In December 2020, three years after Tallin meeting, Germany was occupying the presidency of EU. Ministries met again and discussed the thematic of digitalisation and eGovernment, this time in Berlin. The member-states reaffirm their commitment toward the development of eGovernment services and the inclusion of every citizen. This time, the issue of the digital divide is clearly addressed. The specific nature of rural areas is also addressed, though it remains anecdotical: the member-states should "enhance social participation and inclusion by" "developing relevant policies to deal with existing participation gaps especially with regard to demographics and remote or rural areas" (p.9) Neither the causes of rural digital divide nor possible solutions to the issue appear in the subsequent declaration (Council of the European Union, 2020).

New strategy since 2020

In 2020, the European Commission assessed the achievements of the Europe 2020 strategy as well as the implementation of the digital single market. In particular, it welcomes regulation (EU) 2017/920 of the European Parliament and of the Council which has put an end to roaming charges and allows access to mobile connectivity throughout Europe at similar prices (European Parliament, 2017), as well as the creation of the General Data Protection Regulation (GDPR) to protect the privacy and personal data of European internet users following Regulation (EU) 2016/679 (European Parliament, 2016b). In order to further accelerate digitalisation, the Commission is presenting two digital strategies which will be the pillars of the European Union: "shaping Europe's digital future" and "Europe's digital decade". On the one hand, it is a question of

strengthening initiatives to increase European competitiveness in digital matters and to continue the establishment of the digital single market. On the other hand, the Commission highlights new cutting-edge technologies in which, according to it, Europe must become a leader in order to develop a strong digital economy adapted to future challenges: quantum computing, blockchain, artificial intelligence and European production of semiconductors (European Commission, 2022b).

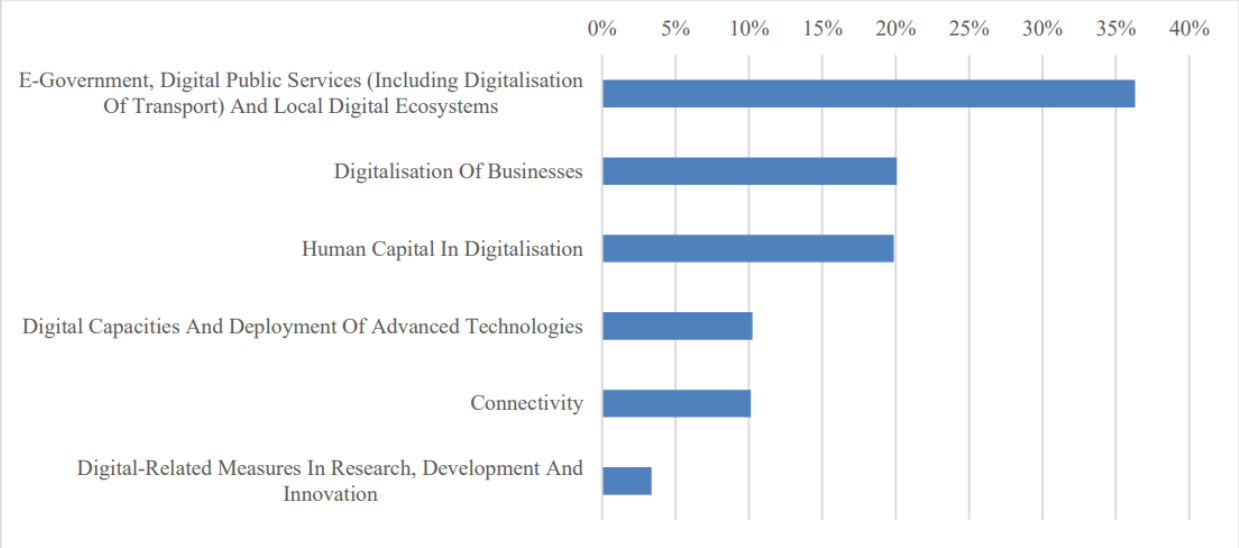
In 2020, the European Commission published a report assessing the progress of the deployment of telecommunications infrastructures in the European Union and comparing the current progress with the objectives set in the Digital Agenda (European Commission, 2021d). The report observes that 97% of European citizens had access to broadband internet (which is close to the target set at 100%) and 67% had access to VHCN, but that broadband only concerned 89.7% of inhabitants. in rural areas and VHCN only 59.3% (p.12).

The COVID-19 crisis that broke out in 2019 will precipitate the needs of the economic and digital transition. Around the world, governments are mobilizing to counter the adverse effects of the slowdown in the global economy and the paralysis of a number of logistics flows, first from China and Asia and then extending to the whole world. While many countries are already offering recovery plans to revitalize their economies, it is in 2021 that the European Union is officializing the launch of the largest financing plan it has ever initiated to date. Regulation 2021/2041 thus establishes the name "Recovery and Resilience Facility" (RRF) (European Parliament, 2021). This is a major financial mechanism which will offer loans to Member States in order to respond to the economic and social emergency. The main idea is not only to solve the economic crisis of COVID 19, but to take advantage of it to restructure the European economy and provide guidelines for the decades to come (Crum, 2020). These guidelines are now known as the "twin transition", a name officially adopted by the European institutions to designate the superimposition of an ecological transition and a digital transition (European Commission, 2022a) into a unified, coherent development strategy who covers both aspects.

In total, the RRF plans funding of €672.5 billion for the twin transition. Each member state had to design its own economic strategy, then submit a request for funding to the European Union. To be valid, the digital transition had to represent at least 20% of the budget allocated in the RRF of each Member State. 22 RRF were submitted to the

European Union by the Member States. 117 billion euros will be allocated to the digital transition, which represents 26% of the declared RRF, i.e. 6% more than the minimum authorized digital investment (European Commission, n.d). If we look at how the RRF budgets allocated to the digital transition are distributed according to the estimation of the Commission, we see that digital public services are the largest item of expenditure (36%), followed by the digitization of companies (20%), investment in human capital (19%), deployment of advanced digital technologies (11%), connectivity (10%) and finally research and development (4%) (see figure 11).

Figure 11: Breakdown of expenditure supporting the digitalisation in the RRF



Source: Commission Européenne, 2022a (p.23)

For the 2030 horizon, which will conclude the EU's digital decade, the Commission has proposed digitization objectives to be achieved, also known as the "digital compass", supplemented by quantitative criteria making it possible to establish whether or not the objectives will have been achieved. These four major objectives are (:

- **A digitally skilled population and highly skilled digital professionals**: at least 80% of European citizens with basic digital skills and 20 million ICT specialists in 2030 (compared to 7.8 million in 2019)

- **Secure and efficient sustainable digital infrastructures**: every European household having access to VHCN and 5G deployment in all urban regions in 2030

- **Digital transformation of businesses**: 90% of SMEs with basic digital skills and 75% using advanced digital technologies

- **Digitalization of public services**: 100% of key public services are accessible online for European citizens and businesses, 80% of citizens use digital ID solutions

These criteria are close to the indicators used by the Digital Economy and Society Index (DESI) report, a method used by the European Commission since 2014 and publishing annual reports that analyse progress in terms of digitization of all member states. Each of the indicators is an aggregate of several data that allow to assign scores to the Member States in each category as well as overall digitization scores, allowing to highlight the strengths and weaknesses of each country (:

- **Human capital**: internet users, basic digital skills, advanced digital skills

- **Connectivity**: broadband take-up, broadband coverage, mobile broadband, broadband prices

- **Integration of digital technolog**y: business digital skills, eCommerce

- **Public services**: accessibility, eGovernment

2022 DESI reports shows for instance that 92% of European households had access to internet (94% in cities, 89% in rural areas) in 2021 and 70% had access to VHCN, with an almost universal access to 4G of 99.8% (p.15), that 84% of European citizens used internet at least once per week, that 54% had at least basic digital knowledge (p.14). Regarding the access to digital public services, 65% of internet users used digital public services (p.66) (European Commission, 2022d).

In Navarro et al (2020), the rural digital divide is defined as ‘the difference between individuals, companies, regions, and countries in the access and use of ICT”. On the contrary, the “concept of digital inclusion emerged referring to the objective and the process of implementing measures by a government or a public or private entity to bring the knowledge and use of ICT closer to those who do not already have it” (p.3). In their study, the authors decided to review a vast sample of 268 scientific papers and documents with main interested being the rural digital divide. After a first analysis, it can be narrowed

once excluding non-european country (-117) and then narrowed again excluding paper without proposal/recommendation (-123). This gives a final result of only 28 documents – only 1.04 document per member-states in the European Union as of 2022 (1.0 if we include the UK that was still a member-state of the EU when some of the papers were published). For a topic potentially concerning around 135 million of European citizens (the rural population of the European Union according to European Commission, 2021b), the scientific literature is extremely scarce.

The digital strategy of France

France showed interest in the question of digitalization later than in the US and other English-speaking counterparts. Thus, Houzet and Grasland (2004) still write that "the expression “digital divide”, widely used but without explicit scientific basis, gives rise to multiple discussions on its theoretical relevance and on its measurement” (p.1). There was therefore no substantial database yet to demonstrate and analyze the notion of digital divide. The first works in France tried to define the notion by carrying out empirical studies, but the definitions vary greatly and the authors do not agree between them (Guichard, 2003 ; Houzet & Grasland, 2004 ; Rallet & Rochelandet, 2004).

Houzet and Grasland (2004) is particularly important because this study addresses the digital divide from a purely geographical angle and analyzes the French territorial situation by region and by department at the start of the digital era. It is therefore a pioneering work on the subject. The conclusion already reveals significant disparities, but the factors leading to the digital divide are not yet clearly identified since population concentrations are not sufficient predictors of digital development in a given area.

The end of the 1990s marked France's first steps into the digital age as a political entity. In 1998, an interministerial committee published the Government Action Program for the Information Society (PAGSI), an action plan aimed at preparing France for the "information society" of tomorrow. Several major digital initiatives stem directly from this plan. Firstly, the use of the internet is becoming widespread in public administration and all the institutions are getting their own public internet site. This allows all the administrative forms to be put online, which then become accessible to anyone with an internet connection and knowing how to access these sites. In the early days, there was a certain reluctance from public administrations regarding digital technologies, which threatened to drastically change the way they operate. The PAGSI, addressing the

administrations directly, seems to have had a positive effect and seems to have largely swept away these doubts. In 2000, there were around 160 government websites, including all types of administrations. In 2004, this number rose to 7,015, including 956 national-scale websites (Alcaud & Lakel, 2004). The plan thus paves the way for the emergence of a digital administration and the first forms of eGovernment in France. The interministerial committee met again in 2000 and 2001 to give new impetus to the digital transformations of the French State. In particular, the deadline of 2005 was established to design a platform allowing to centralize all the administrative procedures that it was possible to digitize: it is the birth of *mon.service-public.fr*, still used in 2022 as central hub for the digitization of French public services. (Sénat, 2004)

The landscape of the French digital industry was transformed in 1999: before that date, the deployment of network and communication infrastructures was reserved for France Telecom, a public company. First in charge of the telephone network, France Telecom undertook to deploy the Internet on French territory from 1995 and became the first French Internet provider by creating the Wanadoo subsidiary. Given that France Telecom owned all the telecommunication lines, the cost of entering the French market was too high for a competing private company. After a political decision to open up to competition, France Telecom gradually transformed into a private company (while retaining state participation), now known as Orange. At the same time, other operators have settled in the territory and are participating in the deployment of telecommunications. One of the objectives of the public authorities was precisely to boost the development of a digital industry in France and to accelerate the digitization of the territory. (Assemblée Nationale, 1996)

From 1997, France Telecom's role within the public authorities was replaced by the creation of the *Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse* (Regulatory Authority for Electronic Communications, Posts and Press Distribution, or ARCEP). ARCEP's objective is first of all to define the regulations in force in the field of telecommunications, regulations which apply to all operators operating on French territory. Secondly, ARCEP serves as an advisory body for players in the digital industry as well as elected politicians. Indeed, ARCEP has a substantial database on digital issues. It has carried out several studies on a national or regional scale and it produces a cartography of the territory in order to model the deployment of telecommunications and to identify the gray areas, the territories little or

not covered by certain telecommunication networks. The ARCEP also represents France in the Body of European Regulators for Electronic Communications (BEREC). (Lions, 2008)

If the opening up to competition has indeed made it possible to develop the telecommunications and digital industry in France, the intervention of the private sector in an infrastructure policy on a national scale has not been without consequences. As Mbarek explains, "the rate of Internet access at home rose from 4% in 1998 to 14% in 2000" (p.64). The deployment rate continues at a similar pace over everal years, thanks in particular to the rapid deployment in metropolises and large cities. The greater the concentration of population in an area targeted by a telecommunications operator, the less it will be necessary to invest in infrastructure because the area to be covered is small. This results in a significantly greater return on investment in urban areas, which offer the highest number of customers for the lowest investment costs. This is the first stage of the digital divide: the further people are from urban centres, the more they live in areas with low population density, the less profitable it is for private companies to deploy the Internet there. Given that the market has been liberalized and privatized, this opening up to private companies results in a search for profit above all, which can sometimes come into conflict with the needs and well-being of the populations. (Mbarek 2019)

In the early 2000s, the entire French territory was already covered by telecommunications infrastructures which were installed between the 1970s and the 1990s under the direction of France Telecom. Unfortunately, these are very largely outdated technologies that absolutely do not correspond to the needs of the 21st century and of contemporary societies where digital is taking on ever greater importance. Two types of lines had been installed: telephone lines (copper) and cables for televisions. Of course, these infrastructures date from a time when the Internet did not exist and when they were sufficient to meet the needs and uses of the population of the time. This is no longer the case decades later, where the Internet occupies a preponderant place and even tends to supplant the use of the telephone and television. These lines suffer from very low capacity compared to the amount of data flowing through the internet medium: they are limited in bandwidth capacity and speed. In 2017, the *Cour des Comptes* (France's supreme audit institution) produced a report on the deployment of digital in France since the launch of public digitization policies and these substantial weaknesses were identified: if broadband is widely accessible, very high-speed broadband cannot be based on the existence of

previous infrastructures. But it is precisely this very high-speed that is necessary to exploit the capacities of the contemporary Internet. While this report already identified certain new uses and services offered by very high-speed broadband, the sustained development of Internet-related technologies assumes that more and more new uses are appearing and therefore that the digital divide is only widening for populations without access to VHCN. (Cour des Comptes, 2017)

The French State quickly became aware of the problems linked to the deployment of new telecommunications infrastructures and of the antagonism between the objectives of public policies and the objectives of private companies. Without public intervention, the digital divide risked increasing at a significant speed: it is the role of public authorities to meet the needs of local populations, and if these needs require an investment beyond any economic profitability, then there is no reason to think that private companies would venture in that context. It is in this context that the law n° 2004-575 of June 21, 2004 called "law for the confidence in the digital economy" was voted. This law transforms the legal framework around the digital economy by providing support for public authorities wishing to invest in digital infrastructure at the local level. In particular, local authorities (including municipalities and inter-municipalities) are seeing their competencies extended and strengthened with regard to digital issues. These new mechanisms allow local authorities to create public initiative networks, offering the possibility of making calls for tenders to private companies and benefiting from public subsidies in order to carry out their local digital policy. Local authorities may have participated into digital policies before, but they were now equiped with new tools designed specifically for them. (Assemblée Nationale, 2004)

If this new device shows first of all promising results and effectively accelerates the deployment of digital coverage in the territories, the results are far from sufficient and the problem of the digital divide has not been resolved. In reality, if global coverage has indeed progressed, the digital divide between metropolitan areas and peripheral areas has rather increased, and this in most countries where competition policies have been implemented, including France (Attour & Longhi, 2009). It is with this in mind that the French State is supplementing the law for the confidence in the digital economy by the two additional laws : the law n°2008-776 of August, 4, 2008 or law "of modernization of the economy", more known by the name of LME law, and the law n° 2009-1572 of December 17, 2009 or law "relating to the fight against the digital divide", more known

by the name of the Pintat law (from the senator who initiated it, Xavier Pintat). The LME law strongly encourages the cooperation between the private and the public sectors: the local authorities should create a bridge between telecommunication operators and the members of civil engineering who are responsible for the deployment and maintenance of electrical networks, in order to facilitate the deployment of telecommunication networks. Additionally, communities have the option of pooling networks and opening them up to any operator, regardless of the operator already present. The idea being to pursue the opening up to competition by facilitating the entry of competing operators into a territory already exploited. (Assemblée Nationale, 2008)

Pintat law is the last foundation piece of French digital policy. It is divided into four distinct initiatives, supposed to respond to the shortcomings of previous policies and to future needs by solidifying the legislative framework (Assemblée Nationale, 2009).

- The first initiative consists of strengthening ARCEP by giving this authority the possibility of intervening in disputes, or even initiating legal proceedings against actors opposing the deployment of digital policies: that it whether private players (opposing competition, for example) or public players (not committing enough to the deployment of network coverage, for example). (Article 18, 20)
- The second initiative was interested in the new communication technology of the time, namely 4G (for 4th generation) which replaced the 2G and 3G networks. This technology, which makes it possible to obtain a very high-speed mobile network, is perceived as being a key to the fight against the digital divide because it could potentially bring network coverage where the deployment of a very high-speed line proved to be the most expensive and the most difficult. Still in a logic of opening up to competition, the licenses allowing the deployment of mobile networks are open to public companies. An ambitious objective has also been set: to achieve 98% network coverage of the population of mainland France within 12 years, with at least 90% of the population of each department covered. (Article 22)
- The third initiative is a series of reports commissioned from Parliament on digital issues to pave the way for new legislation or a strengthening of the existing framework. In particular, a report on the digital divide (referred to here as "digital divide") has been commissioned. (Article 25, 33, 34, 35)
- The fourth initiative is undoubtedly the centerpiece of this law, and the one that seeks to resolve the issue of the digital divide most directly. This involves the creation of territorial directing plans for digital development (SDTAN). These plans must be designed to become the "digital backbone" of territorial planning. They must be established at the departmental level (or even concerted by several departments). The objective is to design digital development projects that meet the needs of populations, the economy and local authorities, and offer a coherent and comprehensive framework that can

> be applied to all actors in the territory concerned. To achieve these ends, the law also provides for the establishment of a digital territorial development fund (FANT), which allocates a budget specifically reserved for the deployment of digital technologies and the development of the digital economy in the territories. The FANTs therefore directly support the SDTANs by giving them the means to achieve their ambitions. (Article 23, 24)

The Pintat law had a direct effect and SDTAN initiatives multiplied very quickly. In fact, as of October 2011, ARCEP has already listed 79 SDTAN projects that have been declared by local authorities. 4 projects were led by regions, the others by departments and groupings of sub-regional authorities. If the SDTANs are deemed to comply with the legislation in force and above all respect the digital development plans as provided for by ARCEP, then this offers the way for local authorities to obtain financing via a FANT. By the date of the report, ARCEP declared that "almost the entire territory of France is subject to an SDTAN declaration" (p.23). (ARCEP, 2011)

ARCEP defines SDTANs as part of a larger whole, the public initiative networks (RIP). This designation was based on the 2004 law and includes all the development plans and digital policies at the community level that have been declared to ARCEP. A RIP is in fact an interest group around digital issues which communicates directly with ARCEP, in exchange for which ARCEP gives advice, facilitates access to financing, and even intervenes to modify the regulation when this is necessary. proves necessary. In a way, it is a policy of rebalancing: if initially the State had intervened to break the public monopoly in telecommunications and give a larger share to the private sector, the latest regulations tend to encourage new public authorities to intervene in the market to solve the problems that have been aggravated by the liberalization of the market. However this doesn’t mean that the French government is encouraging an antagonist relation between the public and the private sphere: RIPs are associated with telecommunications operators by ARCEP. Together, ARCEP, telecommunications operators and local authorities carrying out RIP projects come together to form GRACO discussion groups. GRACO produces an annual report on the state of connected territories, making an inventory of the progress of digital infrastructures as well as an inventory of future actions. (ARCEP 2021, ARCEP 2022a)

In 2011, the report on the digital divide commissioned by the Pintat law of 2009 was carried out by the Center of Strategical Analysis, an institution of expertise aimed at helping the decisions of French prime ministers, since then replaced by France Strategy

in 2013. This report was essential to clearly identify the challenges of the issue of the digital divide. The conclusion of the report is that there is not a digital divide, but at least 3: the demographic divide, the socio-economic divide and the territorial divide. The first divide concerns in particular the inter-generational gap and turns out to be the most important: in 2011, only 16.9% of over 75 year olds owned a computer, compared to 91% of 15-24 year olds (p. 21). The second divide shows that populations having difficulty financing digital tools (smartphones, computers, internet subscription) or not having sufficient education and skills to use digital tools also have difficulty accessing digital technologies. The third divide concerns geography and the unequal distribution of populations on the territory. The authors note that the territorial divide is relatively weak on the scale of the whole territory, much weaker than the territorial digital divide that exists in the rest of the European Union in 2012. Nevertheless, this divide turns out to be much stronger if one is particularly interested in isolated rural areas (Centre d'analyse stratégique, 2011).

At the national level, all the efforts concerning the French digital strategy were crystallized in 2010 by the national plan "France very high-speed network", based on a previous plan from 2006. The final version was published in 2013 and made official by President François Hollande in a speech on February 23. He announced that a financial envelope of 20 billion euros would be mobilized over the next ten years to ensure access to VHCN for all French citizens. In particular, 3 billion euros would be reserved for the use of local authorities. On its official website, the ARCEP counts a total of 138 RIP actions carried out by local authorities and falling within the framework of "France very high-speed network" plan, declared between 2011 and 2022 (ARCEP 2022b). These are regional councils, general councils (*département*), towns as well as community of agglomerations and intermunicipalities. This national plan marks in fact the introduction of fiber among the new telecommunications technologies as well as one of the new priorities of the French government on the digital issue. The idea is to replace copper telecommunication lines, which cannot provide VHCN, with fiber optic lines. The first version of the plan included a statement from the main French operators which promised fiber coverage of at least 57% of the French population by 2023. (ARCEP, 2013) This figure remaining quite far from the 80% for 2022 and 100% for 2025 which have been announced, thus local authorities will have a major role in covering the entire territory and in particular the areas which are the least economically profitable for operators. A

2018 analysis places France among the last countries in Europe for the deployment of very high speed (27th with 52% of the population covered), citing a low population density which leads to a high investment cost. However, France is betting on a strategy that focuses on the deployment of fiber, which is more complex to set up than 4G coverage but offers better capacity and stability: nearly 30% fiber coverage in 2018 against only 2% in Germany on that date (Giovachini, 2018).

Following COVID-19 and the announcement of the RRF by the European Commission, France is one of the 22 member states that have already submitted its RRF. As part of the RRF, an envelope of 39.4 billion euros has been granted to France (European Commission, 2021a). France plans to allocate 21% of its envelope to the digital transition, which places it well below the European average of 26% (to be compared with its neighbours: Germany 52%, Spain 28%, Italy 25%). This share is equivalent to 8.4 billion euros. Among the expenditure items cited in the French RRF:

- 500 million will be used to modernize and accelerate the digitization of public administrations (5.95%), of which at least 17% must be directed to local authorities

- 240 million will be used to develop a high-speed internet network (2.86%), citing the objective of providing 100% of households with optical fiber by 2025

- 136 million to ensure the cybersecurity of online public services (1.62%)

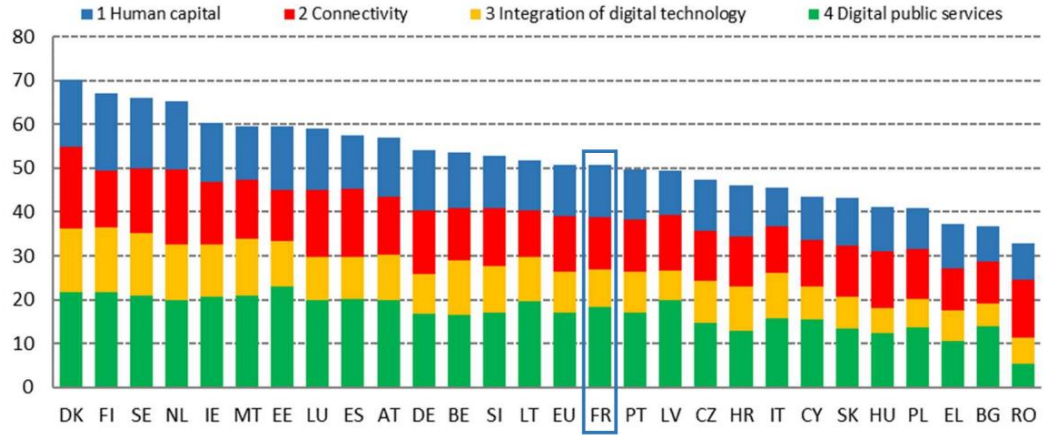
- 131 million to modernize primary schools and equip them with digital equipment (1.56%)

In parallel, France is completing the RRF by its own financial support plan, intitled France Relance, which add an additional €60 billion for a grand total of approximatively €100 billion to be spend until 2026. Unlike the European Union, the French government site does not directly cite the digital transition as one of the priorities. The three pillars mentioned are Ecology, Competitiveness and Cohesion. Two sub-components of the competitiveness pillar refer explicitly or implicitly to the digital transition: technological sovereignty and resilience and the digital upgrade of the state, territories and businesses (Ministère de l'Économie, 2021).

If we pay attention to France result in the 2021 DESI report (note: the 2021 DESI report isn't complete and includes mostly data from 2021), we can observe that France was ranked 15th on the 27th member state, thus being on the bottom half of the scoreboard.

France average DESI score reached 50.6 as compared to EU average of 50.6, which is average or slightly below average despite having one of the biggest economies in Europe (second to Germany in term of GDP). 14 countries were in front and 12 behind.

Figure 12 **Digital Economy and Society Index (DESI) 2021 ranking**



Source: European Commission, 2021a, p. 3

Detailed scores for France look as follows:

- Human capital: rank 14, 47.4 score (EU: 47.1)
- Connectivity: rank 17, 47.4 score (EU: 50.2)
- Integration of digital technology: rank 19, score 34.8 (EU: 37.6)
- Digital public services: rank 13, score 73 (EU 68.1)

France is above average in Digitalisation of public services, average for human capital and lacks behind in both connectivity and integration of digital technology to business France however has improved regarding connectivity since the precedent DESI report, especially very high capacity network (VHCN) but “rural coverage remains low” (p.3). Regarding connectivity, the main weaknesses are a low percentage of household with at least 100 Mbps (17% on last report vs 34% in EU) and no 5G coverage (0% of territory covered vs 14% in EU). Regarding the integration of digital technology, France main strength is the use of big data in company (22% vs 14% of companies in EU), but has a low use of cloud and AI (21% and 19% of companies vs 26% and 25% in EU). Regarding the digitalization of public services, France shows good results with 82% of its citizens using eGovernement (vs 64% in EU) and a good use of open data (94/100 score vs 78/100 score in EU).

The digital strategy of Grand Est region

Houzet & Grasland (2004) observed at the time that departments with less than 850,000 inhabitants did not have the economy, the technological resources and the human capacities sufficient to be attractive and issue strategies about digitalization. Given the uneven distribution of the population in the Grand Est region, it will be interesting to see if their observation is still valid. The presence of SDTAN in all the departments seems to demonstrate the ability to design a digital strategy everywhere, however it is possible that the ambitions are revised downwards in the least populated and less dynamic economic departments. The Grand Est region is made up of 10 departmental sub-divisions. Among these departments, only 2 have a population greater than 850,000 inhabitants: Moselle (around 1 044 000 inhabitants) and Bas-Rhin (around 1 156 000 inhabitants). Given that the Bas-Rhin and the Haut-Rhin were formed in the Collectivity of Alsace and jointly produce their SDTAN, it is wise to group them here as well (the grouping of Alsace did not exist in 2004), forming therefore a sub-division of around 1 924 000 inhabitants. Observing the "disparities in terms of equipment" which then existed on the national territory, the authors also note that the Grand Est region was then less well equipped than the national average and that the situation was critical in certain areas, in particular the mountainous department of the Vosges (p.127-128, map 5).

In 2017, Grand Est region released a joint document concentrating SDTANs from 8 departments in a effort to harmonizing the SDTAN at the regional level, excluding Bas-Rhin and Haut-Rhin which kept their own separate SDTAN at the Alsace level. In the document, the concern for the risk of digital divide is stated (p.42). At that date, only Alsacian departments and Moselle, thus the most populated departments of Grand Est, had their own VHCN plans already in deployment. The regional ambition was thus to bring the rest of the departments to the levels of the 3 leading initiatives and propose common objectives to reach. In total, €1.3 billions were planned to be invested from 2017 to 2022 with the objective of bringing VHCN to the entire population, be it through 4G or fiber connections, cofinanced by all 7 departments. The report indicates a strong contrast between the leaders and the others since Bas-Rhin, Haut-Rhin and Moselle already had promising result, while being also the most urbanized departements (Préfecture de région Grand Est, 2017).

Bringing the digitalization to cities and villages

The concept of smart city is a polysemous notion for which it is difficult to establish a universal definition. As the largest international institution for ICT, the ITU formed in

2013 a working group on smart cities. In addition to seeking to provide a clearer definition, the working group was also tasked with studying existing initiatives around the world and creating key performance indicators (KPIs) in order to be able to assess the level of digitization (smartness) of a municipality. A 2015 study had identified more than a hundred different definitions, more or less similar to each other. The following definition was finally adopted by the ITU: "A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects". That definition has then been used by the UN as well (ITU, 2016). In the OECD, smart cities are defined as "initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process" (OECD, 2018). The European Commission adopted the definition: "a smart city is a place where the traditional networks and services are made more efficient with the use of digital and telecommunication technologies, for the benefit of its inhabitants and businesses" (European Commission, 2014).

The digitization of municipalities should not be seen as a one-dimensional phenomenon but as a new conception of the relationship between the citizen and the municipality, which makes life easier for residents and can be integrated into many activities. Digital technologies can be applied in areas as varied as security (predictive policing, home security), health (telemedicine, epidemic surveillance), mobility (real-time info, autonomous vehicles), energy (smart grids, dynamic pricing), water management (smart irrigation, leakage control), waste management (digital tracking), housing (smart houses), education (education and online training), economy (digital business administration) and social and community life (local social networks, eDemocracy). Numerous reports already exist detailing the innumerable potentialities of digital deployment, the scope of which seems to be expanding ever further as the technologies themselves evolve and as citizens massively adopt digital technology in their daily lives (Woetzel et al, 2018; OECD 2019).

However, the deployment of such technologies remain fairly limited if we compare to the vast potential that digitalization offers. Mello (2020) shows that on the local level,

“finding information and making appointments online” are by far the most common services offered but it doesn’t defer much from what traditional phoning offer. For instance, if it is possible to get an appointment for a doctor, it is usually not possible to access digital solutions such as “eprescriptions, access to online medical records or telemedicine” (p.10). He also finds that the most rural areas are the most critically threatened by digital isolation, as the local administration are “less competitive than national administrations in recruiting and retaining workers with the appropriate IT skills” and that “the lack of adequate infrastructure” prevent high-schale digitalisation, partly because of high cost of deployment due to low population density” (p.14). He also quotes the 2017 EU-wide ESPON study who showed that small and rural cities don’t have their own dedicated IT budgets and thus depends mostly on higher layer of governance to provide finance – which led more than 60% of surveyed people to identify “the lack of funding as the main constraint on their digitalisation efforts” (p.16).

However, not all municipalities in rural areas can be brought to the same level. Indeed, it is difficult to compare the situation of a municipality of 15,000 inhabitants with the situation of a municipality of less than 500 inhabitants. It is obvious that the first has much greater financial resources and human capital than the second, which generally does not have the capacity to have public officials working full-time and even less technicians specialized in digital technology. This notable difference has led some institutions and researchers to focus more specifically on the issue of smart villages, the logical continuity of the concept of smart cities but adapted to the needs and capacities of sparsely populated cities. In the European Union, the ENRD organised thematic group on smart villages and released a 2018 report where the definition proposed by the European Commission in its “EU Action for Smart Villages” was reused: “Smart villages are rural areas and communities which build on their existing strengths and assets as well as new opportunities to develop added value and where traditional and new networks are enhanced by means of digital communications technologies, innovations and the better use of knowledge for the benefit of inhabitants.“ (p.7) (European Network for Rural Development, 2018).

The study of smart villages in Czech Republic in Pělucha (2019) is particularly interesting here because Czech Republic has a territorial structure very similar to France, with a very high number of municipalities compared to EU average and thus a disproportionality low average population in municipality (see p.8). It is possible to extrapolate that the rural

communities of Czech Republic could face the same issues than the rural communities of France due to that similarity. The author focused on municipalities under 500 inhabitants and found out that the question of digital infrastructures was seen as quite critical by the local authorities and that the main issue was the lack of budget. Among the municipalities that didn't receive governmental funding to carry out digitalization, there was a significantly lower access to internet and lower migration balance, which seems to indicate that successful digitalization policy and support from higher-level of administration can lead to significant improvement of digitalization in villages.

The main difference regarding digitalization issues in villages is the question of demographics: the aging population and the out-migration results in lower digital skills in the population as well as lack of investment in digital infrastructures. Regarding the issue of demographics and especially the question of out-migration and in-migration ratios, the digitalization of rural areas has been identified by previous researches as a potential factor of attachment toward a specific rural area (Meier, Beinke, Teuteberg, 2019 ; Birnbaum, Wilhelm, Chilla, Kröner, 2021). This seems mostly due to digital tools ability to connect people with each other, thus strengthening community bonds and encouraging local participation.

Unfortunately, the role of municipalities and local governments in the digital transition remains a niche subject in France and there are few data and scientific articles that deal specifically with this subject. The lack of sources is a major problem that was raised several years ago and has not been resolved since. The situation can be even extended to the European scale, where literature remains scarce (Attour & Longhi 2014 ; Attour & Chaupain-Guillot 2020).

The OECD identifies several issues regarding the development of digital technologies in rural or remote areas and outlines a methodology directed at researches or government that wished to address the rural digital isolation (OECD, 2020). The 4 steps are:

- First of all, it is necessary to collect data in a standardized and comparable form, therefore to develop consistent indicators that can be applied everywhere (measurement).

- The different levels of government and specialized agencies must coordinate to create coherent networks, thus taking into account the opinion of local institutions (coherence).

- Duplication must be reduced as much as possible by encouraging the sharing of infrastructures and technical tools whenever possible (efficiency)

- The legislative framework must keep pace with technological developments, in order to deploy supportive national policies that would not hinder the deployment of ITCs (forward-looking policies)

In a similar manner, data collection was done throughout this study and possible policy solutions will be provided in the proposal section.

3 METHOD

3.1 Dataset and collection

Definitions

The first step of the methodology was to set a common reference in order to define exactly what a rural municipality is, and therefore which municipalities of the Grand Est region are eligible to be part of the study. The definition of rurality is directly linked with the definition of urbanity, as non-urban areas tend to be defined as rural areas and non-rural areas tend to be defined as urban areas. It is therefore possible to coin the term of rural-urban typology. However, there isn't a widely accepted definition of that term and the concepts it encompasses. Indeed, there are competing definitions of rurality depending on whether one relies on French national criteria or European criteria, or even within the same country depending on the agency questioned. The criteria developed depend essentially on the purpose of the study or the mapping operation carried out, and do not necessarily focus on rural issues with precision. It is therefore essential to ask whether or not the data provided by the existing statistical systems allow the study to be carried out successfully.

On a European scale, the European Commission's statistics body, Eurostat, has been tasked with establishing the standards for mapping European territories, of which the urban-rural typology is a part. The Eurostat typology is based on population grids, a geographic analysis standard that relies on the use of population grid cells. A grid cell is a geographical unit with a dimension of one km² and taking the form of a quadrilateral as square as possible. It is the smallest geographical unit used by Eurostat. Grid cell data is

collected by Local Administrative Units (LUA). They are the smallest administrative entity recognized by Eurostat, usually cities or towns, and exist purely for the purpose of collecting statistical data (LUAs do not have a political role or existence on a European scale strictly speaking). The LUAs represent in fact the basic unit constituting the NUTS 3 regions and are composed of a certain number of continuous grid cells, which generally correspond to the territories of a municipality.

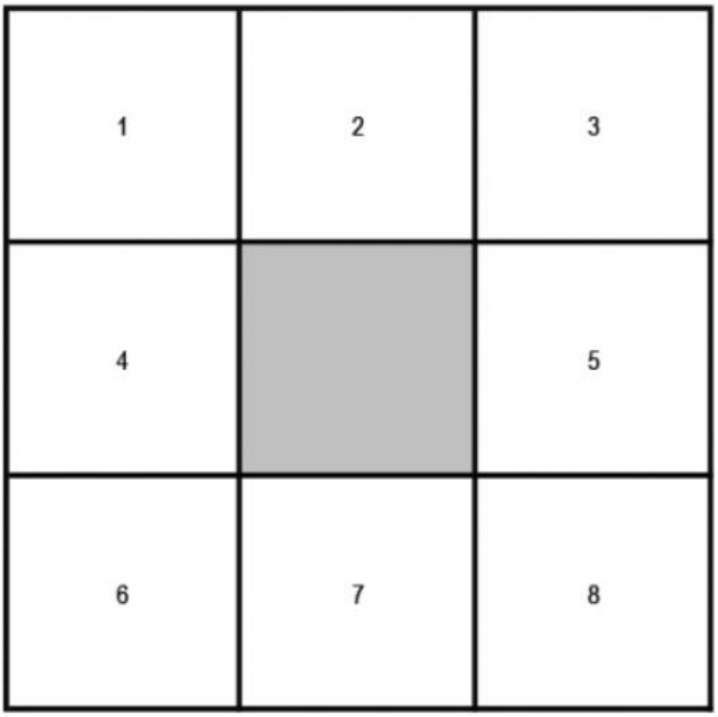


Figure 13: Diagram of grid cell (*gray*) and continuous cells (*white*, with numbers)

Concerning rurality, the data collected by Eurostat in the LUAs make it possible to establish two different typologies: on the one hand rural areas according to the degree of urbanization and on the other hand rural areas according to the degree of geographical remoteness. The degree of urbanization is a metric obtained from the population density in a given area, i.e. a set of grid cells. The degree of geographical remoteness represents the distance in number of kilometers (or number of grid cells) between a rural area and the nearest urban area.

According to the typology manual published online, the rural-urban typology recognized by Eurostat includes 3 categories (European Commission, 2020b):

- predominantly urban regions, regions where more than 80 % of the population live in urban clusters;
- intermediate regions, regions where more than 50 % and up to 80 % of the population live in urban clusters

- predominantly rural regions, regions where at least 50 % of the population live in rural grid cells.

The minimum population density to be considered an urban cell grid is 300 inhabitants per km². A second condition is applied: the LUA to which these cells belong must represent a minimum of 5000 inhabitants, otherwise the LUA cannot be considered as urban. LUAs corresponding to densely populated areas are called "cities" and given the code “1”, LUAs corresponding to areas of intermediate population density are called "town" or "suburbs" and given the code “2” and LUAs corresponding to sparsely populated areas are called "rural areas" and given the code “3”. The cities can be aggregated with the surrounding towns/suburbs in order to create “urban clusters” or “urban areas”, the main condition being the presence of continuous gride cells and thus no landlocking.

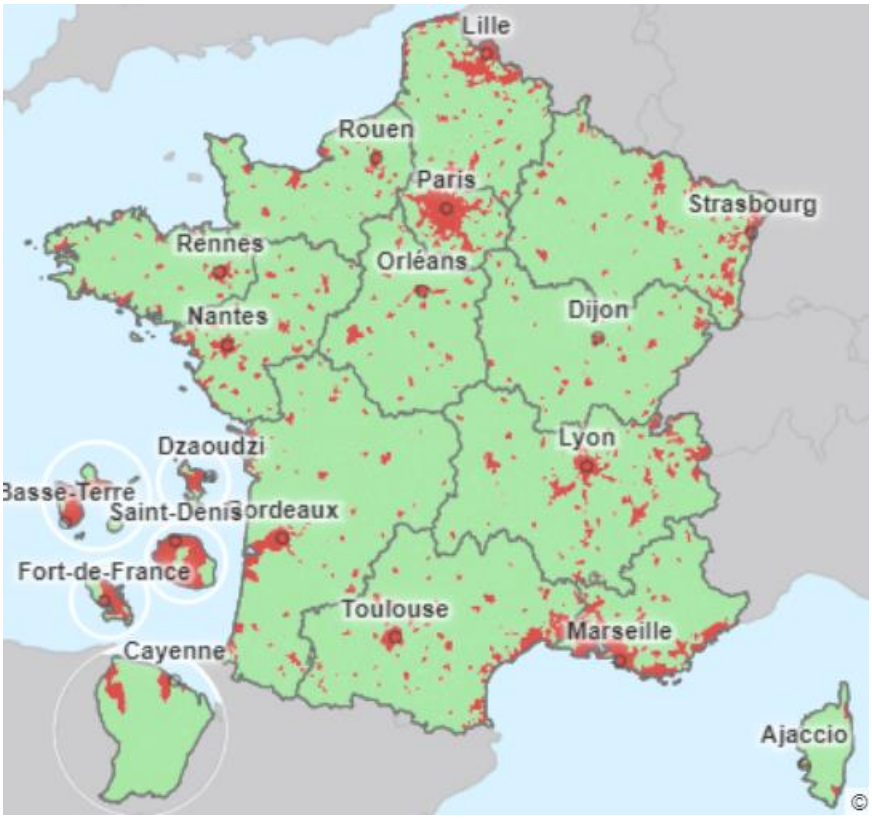
The classification proposed by the European Union is however not sufficient to carry out studies at the local level and to focus in particular on rural municipalities. Indeed, a number of problems arise. First, grid cells and LUAs are above all statistical tools that do not necessarily refer to a political and administrative reality. Because of this, the division into grid cells does not quite correspond to the territories of the municipalities as they are recognized at the national level and can spill over significantly into the administrative territories of other municipalities. This is due to the fact that Eurostat data collection is carried out for studies at NUTS 2 or NUTS 3 levels, so the scale of the municipality is not really considered. Secondly, the standards applied at European level by Eurostat do not always correspond or even contradict the standards of the states themselves (see page X). Using only the rural-urban typology as used by the European Union therefore renders certain data collected from national agencies obsolete or lacking in precision. Finally, there is no exhaustive database that would include all the European municipalities (or at the very least, all the French municipalities) and which would classify them all according to the categories defined by the rural-urban typology.

Despite the fact that the European typology is officially accepted and used by France, INSEE for its part proposes an urban-rural typology significantly different from that used by the European Union. In a similar way, it is based on the data provided by the municipalities, ie the cartography of the territory, the area, the number of inhabitants and therefore the population density. In consultation with the Observatoire des Territoires, a study body dependent on the National Agency for Territorial Cohesion, INSEE

establishes the typology and designs and publishes maps of the territory, where the geographical units are categorized. The INSEE categorization has both the advantage of starting from a lower scale, thus corresponding better to studies focusing on the local scale, as well as having up-to-date and recent data compared to Eurostat data.

Two different urban-rural typologies coexist: the first, more general, has two categories and the second, more precise, has four categories. The first typology makes it possible to divide the national territory between predominantly urban territories and predominantly rural territories. Thus, in 2021, 30,772 municipalities were considered to be integrated into a predominantly rural territory compared to 4,193 municipalities integrated into a predominantly urban territory. This typology is mainly used to have an overview of the territory and to be able to easily observe the large urban clusters. However, it remains imprecise and does not allow a detailed analysis at the local level because it ignores all intermediate categories between rurality and urbanity and proposes too clear a division of territories.

Figure 14: INSEE urban-rural typology, 2 categories



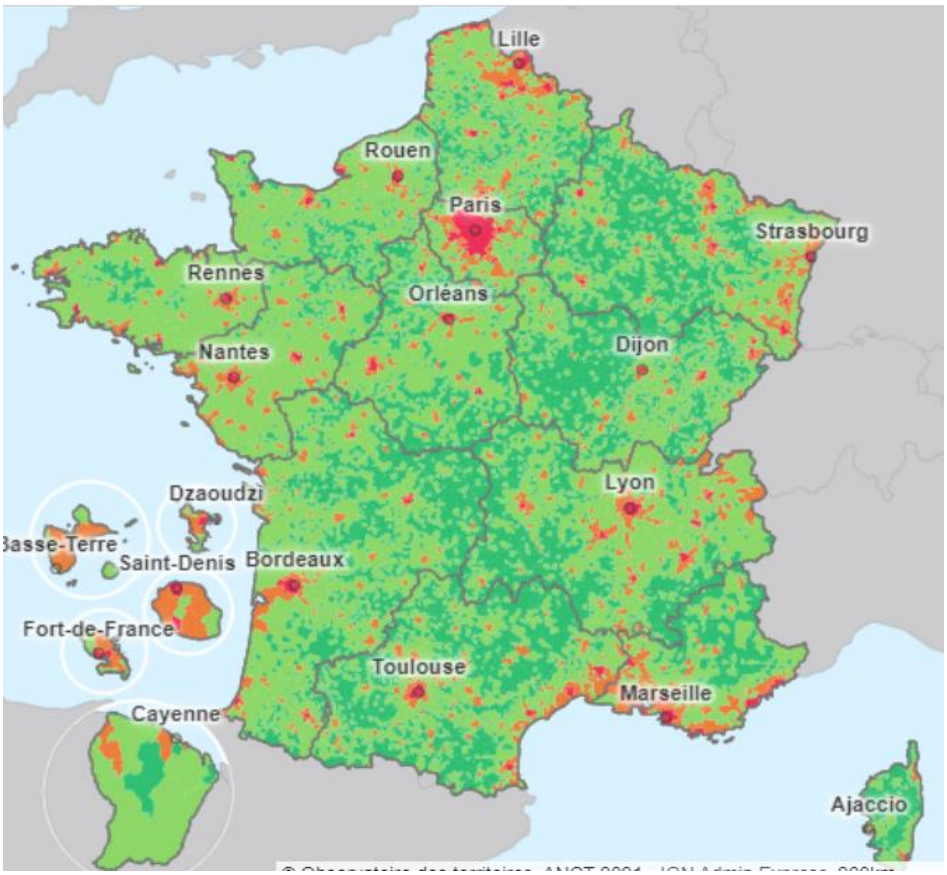
Source: Observatoire des territoires, ANCT 2021, IGN Express

If this first typology is less precise than that of Eurostat, the second typology is on the contrary more precise. Indeed, the analysts of the Observatoire du Territoire have noted that France having an abnormally low rate of urbanization and an abnormally high rate of rurality in comparison with other member countries of the European Union, the Eurostat typology in 3 categories was insufficient to reflect the statistical reality of the French territory. In response, INSEE developed a typology in 4 categories: the rural category was divided into "low density zone" and "very low density zone" (Observatoire des Territoires, 2022). The four categories are:

- dense areas, where at least 50% of the population lives in very dense cells (with a density greater than 1,500 inhabitants per km^2)
- intermediate areas where at least 50% of the population lives in dense cells (with a density greater than 300 inhabitants per km^2) and with a total of at least 5000 inhabitants in continuous dense cells
- low density areas where at least 50% of the population lives in low density cells (with a density of less than 300 inhabitants per km^2)
- very low density areas where at least 50% of the population lives in very low density cells (with a density equal to or less than 25 inhabitants per km^2)

Additionally, continuous sets of dense grid cells that contain a total of more than 50,000 inhabitants are reclassified as urban centers.

Figure 15: INSEE urban-rural typology, 4 categories



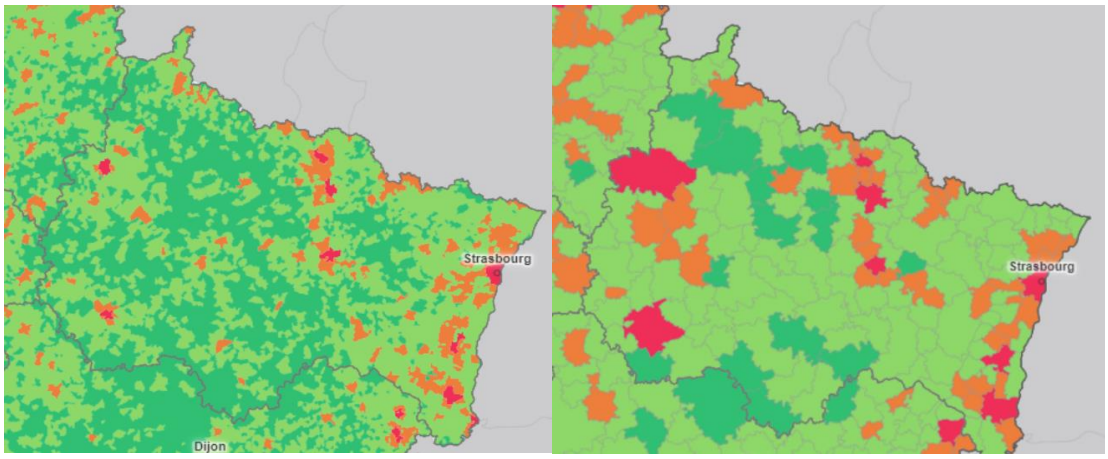
Source: Observatoire des territoires, ANCT 2021, IGN Express

On the map above:

- dense areas are represented in red
- intermediate areas are represented in orange
- low density areas are represented in light green
- very low density areas are represented in dark green

By using these data, it is possible to arrive at a first selection of municipalities on the criterion of population density, which will therefore exclude the municipalities in red and orange on the map since they are part of dense areas or intermediate areas. Another advantage of the INSEE national data is that they also include a classification of intermunicipalities. In order to classify one intermunicipality, all the municipalities belonging to the intermunicipalities are added together and then the same criteria are applied to include it in one of the four categories. The results may appear significantly different from the municipalities, thus also changing the morphology of the French density map if taken from that perspective. It should be considered that the rural municipalities that are integrated into dense or intermediate intermunicipalities can't be put at the same level of rurality than rural municipalities that are part of rural intermunicipalities, as the first may benefit from higher technical support as well as more financial resources than the later.

Figure 16: Rural typology of the Grand Est region by municipalities (left) and inter-municipalities (right)



Source: Observatoire des territoires, ANCT 2021, IGN Express

By taking into account all of these data, it is possible to establish a definition of the rural municipality in the French context. According to the reviewed methods, the primary factors in defining rurality are low population density as well as significant remoteness

from urban clusters. The idea here is also to define rurality in the strictest and most restrictive way possible, in order to exclude secondary factors which could strongly interfere with the results, such as the integration to a non-rural intermunicipality or the presence of a nearby urban cluster. This definition will serve as a basis for discriminating the municipalities that may or may not be used in the study.

In this study, a rural municipality will be defined as follows: a municipality that is part of a low density area or a very low density area (according to INSEE/Observatoire des Territoires), which is not located on the edge of a urban cluster and which doesn't belong to urban municipalities either.

Sample

The dataset that will be used during this study was obtained after crossing several official databases: the INSEE-Observatoire des Territoires database, the BANATIC database and the administration directory. In all three cases, these are public and open databases whose various studies, maps and data can be consulted or downloaded freely from the respective official government websites.

INSEE is by far the most comprehensive French database. In particular, INSEE produces numerous maps of the French territory with thousands of possible filters and indicators. The cartography used here to identify the rural communes and the urban communes essentially comes from INSEE, published in its name or in collaboration with the Observatory of the territories. The typologies, indicators and codes that will form the basis for identifying the municipalities in this study all correspond to INSEE standards.

BANATIC stands for the National Base on Intercommunality. This is a database managed by the General Directorate of Local Authorities and which specializes in particular in data relating to intermunicipalities. This is the database containing the most precise and frequently updated data, thus should be regarded as the best quality source regarding intermunicipalities. Numerous maps are also made available as well as studies and indicators specific to intermunicipalities. It is from BANATIC that the lists and cartography of the intermunicipalities of the Grand Est region were recovered at the last date (July 2022).

Finally, the administration directory is a nationwide database that centralizes all public services and local authorities. From the site of the administration directory, it is possible to obtain contact information for any administrative entity recognized by the French State,

including municipalities and intermunicipalities. This information includes address and postal code, telephone numbers, as well as email addresses and websites when available. Whether it is the contact base to which the questionnaires were sent or the websites that were selected for the study on digitalized public services, all used contact information is that officially declared and recorded in the administration directory.

A first collection of data made it possible to bring together 5,121 municipalities, i.e. all the municipalities of the Grand Est region. Metropolises and municipalities integrated into urban cluster and/or urban intermunicipalities have been excluded, bringing the number to 4,903 municipalities. It includes 4,404 municipalities from common intermunicipalities (CC) as well as 858 municipalities from agglomeration municipalities.

These 4,903 municipalities are divided into 148 intermunicipalities, including 127 CC and 21 CA. 16 intermunicipalities were subsequently excluded, either because they belonged to very dense areas, or because they had more than 300 inhabitants per km² and were bordering very dense areas, thus they did not meet the criteria of rurality (low density and remoteness from urban clusters) that were established for this study. This brings the number of municipalities down to 4,533 and the number of intermunicipalities down to 132.

In the database of this study, the information that have been recorded are: the INSEE code corresponding to each municipality, the name of the municipality, the intermunicipality to which it is integrated, the department and the region, the postal address, the address of the website, the email address, the telephone number and the last update of the database date.

- The INSEE municipality code is a standard of the official geography code, just like the department codes and the region codes. It consists in a series of 5 digits, the first two of which correspond to the department number (ex: *68*) and the last three correspond to the number of the municipality in this department (ex: *369*). Each code being unique, this makes it possible to identify a municipality without any ambiguity and to eliminate the risk of homonyms and duplicates. Ex: 08240 corresponds to the municipality of *Thénorgues*
- The name of the municipality is the official name as used in documentation and signage. It is this name that is commonly used as a reference to designate a municipality in this study. Ex: *Vienne-la-Ville* is a municipality from *Marne* departement, with INSEE code 51620
- The designation of an intermunicipality has two components: the name of the intermunicipality and the corresponding legal nature. The name of the intermunicipality is the official name as used in documentation. The legal nature is indicated by the abbreviations CC, CA and CU: CC for *Communauté de*

Communes, CA for *Communauté d'Agglomération* et CU for *Communauté Urbaine* (see p.8 for the explaination of these terms). CU were excluded from these studies. Ex: the *CC du Chaourçois et du Val d'Armance* is an intermunicipality from the *Aube* department

- Regions and departments can be designated in two different ways: either with the official name as used in documentation, or with the corresponding 2-digits INSEE code (ex: 88 for *les Vosges* department et 44 for *Grand Est* region). In this study, only municipalities from Grand Est region are used. Ex: *Guebenhouse* (57264) is a municipality from *Moselle* department (57) and *Grand Est* region (44).
- The postal address corresponds to the address of the town hall. It consists in a street name, house number and postal code. It makes it possible to geographically locate a municipality, in addition to being a potential contact information (if exchange by post mail, not planned for in this study). Ex: 3 rue Auguste-Peschaud, 52410 is the postal address from the town hall of *Roches-sur-Marne*, a municipality from *Haute-Marne* department.
- The website address and the email address correspond to the addresses officially registered in the administration directory. The website corresponds to the official website of a town hall and the email address corresponds to the official email box of the town hall secretariat. The email address is the main means of communication used for this study. Some town halls have no website, no email address or even neither. Ex: http://www.rottelsheim.fr is the website address of *Rottelsheim* municipality and mairie@rottelsheim.fr is the email address of *Rottelsheim* municipality secretariat.
- The telephone number is another way to contact the town halls. The presence of a telephone number is normally mandatory, unlike websites and email addresses which are recommended but not imposed. This is the secondary contact method used in this study. Ex: 03.26.52.12.97 is the telephone number of *Blancs-Coteaux* municipality
- The date of the last update of the data makes it possible to ensure that it is not outdated data, which potentially would no longer be valid. The maximum date retained is 2018, the date of the last nationwide census: any information dating from before 2018 is not selected. Ex: *Chancenay* municipality entry in the administration directory was last updated on the 7th of July 2021.

A typical entry for a municipality in this study database looks like this:

Code INSEE	Last update	Municipality
88253	10/05/2021	Jeuxey

Address	Post code
2 rue du Centre	88000

Email	Website URL	Telephone number
mairie.de.jeuxey@wanadoo.fr	http://www.jeuxey.fr	03 29 34 10 31

Intermunicipality	Département	Région
CA d'Epinal	VOSGES	GRAND EST

Regarding intermunicipality, the standards are not the same since the information provided as well as the nature of the structure is different from a municipality. Firslty, it will not include INSEE code as there is no INSEE code specifically made for intermunicipality as of 2022. Secondly, an entry for an intermunicipality will also include the municipality where the administrative center of the intermunicipality is located, as it is also its official postal address and the main way to locate the intermunicipality geographically. The postal address for the intermunicipality is typically different from the postal address of the municipality town hall and thus the two information shouldn't be confused.

A typical entry for an intermunicipality in this study database looks like this:

Last update	Intermunicipality	Municipality
21/02/2019	CC du Pays de Phalsbourg	Mittelbronn

Address	Post code
18 rue de Sarrebourg	57370

Email	Website URL	Telephone number
contact@paysdephalsbourg.fr	http://www.paysdephalsbourg.fr	03 87 24 40 40

Département	Région
MOSELLE	GRAND EST

3.2 Empirical study

3.2.1 Questionnaire

The first part of the empirical research consists of a questionnaire that will be sent to town halls in rural areas in the Grand Est region. To find out about the selection process that led to contacting the town halls in question, refer to the *database and sample* section above. The questionnaire can be answered in two different ways: either by submitting

answers to the questionnaire in electronic format (addressed by email), or by responding directly to the researcher in a telephone interview. The questionnaire and interviews will all be submitted in French, as all the sample is located in the Grand Est region of France. The questionnaire and the answers are then translated into English for the purpose of that study. The target audience is the town halls and it is therefore necessary that the questionnaire or the interview be carried out by an official representative. Ideally, it is requested that the mayor or deputy mayor respond. Otherwise, it is possible to submit the questionnaire to the secretary of the mayor or to a technical officer in charge of digital issues, but it seems unlikely that small rural town halls have specialized staff. Responses from non-elected staff might be used in the event that the number of responses from the mayor and deputy mayor is insufficient. The participants are being submitted through mail at the email addresses available on the administration directory. The answers must be returned through mail from the same address at the email address of the research.

There are few studies using a similar method and addressing the same issues. Indeed, while it is possible to find studies of digitization in cities, none specifically targets towns or villages in rural areas in a proportion similar to this study. Moreover, in the preparatory phase of this thesis, no study that focuses specifically on the Grand Est region was found. Most of the studies are carried out at the national level. Most of the surveys and questionnaires that were sent to municipalities are not relevant for this study, because it is generally aimed at structures of a much larger size, therefore with much greater financial, logistical and human resources.

The model that was selected to serve as a reference for this study is the DIGISER study. DIGISER stands for Digital Innovation in Governance and Public Service Provision. This study was directed by the European Observation Network for Territorial Development and Cohesion (ESPON), an EU funded program part of the Cohesion policy strategy which provides information and analyzes of European regions in order to advise development policies for the respective territories. The DIGISER research is an online survey, accessible on the European Commission website, which is aimed at all local authorities in the European Union. Potential participants include cities, intermunicipalities, local action groups and regions. The main theme is the digital transformation of public services. The study takes the form of a questionnaire of 62 questions. The researchers indicate a completion time of one hour. In compensation, participants are drawn at random to win a prize (Barroca, J. et al, 2020).

With 62 questions, including many multiple-choice questions, complex answer matrices, as well as open-ended questions, the scope of this study is extremely broad and includes many topics around digitization. In the context of our study, the scope is much smaller and most of the questions would not be relevant for municipalities in rural areas. DIGISER makes a difference between cities and towns: cities are defined as having more than 50 000 inhabitants and towns are defined as having less than 50 000 inhabitants. Given than half of municipalities in France have less than 500 inhabitants and that almost 90% of municipalities in Grand Est region are considered rural, then the upper limits of 50 000 inhabitants is still too high to be relevant to our study. There isn't any category for small towns or villages. That being said, a number of questions were still selected for reuse or adaptation in this study (ESPON, 2021):

- Question 2.1: Has your public authority formally approved and published a digital innovation strategy (also digital transformation strategy, smart city strategy or similar)?
- Question 3.1: How is the budget for digital innovation organized in your public authority?
- Question 4.1: Does your public authority have a dedicated ICT team ?
- Question 6.1: Does your public authority use platforms to actively engage with citizens?

Resources are available on the most effective methodology for designing a questionnaire that meets the standards of scientific research. The use of questionnaires for empirical research is a common practice but it is a method that has advantages as well as disadvantages. It is crucial to prepare the methodology well to reduce the risk of hazards that could weaken the quality of the results. Bee & Murdoch-Eaton (2016) propose to detail the ideal design of a questionnaire in three parts: preparation, evaluation and delivery.

The first stage of the preparation could be summed up with the question: is the use of a survey or a questionnaire the best tool to carry out the research question of this study? Questionnaires are generally used to investigate the opinions or habits of a population. The questionnaire has the advantage of being able to address an extremely large population sample, requiring no or modest financial investment, a reduced time spent on each statistical individual and relatively simple logistics. You simply need to be able to gather a sufficiently large database (here n = 4,533): then, if the contact information is standardized (for example an email address), the same questionnaire can be sent to all of the sample without requiring individual support. The risk of self-completed

questionnaires is essentially based on the ability of participants to grasp the issues. Since they are not completed in the presence or in direct contact with the researcher, they do not have the possibility of asking him questions or asking for clarification.

In the present case, the target sample is of substantial size. In order to collect a certain number of responses in a limited time and to be able to process and analyze the data, it is not possible to devote a significant amount of time to each statistical individual. Non-structured or semi-structured approaches are the favored method when it comes to in-depth study of the opinion of a smaller number of individuals: they make it possible to collect a greater amount of information and to obtain additional data such as the vocabulary used or even the psychological condition of the interviewee. The less structured a questionnaire is, the wider the spectrum of possible responses. However, this often leads to less consistent responses and more off-topic discussion. The advantage of the structured questionnaire is, on the contrary, to limit the number of possible answers by eliminating the hazard of interpersonal discussion and the possibilities of reformulating a question. The person responding to a questionnaire is simply limited by the framework offered to him. The risk being that if a question is not correctly understood, the answer may be invalid in the context of a study or even the question may not be answered. The semi-structured approach is more qualified to collect qualitative data. The structured approach is more qualified to collect quantitative data.

In order to limit misunderstanding or off-topic answers, the questionnaire will here take the form of a multiple-choice questionnaire. Some questions will propose between 2 and 7 possible choices. Other questions will take the form of yes/no questions, also known as dichotomous questions. Others question will take the form of a rating scale question. A space at the end of the questionnaire (after completing it) is provided to allow respondents to express themselves freely if they wish, in order to comment on one of the questions, give advice or provide clarification. Apart from that, they do not have the possibility of expressing themselves freely and of responding apart from the choices offered. While such a system risks significantly reducing the precision and representativeness of the results by perhaps excluding certain possible answers that respondents would have liked to propose, it should also significantly reduce the possibility of error or off-topic answers. The fact of offering choices directs the participants toward the expected answers and allows a better understanding of the question themselves, where if they had only the question, they would be unable to answer it correctly without understanding it correctly.

Participants are also free not to respond if no response meets their situation. In some case the answer “none of the above” is also possible.

If telephone interviews are conducted in parallel to questionnaires, the question of data interoperability arises. In effect, this means that oral interviews should be mixed with electronic questionnaires, the format of which can vary significantly, in order to obtain similar results that could be analyzed together. The method used in a questionnaire is purely structured: the questions are fixed and the answers must correspond exactly to the question, or else they will be invalidated. In the case of an interview, it would rather be a semi-structured method: the choice of answer is wider because it is possible to reformulate both the question and the answer, or even to receive several answers. The significant risk of not obtaining consistent statistics has already been raised by researchers. Harris & Brown conducted a critical search of 19 interview and questionnaire comparison studies and found the results to be generally unconvincing (Harris & Brown, 2010). In the factors that may affect the alignment of data between questionnaire and interview, they note: "differences in data collection procedures, the complexity and instability of the construct being investigated, difficulties in making data comparable, lack of variability in participant responses, greater sensitivity to context and seemingly emotive responses within the interview, possible misinterpretation of some questionnaire prompts, and greater control of content exposure in the questionnaire” (p.1).

In their conclusions, the authors advise to ensure that the structure of the interviews and the structure of the questionnaires are as similar as possible, or even identical if possible. This therefore means that semantic variability must be reduced as much as possible by ensuring that the essential words are used correctly. In this study, each question and answer must contain the key words corresponding to the questions of the original questionnaire. If the key words are not present, a reformulation can be requested during the interview. In the event that the answer is too different from the original question, the answer must be invalidated and excluded from the final analysis. Synonyms can be accepted on a case-by-case basis, but they will always be translated in the same way in order to be consistent with the original questionnaire. This precaution makes it possible to exclude the risk of losing the meaning of an answer simply because of the semantic difference between French and English.

The second preparatory phase of a questionnaire consists in defining the size of a sample. This can be summed up by the question: how much data is needed to answer the question?

In general, the larger and more varied a chosen population, the greater the number of responses expected in order to have a representative sample. The best way to ensure a representative sample is to have access to all or most of the population studied. If individuals are contacted without any particular selection bias in the population as a whole, the sample, once it reaches a sufficient size to neutralize the phenomenon of high variability due to too small samples, should be relatively representative. The larger the sample obtained; the more representativeness can be assumed. The absence of manual selection is important to avoid investigator bias, instead the random selection should be preferred when possible. However, if the selection bias can be avoided, the response bias cannot be and variations of responses rates in certain specific demographics that harm the representativeness of the sample may occur.

In the case of this study, the questionnaires are submitted to almost the majority of the population, ie town halls in rural areas of the Grand Est region. The fact that these are officially declared administrative structures and that contact information could be found online has a significant advantage over questionnaire-based studies that depend on their ability to attract participants. Here it was possible to contact them directly. Since almost the entire population is covered, provided a sufficient sample is reached, the representativeness of the sample should be ensured. The size of the population is 4,533. With a confidence rate of 95% and a margin of error of 10%, a minimum of 95 responses would be needed to obtain a sufficiently reliable sample. If the margin of error is set at a preferable threshold of 8%, then the number of responses required is 146. If the margin of error is set at the ideal threshold of 5%, the number of responses required is 355.

Once the sample has been collected, the participating town halls will be reassessed to see if they actually correspond to the criteria set for the study and it will be verified whether or not the final sample is representative of the regional averages. For example, the average number of inhabitants and the average population density must be similar to the average of the rural communes of the region, ie the 4,533 of the population initially selected. If possible, the number of municipalities in the intermediate areas, in the low density areas and in the very low density areas should approach the existing distribution at the scale of the region. If the sample deviates significantly from the regional averages, then it will ideally be necessary to rework the sample to get closer to them, or at least noting in the results analysis that the representativeness could be lower than expected.

Evaluation

The evaluation consists of the field test of the questionnaire tool developed in order to estimate its effectiveness. Testing a tool on a few selected individuals before deploying it massively ensures that the questions are functional and that it will be able to provide the data sought in the context of the study. The evaluation can be carried out by peers or by participants. It provides feedback to adjust the original method based on potential problems encountered. Important considerations include being able to critically assess the number of questions and the time needed to complete the questionnaire. It is likely that a longer questionnaire in terms of number of questions or completion time will have a much lower response rate because it represents a greater cost for the participants, who get nothing in return.

In practice, the evaluation of the quality of this questionnaire was done with the first version that was produced. Indeed, the version of the questionnaire used in this study is a second reworked version. The first version was sent to 250 municipalities which served as a benchmark in order to be able to estimate the reliability of the questionnaire, both in terms of the number of responses and their quality. The quality of responses can be defined as the rate of correctly answered responses: the fewer the errors in using the questionnaire, the greater the quality of the responses. Errors can include answering both "yes" and "no" (positive and negative answers) for the same question or not answering a question at all. These errors do not necessarily invalidate a questionnaire but reduce its quality. Conversely, incorrectly entering the name of the participant, his function and the municipality he represents is a major error: if this does not allow the participant to be correctly identified, then the questionnaire is automatically invalidated regardless of the quality of the answers.

Of the 250 municipalities that were contacted with the first questionnaire draft, only 8 responded positively to the study in over a month and a half and returned a completed questionnaire. This represents a response rate of 3.2%, or approximately 1 municipality of out 31 having responded. If we relate this to the total population (n = 4,533) then we can expect 145 positive responses. This figure remains largely optimistic and must be reassessed downwards: indeed, out of the 8 completed questionnaires, only 6 were usable within the framework of the study. 1 participant had not filled in its personal information correctly or not correctly and 1 participant had answered only half of the questions. Therefore it represents a correctly completed questionnaire rate of 75% and a failure rate of 25%, although the very small sample does not allow this result to be generalized. If we

relate this to the number of municipalities contacted, we obtain a rate of correct answers of only 2.4%. If we relate this to the total population, then we can expect 109 responses. This estimate is well below the expected number to have a sufficiently representative sample with a low margin of error (145, ideally 352). It therefore appeared necessary to understand the reasons for this low success and to find a solution to increase the effectiveness of the questionnaire.

Among the possible reasons for the relative failure:

- the lack of compensation for the participants
- the fact that this study was carried out as part of a master's thesis and not by a doctoral student or a specialized laboratory (trust issue)
- the fact that this study is aimed at elected officials with responsibilities and a potentially busy schedule
- the contact method
- the length of the questionnaire
- the time needed to complete de questionnaire
- the complexity of the questionnaire
- the poor design of the questionnaire

Finalization & delivery

The first points can’t be addressed because they have to do with the framework and the nature of the research itself, of the researcher and of the target audience. However, the questionnaire itself can be questioned and significantly adapted to achieve better results. First, the contact method has been revised. In the first version, exchanges were limited to emails. In the second version, participants are offered to answer a questionnaire by telephone instead. In the first version, the questionnaire was presented in a word format which requires the use of a word processor software. In the second version, the questionnaire is submitted as an online questionnaire that participants can fill out directly with their web browser. Then, the dimension of the questionnaire was seriously revised: the first version foresees a completion time between 30 min and 45 min. A participant also claimed to have taken more than an hour, because some questions were lexically difficult to understand for a non-specialist. The questionnaire consisted of 35 questions taking multiple forms: multiple choices, yes/no, Likert scale, open answer.

In the reworked version, the content has been significantly lightened. This time, the questionnaire was designed to be completed in 15 minutes and require a minimum time investment from the participants. The number of questions has been reduced to 11, eliminating less relevant questions and merging some where possible. Open-ended

questions were removed because they are the longest for the participant, as well as the most complex to deal with within the framework of the study because of their greater variability. Finally, the design of the questionnaire has been improved to avoid errors: filling in your name, function and town hall has become mandatory in order to prevent you from returning an unsigned questionnaire. The tool used is Google forms, because it is a simple software, accessible to everyone and directly usable online without requiring the slightest modification or the slightest knowledge of the software.

The selected questions look as follows:

Question 1: Does your municipality have a digital strategy? (digital projects, digitization of public services, smart city/village)

- Yes, at the municipal level
- Yes, at LAG or intermunicipal level
- No

Question 2: Does your municipality employ an IT specialist technician?

- Yes
- No

Question 3: Does your municipality have a dedicated digital budget?

- Yes, there is a dedicated budget
- Yes, but the digital budget is part of another budget
- No, there is no budget

Question 4: Has your municipality implemented any of the following initiatives:

- Communication on a website
- Communication on social networks
- Technical support for individuals and businesses
- Online public consultation, electronic voting, direct democracy
- Transparency and data sharing Initiative (open-data)

Question 5: Do you think that digitized public services are sufficiently accessible?

- Yes
- No, not all citizens have the necessary digital skills
- No, not all municipal agents have the necessary digital skills
- No, some public services are not accessible remotely
- No, digital public services are poorly designed

Question 6: Do you have any financial or logistical support regarding digital issues?

Answers:

- Yes, at local level (GAL, intercommunality)
- Yes, at regional level (department, region)
- Yes, nationally
- No

Question 7: Would you be ready to invest in the digital transition with financial support?

Answers:

- Yes
- No, it's not a priority
- No, this is not the role of my municipality

Question 8: what do you think are the main weaknesses of your territory?

Answers:

- Infrastructure quality (ADSL, 4G, fiber)
- Lack of digital skills of public officials
- Lack of digital skills in the population
- Limited access to public services
- Absence of companies and innovation structures
- Other: (type your own answer)

Question 9: Do you identify digitization as a priority?

Answer:

Perfect priority 1 2 3 4 5 Absolutely no priority

Question 10: France and the European Union have designed a recovery plan for the next 10 years. The common strategy is based on the dual digital and ecological transition. Does this strategy seem relevant to you?

Answer:

Perfectly relevant 1 2 3 4 5 Absolutely irrelevant

Question 11: Do you think that the municipalities are sufficiently supported in terms of digitization?

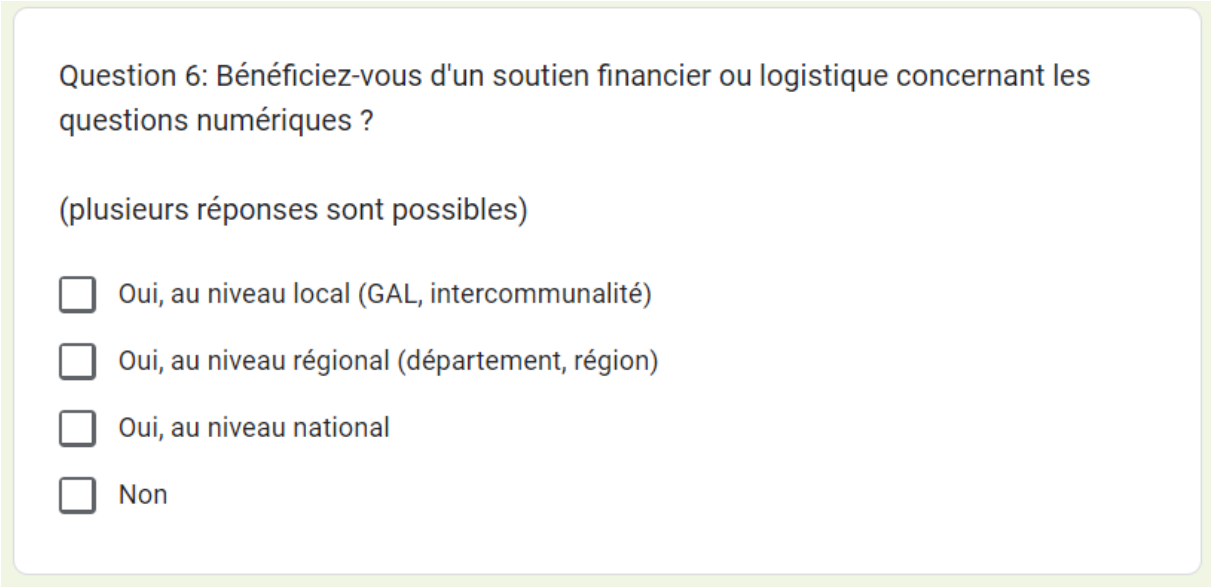
Answer:

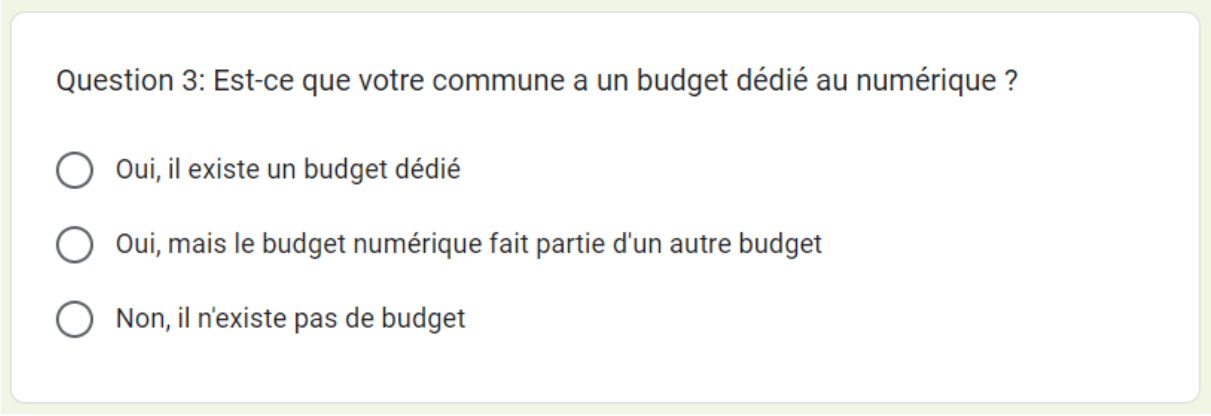
- Yes
- No

In addition, the participants are asked to fill in their name, status and the municipality they represent before starting to answer the questionnaire. No data is stored by the online form software, therefore the declared identity is the main identification method. Any questionnaire without identity will be considered invalid and thus not saved. A questionnaire with improperly filled identity that prevent identification will be considered void and taken out of the study.

The questions 4, 5, 6 and 8 allow the participants to give multiple answers, without limitations (all the answers can be selected, it is indicated to the participant below each question in the questionnaire). Question 2 and 11 are the only questions with a binary yes/no choice. Question 9 and 10 take the form of Likert scales: the participants are asked to graduate their opinion on a scale from 1 to 5. The question 8 includes the possibility of adding a personal answer in the "other" text field.

From the perspective of the participants, a typical question looks as follows:





The original version of the questionnaire (in French) can be found in the annexes (annex n°5). The translation was carried out in such a way as to transcribe all the important notions, thus the meaning of the words and the coherence with the study being privileged over the style and the idiomatic nature of the expression.

3.2.2 Website analysis

The second part of the empirical research consists of an in-depth analysis of the services offered to the populations by the official websites of the municipalities. The method for selecting municipalities is the same as described in the *database and sample* section of the paper. The websites selected correspond to the internet addresses officially declared in the administration directory.

Similar studies have already been carried out with various methodologies. The methodology used in this study is strongly inspired by previous studies and relies on their experience and their results to constitute a relevant and effective method. First of all, it is a question of defining the various items which will be investigated. The major difficulty is the wide variety of websites, which can be organized or have completely different designs. It is therefore necessary to make sure to define items sufficiently broadly to be able to include all of their variations, the important point being not the way in which the services are digitized but whether or not they are digitized and made accessible to the general population of the municipality. This study will therefore not focus on the quality of online services, their efficiency or their reliability. The services have not been tested to ensure that they work properly.

Layne & Lee (2001) conducted a study in the United States, which didn't focus on municipalities but instead overviewed different administrative layers in the way they conduct digitalization. The United States system has three layers of administration: the federal level, the state level and the local agencies level (which include municipalities). The authors propose a wide range of items to analyze:

- Online presence of the agency
- Catalogue presentation with different sections
- Downloadable forms
- Services and forms accessible directly online
- Possible transaction of information
- Integration of other administrative layers
- Integration of other agencies
- "One stop shopping" system

From these items, they constructed 4 categories that represent the different stage of digitalization of public services: catalogue (phase 1), transaction (phase 2), vertical integration (phase 3) and horizontal integration (phase 4). In the phase 1, online administrative websites are still quite underdeveloped and mostly limited to online presentation of an administration as well as displaying basic information. They are usually characterized with basic digital skill and no IT specialist available, therefore the

authority has to lower the ambition. At best, the website can be properly indexed so that citizens can find the right pages and electronic documents easily and are able to download forms (cataloguing). The positive effect to have at least stage 1 online presence is to reduce government staff workload by answering basic citizen' inquiries with the information provided online, thus limiting the need to call an agency or to go there physically to ask a question.

In the phase 2, citizens have the possibility to connect directly with the administrative authority through a website and can exchange information and forms with them, from way or the other. At best, the information transaction should be achieved automatically without requiring intervention from staff. Such functionality prevent citizen to do unnecessary trips in order to fill paperwork or hand over filled forms, as they are able to download and then upload the forms directly on the website. The secondary positive effect is to be more inclusive toward people with limited mobility, that have trouble going physically to the local administrations.

In the phase 3, the digitalization aims more at transforming public services rather than simply automating them. Online platforms should also allow to communicate to upper and lower layers of administration in a coherent way, when dealing about the same type of services. For instance, medical and social welfare files could be transmitted from the local to the national level, allowing the citizen to move freely around the country while retaining his information online and strongly reducing the need for new procedures when settling down in a new place.

The phase 4 represents the last stage of digitalization, where the administration is about to reach the full potential of information technology from the perspective of citizen. Online platforms should concentrate different administrative functions. Instead of having platforms for each agency, platforms should be hub indexing all public services, in order to save citizens' time and prevent them from searching through multiple websites. This is an entire new approach to concept of governance, as the agencies still exist but the citizens don't have to address them individually. Working on the interoperability of service could increase administrative efficiency drastically, as well as simplifying procedures for the citizens by not forcing them to adapt to each agency system.

As the author points out, at the time of writing the paper there were no example of eGovernment system that reached phase 4 in the digitalization of public services. The

phase 4 was more an extrapolation of what could be achieved through digitalization. The results were scarce as the method was developed during the early years of digital governance, however the method of evaluation has proven successful as it was reused by other researchers (Hiller & Belanger, 2001 ; Moon 2002 ; Siau & Long 2005 ; Jansen & Olnes 2016 ; Mbarek 2019).

Most of the authors provided small or major tweaks to the original model, either extending it or modifying it substantially. One modification that stands out is the inclusion of a fifth phase, regarding eDemocracy, that is to say any way to involve directly the citizens in the politics through the use of online platforms (Hiller & Belanger 2001 ; Moon 2002 ; Siau & Long 2005). Lee himself revised his own work in 2010, analyzed different stage models of eGovernment and he added e-Governance involvement as the last stage of digital transformation of governments (Lee, 2010). The important changes he made to his own work show the complexity of the subject and the rapid evolution of thoughts.

Without citing any of the previous authors, Attour and Longhi (2009) develop a similar approach by constructing a model for evaluating the e-Governance of municipalities which consists of an analysis of municipal web platforms according to the services they offer to citizens. Although significantly different from Lee's (2001) approach, the process tends to produce similar results. The typology is composed of four phases also:

- 1: providing information online
- 2: possibility of downloading forms from a platform
- 3: possibility of filling up all the forms directly online
- 4: possibility of carrying out all the procedures online in direct communication with the public authority

Here, phase 1 and 2 correspond to the “catalogue” phase in Lee’s typology (phase 1), but fragmented into two parts. Phase 3 and 4 roughly correspond to “transaction” phase (phase 2), also divided into two distinct levels. Attour and Longhi’s typology can be seen as more progressive but also less ambitious than Lee’s. One of the reasons might be that they solely focus on the municipalities, who have fewer financial resources and human capital to carry out digital policies, whereas Lee’s proposed a framework for public authorities from municipalities to regions. Attour and Longhi (2014) extended their research. However, the focus is put on municipalities between “10 000 – 100 000”, presented as the heart of the digitalization, thus excluding the vast majority of municipalities that could been considered rural (p.14).

Mbarek (2019) analyzed some of these eGovernment models and proposed categories to qualify the local authorities according to their level of involvement in the digital transition. He divided them in 4 categories:

- so-called "passive" local authorities who are not involved neither in the deployment of digital infrastructures nor in the development of online public services
- local authorities active in the deployment of digital infrastructures but passive in the development of online public services
- passive communities in the deployment of digital infrastructures but active in the development of online public services
- the most digitally active local authorities, which are involved in both the deployment of digital infrastructures and the development of online public services (p.68)

Selected items and proposed categories

For this study, 12 items were selected. The items are each evaluated independently then combined to result in a rating out of 12: each item that is available on the municipality website gives 1 point. The items were divided into 6 phases: online presence (1), communication (2), basic digitalization of public services (3), advanced digitalization of public services (4), horizontal and vertical integration (5), and very advanced digitalization of public services (6). Each phases include 2 elements.

The items and digitalization phases look as follow, ordered from the lowest level of digitalization to the highest level:

1. **Online presence**: existence and accessibility of website (1 point), basic display of information (name of municipality, town hall address, email address, phone number on main page or every pages) (1 point)
2. **Communication**: publication of news (article, photo, event…) (1 point), social medias (links or direct integration to the website, include Twitter, Facebook, Youtube, Instragram…) (1 point)
3. **Basic digitalization of public services**: downloadable forms (1 point), guidelines on administrative procedures (1 point)
4. **Advanced digitalization of public services**: fillable forms online (1 point), website ergonomics (search engine, proper website catalogue, visually impaired accessibility) (1 point)
5. **Horizontal and vertical integration**: horizontal integration (such as eHealth, waste management, water & electricity services) (1 point), vertical integration (local, regional or national administration) (1 point)
6. **Very advanced digitalization of public services**: eDemocracy and opendata (public consultation, electronic vote, open data) (1 point), application (internal or external software which provide services for other mediums such as smartphones) (1 point)

Regarding fillable forms online (criterium 7), any municipality that propose online fillable forms will also be awarded with one point from the downloadable forms (criterium 5).

Regarding the existence and accessibility of website (criterium 1), if the website doesn't belong to the municipality but it is a webpage hosted on the website of another public authority (for instance, the intermunicipality), then a score of 1/12 is given and the other items are not considered.

Regarding the publication of news (criterium 3), 0 is given if:

- There is no news section
- The news section is empty
- The last news is more than 2 years old (prior to 06/2020)

Regarding the horizontal integration (criterium 9) and the vertical integration (criterium 10), a link isn't considered as proper integration. Proper integration should include information, guidelines, downloadable or fillable forms from the second-party administration.

Depending on their score (0 to 12 rating), the municipalities will be assigned to a category that supposedly reflect their level of digitalization.

- 0: No digitalization
- From 1 to 2: minimal digitalization
- From 3 to 4: basic digitalization
- From 5 to 6: medium digitalization
- From 7 to 8: advanced digitalization
- 9 and more: very advanced digitalization

Analysis results of one website looks as follow:

NAME OF MUNICIPALITY		
PHASE	**ITEM**	**YES NO**
Online presence	Existence & accessibility	
	Basic display of info	
Communication	Publication of news	
	Social medias	
Basic digitalization	Downloadable forms	
	Administrative guidelines	
Advanced digitalization	Fillable forms	
	Web ergonomics	

Horizontal and vertical integration	Horizontal integration	
	Vertical integration	
Very advanced digitalization	eDemocracy/Transparence	
	Application	
	TOTAL SCORE	

For instance:

Niederschaeffolsheim			
PHASE	**ITEM**	**YES**	**NO**
Online presence	Existence & accessibility	1	
	Basic display of info	1	
Communication	Publication of news	1	
	Social medias		1
Basic digitalization	Downloadable forms		1
	Administrative guidelines	1	
Advanced digitalization	Fillable forms		1
	Web ergonomics		1
Horizontal and vertical integration	Horizontal integration		1
	Vertical integration	1	
Very advanced digitalization	eDemocracy/transparent		1
	Application		1
	TOTAL SCORE	5	

Here, the website of the municipality of Niederschaeffolsheim obtained 5 points. Therefore, the rating is 5/12 and the municipality is qualified as a municipality with medium digitalization (from 5 to 6).

Sample size and selection method

Unlike the questionnaires, the analysis does not cover all the municipalities. Given that the population size is identical (n = 4903), then the minimum required sample is the same. With a confidence rate of 95% and a margin of error of 10%, a minimum of 94 responses

would be needed to obtain a sufficiently reliable sample. If the margin of error is set at a preferable threshold of 8%, then the number of responses required is 145. If the margin of error is set at the ideal threshold of 5%, the number of responses required is 352. To be able to carry the study in time, the sample sized was fixed at 253 statistical individuals, which gives a margin of error of 6%. The municipalities were randomly selected using Microsoft Excel function "=RAND()" : each of the 4533 municipalities were assigned a random number and then sorted out. The first 253 municipalities on the randomized list were then selected.

The only selection criterium was the registration of the municipality in the administration directory. In accordance with the French laws in force, local authorities have a certain number of obligations concerning the accessibility and visibility of digital services (Assemblée Nationale, 2013). In particular, the contact information must be officially declared to the local prefecture. This information is then centralized in the administration directory. As part of this study, websites that have not been declared or whose address does not refer to an existing site (either the address is false or the address has changed without update of the directory) are considered non-accessible and will receive the rating 0, corresponding to no digitalization category.

4 RESULTS

Questionnaire sample

The pre-selected sample was made up of 4533 municipalities. After an analysis of the database and the contact information available on the administration directory, some email adresses were missing. When there was also a declared website, the website was checked in order to retrieve the email adresses, however 61 email addresses could not be retrieved and thus the municipalities were not contacted. Thus, only 4442 of the 4533 municipalities could be contacted (98%). After sending all the emails, a total of 51 municipalities couldn't be reach because the email adresses was non-existent or non-responsive. Each of these municipalities were double-checked by using another email adress to contact them, uncessefully. This reduces the number of municipalities that were reached to 4391, or 97% of the main selected sample.

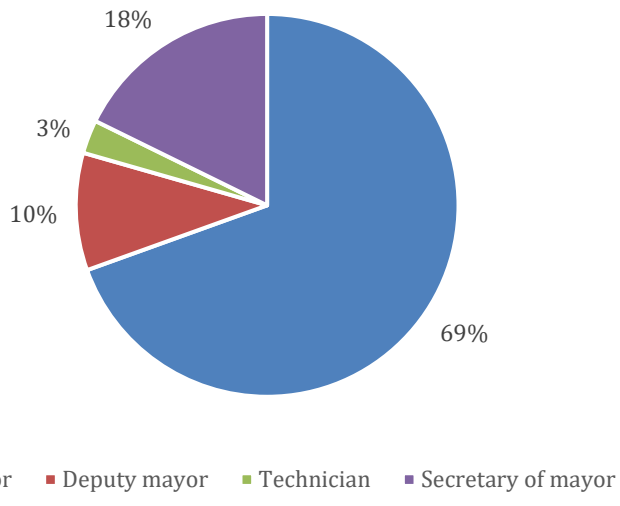
On total, 148 answers were received accross the span of around 45 days, with an average of 3.2 answer per day. 2 answers were eliminated because they were a duplicate of the

same municipality. A further 5 answers had to be eliminated because the participant information were not properly declared and thus it wasn't possible to find the municipality. Addtionnally, 30 answers had improperly stated the contact information (such as incomplete name of the participant or position not clearly stated) but could be completed, either by contacting again the municipality (in 18 cases) or by searching the missing information on internet (in 12 cases). The rate of positive and correctly completed answers is therefore 75% (n=111). Among the 25% of incorrect answers (n=37), only 4.73% cannot be used and 20.27% could be brought up to study standards. The new revised version of the questionnaire seems thus much more effective than the benchmark one, that had a failure rate of 25% (against 4.73% now).

That being said, the number of usuable answers (n= 141) falls just below the expected sample of at least 145 answers for a margin of error of 8% and quite far from an ideal of 352 answers for a margin of error of 5%. Instead, it corresponds to a margin of error of 8.13%. 141 municipalities corresponds to 3.11% of the total of 4533. The list of the municipalities is made available in the annex n°6 and the answers in annex n°7. Possible explainations for the low ammount of answers will be provided in the discussion section.

Among the participants, 69% were mayors (n=98), 18% were secretary of mayor (n=25), 10% were deputy mayors (n=14) and 3% were technicians (n=4). In other terms, elected officials represents 79% of the sample (n=112) and 21% were employees.

Figure 17: Distribution of participants by function



Geographically, the study covered all Grand Est 10 departments. The biggest spread was between Marne department (n=9 ; 6.38%) and Bas-Rhin department (n=22 ; 15,60%),

despite that Marne departement represented 19.5% of the original sample (n=890) and Bas-Rhin represented 9% of the original sample (n=410). The correlation between the number of municipalities contacted in each department and the number of municipalities that answered in each department is low.

Table 3: Distribution of municipalities per departments

Department	Number of participants	Sample %
Ardennes	11	7,80%
Aube	12	8,51%
Marne	9	6,38%
Haute-Marne	10	7,09%
Meurthe-et-Moselle	16	11,35%
Meuse	13	9,22%
Moselle	20	14,18%
Bas-Rhin	22	15,60%
Haut-Rhin	15	10,64%
Vosges	13	9,22%
	Total : 141	

The average population of the municipality was 827 inhabitants, with a median of 351. The smallest municipality, Montbras, had 22 inhabitants (very low density area). The biggest municipality, Saint-Avold, had 15 767 inhabitants (intermediate area). Almost 60% of all the municipalities had less than 500 inhabitants (n=84), 31.91% had bewteen 500 and 2000 inhabitants (n=45) and 8.52% had more than 2000 inhabitants (n=12).

Table 4: distribution of municipalities per population range

Inhabitants	Number of municipalities	Percentage %
Less than 100	12	8,51%
100-200	36	25,53%
200-500	36	25,53%
500-1000	24	17,02%
1000-2000	21	14,89%
2000-3000	6	4,26%
More than 3000	6	4,26%
	Total : 141	

To make sure that no urban municipalities or high density municipalities were included into the sample, the municipalities that answered were checked again and searched inside INSEE/Observatoire des Territoires shared databse. The results found that no municipalities were part of urban areas and that rural municipalities (low density and very

low density areas) represented 91,49% of the sample (n=129) whereas the intermediate municipalities represented the remaining 8,51% (n=12).

Area density	Number of municipality	Percentage %
Urban	0	0,00%
Intermediate	12	8,51%
Low density	72	51,06%
Very low density	57	40,43%
	141	

Questionnaire answers

Question 1: Does your municipality have a digital strategy?

	No strategy	Municipal strategy	Intermunicipal strategy	No opinion
n=	86	41	13	1
Percentage %	60,99%	29,08%	9,22%	0,71%

Almost 61% of the participants declared that their municipality did not have any strategy regarding digital issues, whereas 38.30% declared to have a digital strategy, either on the municipal scale (29,08%) or intermunicipal scale (9.22%). Unsurprisingly, the municipalities that declared to have a digital strategy of the municipal level (n=41) had an average population much higher than the sample average with 1541.76 inhabitants.

Question 2: Does your municipality employ an IT specialist technician?

	Yes	No
n=	6	135
Percentage %	4,26%	95,74%

More than 19 out of 20 municipalities (95.74%) didn't employ an IT specialist. Unsurprisingly, the 6 municipalities that declared to employ an ICT specialist had an average population of 4351 inhabitants, much higher than the sample average, and didn't include any municipalities from very low density area.

Question 3: Does your municipality have a dedicated digital budget?

	Dedicated budget	Shared budget	No budget at all
n=	4	25	112
Percentage %	2,84%	17,73%	79,43%

Again, the vast majority of municipality (79.43%) declared to have no budget of any sort regarding digital issues. 20,57% of the participants on the contray said that their municipaliy had a digital budget, but only 2.84% had a dedicated budget whereas 17.73% had a shared budget with other expenses.

Question 4: Has your municipality implemented any of the following initiatives ?

	A	B	C	D	E	None
n=	86	77	19	15	3	25
Percentage %	60,99%	54,61%	13,48%	10,64%	2,13%	17,73%

A corresponds to website communication, B to social media communication, C to technical support for citizens, D to eDemocracy and E to open-data. Website and social media communication were by far the most common digital initiatives, each being implemented by more than half of the municipalities. Around 1 municipality out of 6 declared to never had done any digital initiative.

	1	2	3	4	5	None
n=	45	53	15	2	0	25
Percentage %	31,91%	37,59%	10,64%	1,42%	0,00%	17,73%

Almost one third of the munipalities (n=45) declared to have implemented only 1 digital initiative and 69,50% (n=98) had implemented 1 or 2 digital initiatives. The most common combination was A+B (website communicaiton + social media communication) and represented 45 answers, around 32% of the total answers.

Question 5: Do you think that digitized public services are sufficiently accessible?

	A	B	C	D	E
n=	11	122	47	35	22

Percentage %	7,80%	86,52%	33,33%	24,82%	15,60%

A corresponds to “Yes”, B corresponds to “No, not all citizens have the necessary digital skills”, C corresponds to “No, not all municipal agents have the necessary digital skills”, D corresponds to “No, some public services are not accessible remotely” and E corresponds to “No, digital public services are poorly designed”. Only 7.80% of the participants believed that the digital public services were sufficiently accessible, whereas the remaining 92.20% stated that they were not. The most common answer by far was the lack of digital skill in the population with 86.52% of the answers, and the second most common answer also related to human capital with one third of municipalities declaring that municipal employees were lacking of digital skills as well.

	1	**2**	**3**	**4**
n=	58	53	16	3
Percentage %	41,13%	37,59%	11,35%	2,13%

Most of the municipalities quoted 1 or 2 reasons for the lack of accessivity: 41,13% of municipalities quoted 1 reason and 37.59% quoted 2 reasons, while the rest quoted 3 or more reasons.

Question 6: Do you have any financial or logistical support regarding digital issues?

	A	**B**	**C**	**D**
n=	20	9	6	110
Percentage %	14,18%	6,38%	4,26%	78,01%

A corresponds to ‘Yes, at local level”, B corresponds to “Yes, at regional level”, C corresponds to “Yes, at national level” and D corresponds to “No”.

The vast majority of municipalities declared to not have any financial and logistical support regarding digital issues: almost 8 out of 10 (78.01%). Only 4 municipalities (2.84%) have declared having support from more than one structure. The municipalities that said to have received support (n=30) are usually much larger than the average, with a population of 1397 inhabitants and belonged disproportionately to intermediate or low-density area, around 75% where these typologies represent 60% on the total sample.

Question 7: Would you be ready to invest in the digital transition with financial support?

	A	B	C	No opinion
n=	46	70	21	4
Percentage %	32,62%	49,65%	14,89%	2,84%

A corresponds to “Yes”, B corresponds to “No, it isn’t a priority” and C corresponds to “No, it isn’t the role of my municipality”. Together, the negative answers accounted for 64.54% of the participants. Only about 1/3 declared to be ready to invest into digitalization if they were proposed funding.

Question 8: What do you think are the main weaknesses of your territory?

	None	A	B	C	D	E	Other
n=	4	36	43	109	35	27	16
Percentage %	2,84%	25,53%	30,50%	77,30%	24,82%	19,15%	11,35%

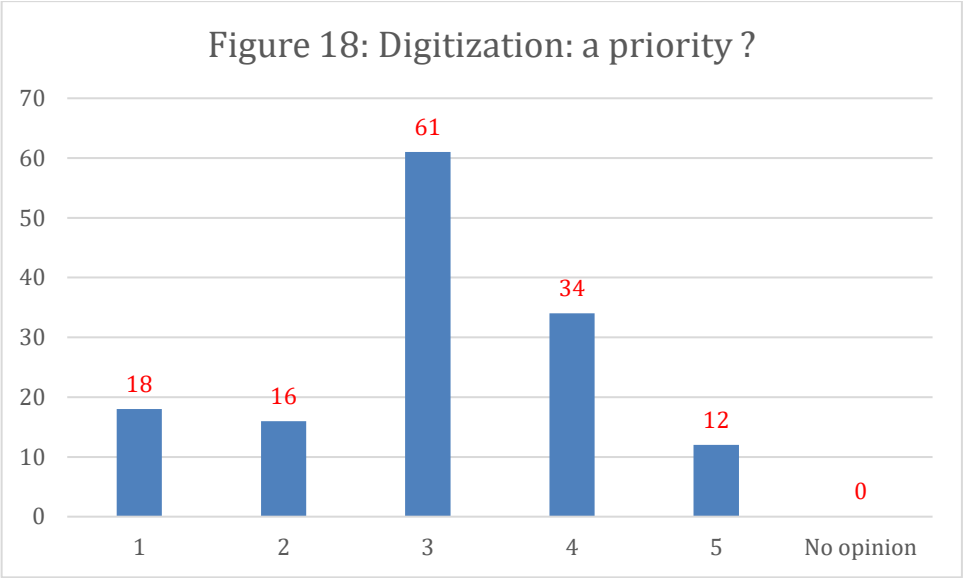
A corresponds to “infrastructure quality”, B corresponds to “lack of digital skills of municipal agents”, C corresponds to “lack of digital skills in the local population”, D corresponds to “limited access to services” and E corresponds to “absence of innovation structure and companies”. Like in question 5, the lack of digital skills in the population is dominated since 77.30% of the participants selected it, followed by the lack of digital skill of municipal agents with 25.53%. The average population of the municipalities declaring that infrastructures were an issue is 568 inhabitants (n=36).

Only 4 participants declared that their territory had no weaknesses regarding digitalization. Unsurprisingly, the average population in these 4 municipalities is quite high with 1680.25 inhabitants.

	None	1	2	3	4	5
n=	4	53	48	26	10	0
Percentage %	2,84%	37,59%	34,04%	18,44%	7,09%	0,00%

Most of the participants (71,63%) recognized 1 or 2 digital weaknesses in their territory. Only 25,53% reported more than 2 digital weaknesses.

Question 9: Do you identify digitization as a priority?

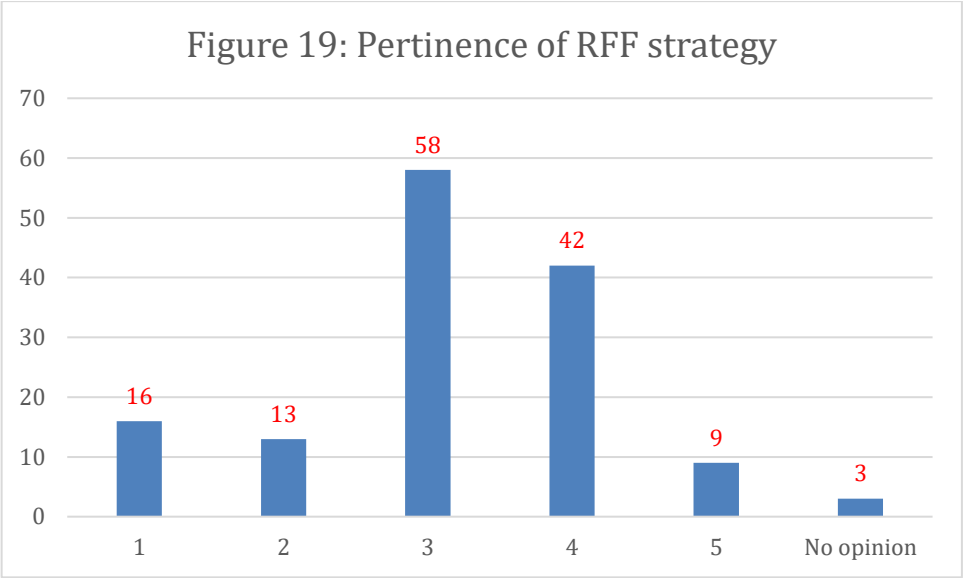


Here, the participants were asked to rate the importance of digitalization on a scale from 1 to 5, being the lowest rating (not a priority at all) and 5 being the highest rating (highest priority). On average, they gave a moderate rating of 3.04 out of 5, meaning that digitalization isn't considered as a top priority regarding municipalities.

Small municipalities were more likely to say that the digitalization wasn't a priority at all (average population of municipality giving 1/5 = 231 inhabitants) whereas larger municipalities were more likely to say that the digitalization was a very high priority (average population of municipality giving 5/5 = 1102 inhabitants).

On total, 24,12% of municipalities (n=33) considered digitalization as a low priority, whereas 32,62% (n=46) considered it a high priority and 43,26% (n=61) were moderated.

Question 10: France and the European Union have designed a recovery plan for the next 10 years. The common strategy is based on the dual digital and ecological transition. Does this strategy seem relevant to you?

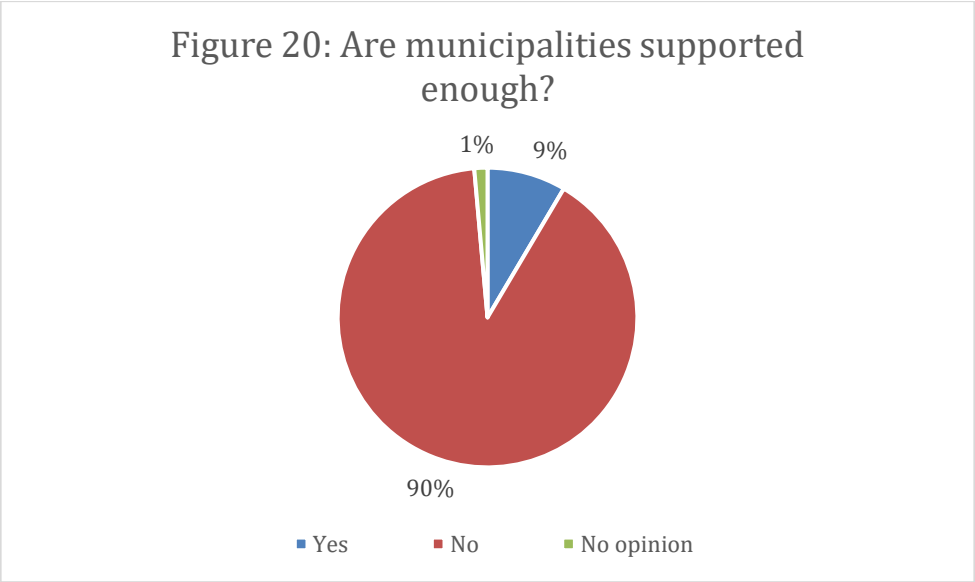


Here, the participants were asked to rate the pertinence of the twin transitions strategy from France and the European Union on a scale from 1 to 5, 1 being the lowest rating (not pertinent at all) and 5 being the highest rating (highest pertinence). On average, they gave a moderate rating of 3.04 out of 5, meaning that the strategy isn't considered as neither very pertinent nor not pertinent regarding municipalities.

Even though the difference is much smaller than in question 9, the small municipalities were more likely to say that the strategy wasn't a priority at all (average population of municipality giving 1/5 = 198 inhabitants) whereas larger municipalities were more likely to say that the digitalization was a very high priority (average population of municipality giving 5/5 = 352 inhabitants).

On total, 20.57% of municipalities (n=29) considered the French and European strategy as less pertinent, whereas 36.17% (n=51) considered it very pertinent and 41.13% (n=58) were moderated.

Question 11: Do you think that the municipalities are sufficiently supported in terms of digitization?



The last question is undoubtedly the one with the highest consensus: 90% of participants (n=127) declared that the municipalities were not supported enough on the issues of digitalization, while only 9% (n=12) think they were.

Webanalysis sample

The randomized selected sample consists in a list of 253 municipalities from the administration directory, where the official websites from the municipalities are normally declared along the other official contact information and the official address. The list is available in the annexes (annex n°8).

Table 5: Distribution of municipalities by departments

Department	Number of participants	Sample %
Ardennes	32	12.65%
Aube	35	13.83%
Marne	25	9,88%
Haute-Marne	21	8,3%
Meurthe-et-Moselle	26	10,28%
Meuse	16	6,32%
Moselle	31	12,25%
Bas-Rhin	25	9,88%
Haut-Rhin	10	3.95%
Vosges	32	12,65%
	Total : 253	

The average population of the selected sample was 688 inhabitants and the mediane population was 245 inhabitants.

Table 6: Distribution of municipalities per population range

Inhabitants	Number of municipalities	Percentage %
Less than 100	51	20,16%
100-200	61	24,11%
200-500	60	23,72%
500-1000	43	17%
1000-2000	22	8,7%
More than 2000	16	6,32%
	Total : 253	

Regarding the density of population, 94.07% of the municipalities belonged to rural areas (n=238) and 5.93% to semi-rural areas (intermediate).

Table 7: Distribution of municipalities, urban-rural typology

	Intermediate	Low density	Very low density	
n=	15	107	131	253
Percentage %	5,93%	42,29%	51,78%	100,00%

A first analysis was carried out on the entire database of the administration directory (n= 4533) after excluding the municipalities from urban areas in order to estimate the number of municipal websites among the rural municipalities. The analysis found at that among the 4533 municipalities, only 36.84% (n=1670) declared to have an official website on the directory, thus implying that 63.16% of the municipalities never conducted any kind of online initiative. The results from the sampled 253 municipalities were rather similar: 85 of the 253 municipalities declared a website, around 33.6%.

Given that the remaining 168 municipalities didn't declare any website, the names of the municipalities were checked manually in a web browser to look for an official website. After the search, only 5 websites could be retrieved. Thus 90 websites were found in total (35.57%) and 163 municipalities were not associated with any websites (64.43%). The list is available in the annex (annex n°9).

Webanalysis results

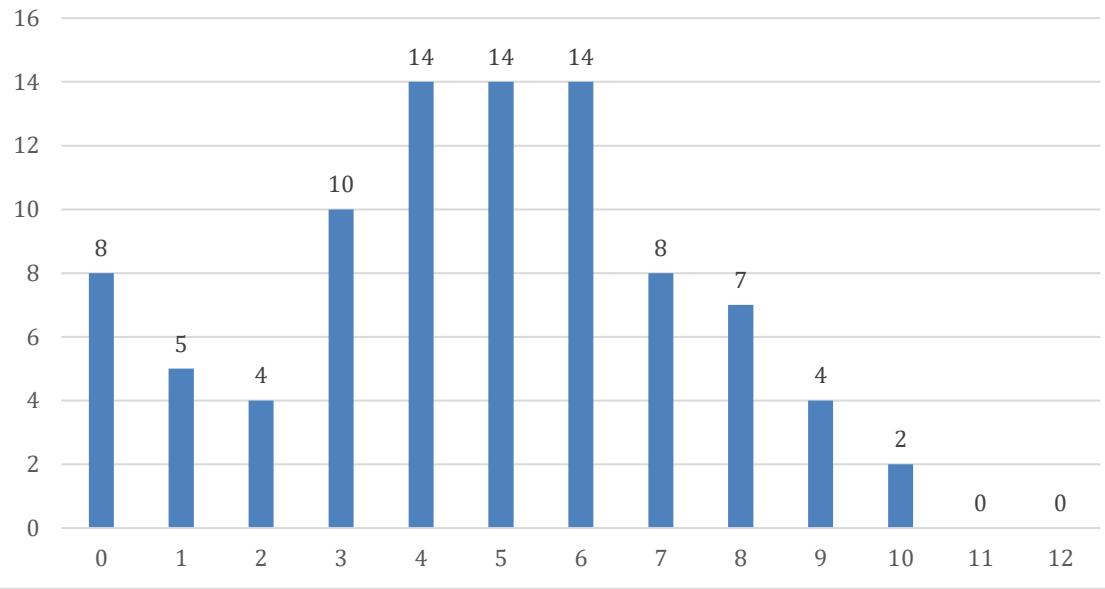
The 163 remaining municipalities were credited the score of 0, which corresponds to no digitalization at all. Unsurprisingly, there is a high correlation between the population of

municipality and the existence of an official website: the higher the population is, the more chance of having their own municipal website. If we focus on the municipality with more than 1000 inhabitants (n=38), 100% had a website. Two of them were not accessible however, thus 94.74% of the municipality above 1000 inhabitants had an accessible website. On the contrary, if we focus on the municipalities with less than 1000 inhabitants (n=215), only 24.19% (n=52) had a website. In addition, 6 websites were not accessible which means that only 21.4% of municipalities with less than 1000 inhabitants had an accessible website. With a focus on municipalities with less than 100 inhabitants, the results are even lower as only 1 had an accessible website (1.96%).

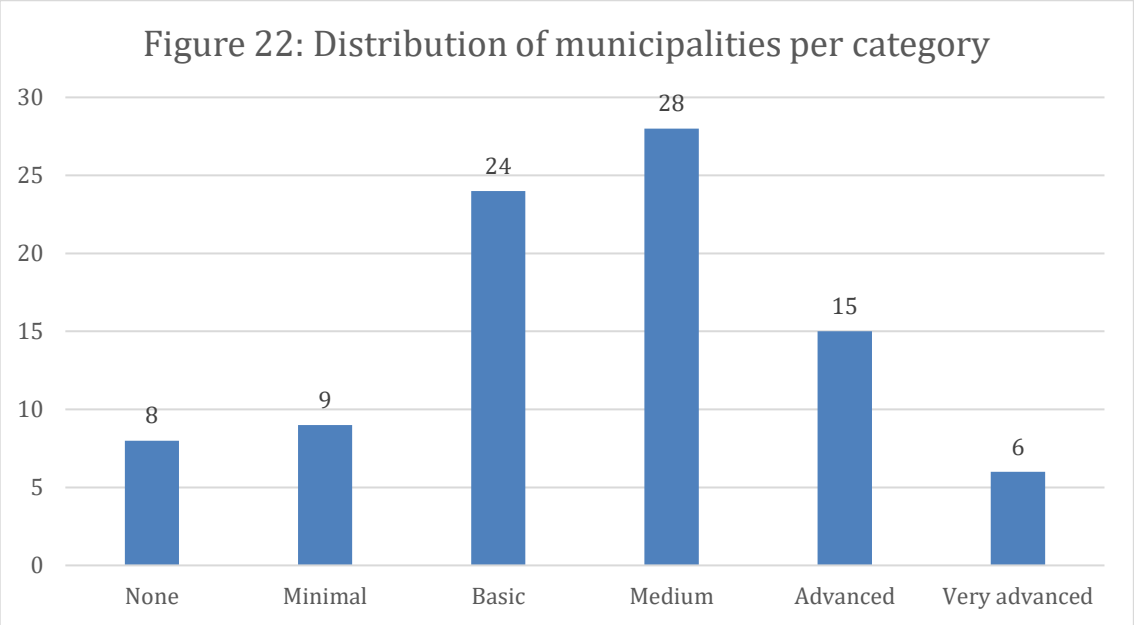
If the average rating of the entire sample of 253 municipalities is calculated, the result is 1.68/12 on average. This is due to the 163 municipalities that were credited a score of 0. If the selection is narrowed only to the municipalities for which a website was declared on the administration directory, then the average score is 4.67. That score is between the category “basic digitalization” and the category “medium digitalization”. The median score was 5, corresponding to “medium digitalization” category.

0% of municipalities received a score of 11 or 12. 8.89% of municipalities received a 0 because the websites that were declared in the administration directory were not accessible. The two thirds of the websites (n=60) had a score between 3 and 7. Only 14.4% had a score above 7 (n=13).

Figure 21: Distribution of municipalities per score



According to the categories that were established in the method sections, 57.78% of the websites were rated as basic or medium level of digitalization (n=52) and 23.33% were rated as advanced or very advanced in digitalization (n=21).



Municipalities with less than 1000 inhabitants had an average score of 3.78, whereas municipalities with more than 1000 inhabitants had an average score of 5.97.

Table 8: Websites items

Existence and accessibility	**Basic display of information**
N= 82	N= 72
91,11%	80,00%
News	**Social media**
N= 56	N= 29
62,22%	32,22%
Downloadable forms	**Administrative guidelines**
N= 20	N= 34
22,22%	37,78%
Fillable forms	**Web ergonomics**
N= 8	N= 49
8,89%	54,44%
Horizontal integration	**Vertical integration**
N= 10	N= 42
11,11%	46,67%

eDemocracy/Transparency	Application
N= 4	N= 15
4,44%	16,67%

When analyzing the distribution per item, more than 80% of the websites were accessible and displayed basic information. However, less than a quarter of the websites proposed any digital public services directly hosted on the website, with 22.22% offering downloadable forms. 37.78% of the websites proposed administrative guidelines but this is only a partial public service as they should either go to another website to download or fill form or they should go physically to the town hall. eDemocracy and transparency initiatives were the least popular, with only 4.44% of the websites proposing a related initiative. More than half of the website (54.44%) were optimized to be ergonomic and more efficient for the user, regarding if they proposed any digital public services or not. The integration of national public services inside the website was much more frequent than the proposal of local public services directly hosted on the website, with 46.67% of the municipalities preferring that option.

5 DISCUSSION

Questionnaire

Despite the changes in the questionnaire form, with significantly reduced numbers of questions and lenght, the rate at which the answers were obtained was unsufficient to obtain the ideal sized sample who could lead to more reliable results or more indepth analysis. In order to have more answers, more collection time should have been planned but it was render impossible by the study deadline and the fact that the questionnaire had to be reset after 1 month and half to send the second version. With additionnal researchers, it would have been maybe possible to conduct phone interviews that tend to lead to better results because of direct engagement with the potential participants, however that study focused solely on email contact and online questionnaire because of a lack of time. In addition to the explanatory factors quoted in the method section (p.66), one of the reasons that might explain the issue at collecting answers from municipalities is the timing of the study: july and august, which covers most of the period where the questionnaires were send, is traditionally the public holidays in France and most of the municipalities close their services for a month. In addition, some technical issues might have complicated the

task, if the emails were classified as spam by some operators (no professional email service to send massively were used).

With a much broader study, it might be possible to do a more in-depth analysis, but with a sample of 141 such analysis lack of reliability. For instance, the studied sample is probably not enough to have reliable estimation of the analysis per department, as it would required to have a large enough sample for each departement (145 minimum and minimum total of 1450 municipalities if the standards of this study are kept). The same is true for an analysis per function: it could be interesting to see if elected officials have different opinons than employees, or if technicians have special view as they have wider knoweldge of the matter of digitalisation.

One of the main trends that stems out from the study of the answers is that there is a strong focus on human capital issues regarding the questions of digitalization. When asked about the issues regarding digital public services in the question 5, 86.52% of the participants answered that the lack of digital skill in the population was an issue and 33.33% answered that the lack of digital skill in the municipal employees was an issue, thus the lack of digital skills appear a bigger issue than the low accessibility (24.82%) or the poor design (15.60%) of the public services themselves. Similarly, when asked about the digital weaknesses of their territories in question 8, the main answer was again the lack of digital skills in the population (77.30%) followed by the lack of digital skills in the municipal employees (30.50%). On the contrary, only 25.53% quoted infrastructures as an issue, despite that the digital infrastructures seem to be a strong focus on the digital policies from higher level of governements. That being said, small towns are unsurprisingly more likely to declare having issue on the deployement of digital infrasturcture, so it doesn't mean that the issue doesn't exist or even isn't important.

Overall, bigger towns are less likely to view the situation negatively, while smaller towns and villages are much more critical about the higher level of governement policies, the support they receive and the current state of their municipality. These small municipalities represent the majority of the study. It isn't surprising as that very high prevalence of municipalities with less than 500 inhabitants corresponds to the specificity of France and its very high number of municipalities with low average population, as around 54% of French municipalities has less than 500 inhabitants, closed to the 59% of the study (where the urban clusters were removed from the sample) (INSEE, 2015). If we compare the case

of France with the case of other European countries whereas the average population in a municipality is much higher, it is highly possible that the results would be quite different.

In the ESPON 2017 survey, it was already identified that small and rural cities didn't have their own dedicated IT budget: more than 60% of surveyed people identify „the lack of funding as the main constraint on their digitalisation efforts (ESPON, 2017, p.16)". This can be confirmed by the questionnaire answers where only 2.84% of the municipalities declared to have their own IT budget.

Despite that mayors are conscious about the issues of their territory and that the vast majority of them declared that they didn't have any logistical or financial support (78%) and that they believed that their municipalities were not supported enough regarding digital issues (90%), most mayors still consider digitalization not to be a priority and would rather not invest into digitalisation if the funding were proposed. This might indicates that rural areas suffer from several constraints and that digitalization is neither the only one nor the most critical one for some municipalities, because they would prefer to receive funding for other reasons even when they are not satisfied with the digitalization of their own municipality.

Webanalysis

Regarding the analysis that was done on the entire statistical population (n=4533), the provided web addresses themselves were not checked to see whether they are correct and link to a functional website or not. Therefore, that number (36.84%° is based on a purely declarative data. It is possible that some of the links are not accessible (either because of wrong address or because the website isn't available anymore). On the opposite, it is also possible that some websites exist but were not officially declared yet. This could be assumed since both cases were encountered in the study of the 90 websites: 5 websites were found despite not being registered in the directory, and 8 websites were not accessible despite being registered.

Logically, there is a clear difference observable between the smaller and the larger municipalities, as the later have access to more ressources, especially human ressources since they can afford to hire ICT specialist and invest money into ICT infrastructure or software. The consequence is that the digital initatives that require the highest digital skills are less common, such as directly fillable form : the few cities that used them had more than 3000 inhabitants on average (n=8).

According to the studied sample, applications seem to be a fairly common tool used by municipalities. They offer new possibilities to connect with citizens, since they are accessible more widely through smartphones which are the prefered tools of communication and they require very little investment. That form of 3rd party service could be interesting in fighting against digital divide, because these applications can offer a variety of services for a very low cost and they do not require to invest into expensive webdevelopement or to recruit IT specialists: the work is done by an external company. Thus it might be an affordable solution for the smallest municipalities that have limited financial and logistical capacities. In Ye & Yang (2020), the authors observed similar initiative in China: a mobile application called WeCountry (based on WeChat, the most common messenger application in China) is used to create common social netwrok on the local level. They found that such mobile plateform could be very efficient at dealing with the digital divide and including the local citizens into village life. Some of the applications used by the sampled municipalities in Grand Est are adivsed as free. 4 applications appeared during the frame of that study. The most common application was PanneauPocket. Other applications include Intramuros, Infos Commune and MaCommuneConnectée. The functionnality offered by the different applications were not analysed in that study.

Surpsingly, only one third of municipalities used social medias, despite that the vast majority of citizens use them and that they are usually free, and less time intensive than other digital initiative. That being said, the absence of social media or no mention application on the website doesn't mean the municipality doesn't use them. In the course of the study, the social medias and applications were not searched to look at the presence on municipalities that wouldn't be indicated on websites, even though the websites are supposed to be the most visible and accessible way to communicate, as social media or application usually require to create personal account in order to be able to access the functionnalities. What it would show if it was the case is that the different online services are not properly interconnected, interopoerable and advertised between each other.

Comparison

Despite being integrated to both part of the study in form of question or researched items, open-data appeared very rarely. In the question 4 of the questionnaire, open-data is by far the least common digital initiative that the municipality conducted with only 2.13% (n=3) declaring it. In the webanalysis, only one municipality out of the 253 selected sample had

undergo an open-data demarch and that municipality was the largest of the sample with 15,415 inhabitants. Despite its classification as an „intermediate area“, it appears once again clearly that intermediate areas has a much different reality than the rural-isolated areas. It is possible than the main issue with deploying open-data intiatives isn't in the digital skills required, but mostly in the fact that municipality might lack the critical ammount of data necessary in order to make open-data viable.

Surprisingly, eDemocracy was commonly quoted in the questionnaire with more than 10% of municipalities in the question 4 declaring to have conducted eDemocracy initiative, however it rarely appeared on the municipal websites of the webanalysis: eDemocracy initiatives (online consultation, electronic voting system...) appeared in only 3 websites that all proposed intern message system or online fillable form to ask publically a request to the municipality. It is possible that some eDemocracy initiatives were conducted outside of the official websites, maybe on other websites, with web questionnaires or an external application.

Another curious disproportion between both study is that among the participants that were surveyed by the questionnaire, only 1 municipality out of 6 declared to not have undergone any digital initiative (question 4) despite that according to the webanalysis, more than half of municipalities didn't have any official website to conduct their digital initiatives.

Finally, more extensive research work should undoubtedly be carried out by including as many intermunicipalities as possible in the study. Indeed, intermunicipalities allow municipalities of small size or geographically isolated to group together with other municipalities in order to have a greater weight and potentially to be able to develop territorial strategies of which they alone would be incapable. It is possible that such structures allow them to have the financial ressources or the human capital necessary to deploy more complete or more advanced digital solution. Intermunicipality appeared in the questionnaire twice: question 1, where 9.28% of the municipality declared having a digital strategy on the intermunicipal level and question 6, where 14.18% declared to have received logistical or financial support at the intermunicipal level (more than the 6.38% from the region and 4.26% from the national governement). In the webanalysis, a few websites were hosted on the website of their municipality, though with very limited functions since it was only a presentation page with contact information (thus they receive the minimal score of 1/12 because they only had online presence and no other services).

Here again, it seems that the intermunicipality allowed them to have online presence where they probably wouldn't have any if they were not hosted on a common website (that most likely include the other municipalities that don't have a website either).

6 PROPOSALS

1. Governments should propose ready-to-use toolkits in order to provide a minimum technical service for town halls that do not have the critical mass to concentrate sufficient digital skills and be autonomous in the deployment of digital services (creation of a website, creation of social networks, secure network architecture, updating server layout...). For instance, website templates should be proposed to each municipality that doesn't have one with at least the minimum digital services proposed: contact infos, news and administrative guidelines, which don't require complex digital skills to manage.

2. One of the main issues that appeared is the question of demographics and the aging population. The governments should consider offering a digital education service to teach basic digital skills to people who are no longer in school, especially the elderly, because they represent most of the digital illiteracy, yet the educational program of the governments focus on pupils and students, which represent a smaller share of the population in an aging society like Europe's.

3. Similarly, the main issue seems to be human capital. Many places already have good enough digital infrastructures to deploy more advanced digital initiatives, however they simply lack the digital skills either in the employees (who can't manage the initiatives) or in the local population (who can't properly access and utilize the initiatives).

4. Explore more alternative technologies instead of focusing on the issue of the existing deployed technologies. For instance, internet by satellite, could be a promising tool to reach the most geographically isolated areas as it doesn't depend on the deployment of physical ICT lines which can be too expensive in very low-density areas.

5. Broaden the documentation: there are few scientific documents and exhaustive data on the subject as they often include different sizes of municipalities and do not address specifically the issues of the smallest municipalities or the most isolated ones. Most of the studies are quite fragmented with focus on local population and few propose common framework that can easily be used again in other similar studies.

7 CONCLUSIONS

The research aimed at giving a comprehensive overview of the issue of digitalization in the rural areas by focusing on the most local actors and giving a voice to them. Based on the quantitative and qualitive analysies that were conducted through the questionnaire and the webanalysis of this study, it can be concluded that the gap between the proposed policies on the European, national and regional scales and the realities of the ground for the muncipalities is still large. The first part of the study aimed at defining „rural areas“ and integrating the notion into the French system and found out that the complex layers of administration and the existence of competing definitions and various methods of measurement of rurality complicate the task. The second part and third parts reviewed the main political guidelines and the political history of both rural development policies and digital transition policies, however the results are that there are few interconnection between the two. Most of the political initiatives do not even consider rural areas, or give them very limited space in their policy paper. Usually they simply acknowledge the particular or critical situations of rural areas regarding developement and digitalization, but they do not propose any concrete political solutions that seem adaptated to them, despite that rural area covers most of the land in Europe and around one third of the population. The fourth part focused on fixing definitions of the research topics and designing a questionnaire and a webanalysis in order to provide the quantitative data on which to address the issues of municipalities regarding digitalalization. 141 municipalities were questionned and a sample of 84 municipal websites were analyzed.

The fifth part analyzed the result. The main concern encountered by the municipalities is the lack of even basic digital skills in the population or among the professionals they employ to service the population. Even with proper infrastructure plans, that are the main focuses of the European and national plans, the digital initiatives can’t be successfully conducted without a proper competent public to utilize them. As a result, most municipalities lack the capacity to even deploy something as simple as internet websites, who are not technolocally complex for the simple templates. Additionnally, the digitalization of public services appeared to be concentrated only on the national scale and the bridge with the local citizens doesn’t exist yet. The town and village halls should be the link to provide helps to the local citizens when they need to access digital public services, but once again the local public servants and elected officials don’t necessarily have more digital skills than the local citizens. The intermunicipalities appeared as a

possible intermediary to conduct digital policies on behalf of smaller municipalities who lack the ressources on their own.

While the limited sample limits the possibility of generalizing results to the entire France or even to other European member-states, it seems crucial to gather more data from local actors because they are the centers of local life and the local elected officials should be the link to deploy digital policies. To better understand the implications of these results, future studies could address similar question in other rural areas of France or Europe and try to aggregate data. More extensive dataset should allow for more precise analysis and could potentially highlight substantial differences encountered in different areas. For now, that study provides a sample from the Grand Est region and gives an idea of the digital situation in rural areas of Europe in 2022 from the perspective of municipalities, where local actors mostly perceive a lack of support from higher governement levels. The literature review lacks of scientific articles to evaluation the efficiency of the digital policies. In general, the research seems to confirm the hypothesis that the policies do not address sufficiently the needs of rural areas regarding dititalization and new methods should be considered.

8 SUMMARY

Digitization is at the heart of our modern societies and the digital divide is an important issue. Rural and isolated territories are often the first victims of this digital divide. Previous researches exist but remain scarce compared to magnitude of the problem and the economical and social threat it represents. This thesis focuses on the experience of rural municipalities in the Grand Est region, France, regarding digitization issues, and whether or not these municipalities are sufficiently supported. 141 representants of rural municipalities from Grand Est region were interviewed through online questionnaire and an additonal set of 253 municipality websites were analyzed. 90% of participants believed that their municipality where not sufficiently supported and several issues and weaknesses were identified. The lack of digital skills in the local population was the most common complaint, more than infrastructure or quality of national digital public services. Most participants did not identify digitization as a main priority and were not willing to engage in digital investments. Meanwhile, the availability of websites and public services among rural municipalities remain scarce: most of the municipalities still don't have a website or propose only basic function and no truly digital public services. Advanced digital services on a municipal scale are rare. Futur researches should complete the available data and extend it to more regions or to other countries. More attention can be given to intermunicipality, which are key for small, isolated municipalities. Alternative digital solutions like mobile platforms can also be considered in order to replace traditional websites.

Keywords: digitalisation, rural area, municipality, rural, Grand Est, questionnaire

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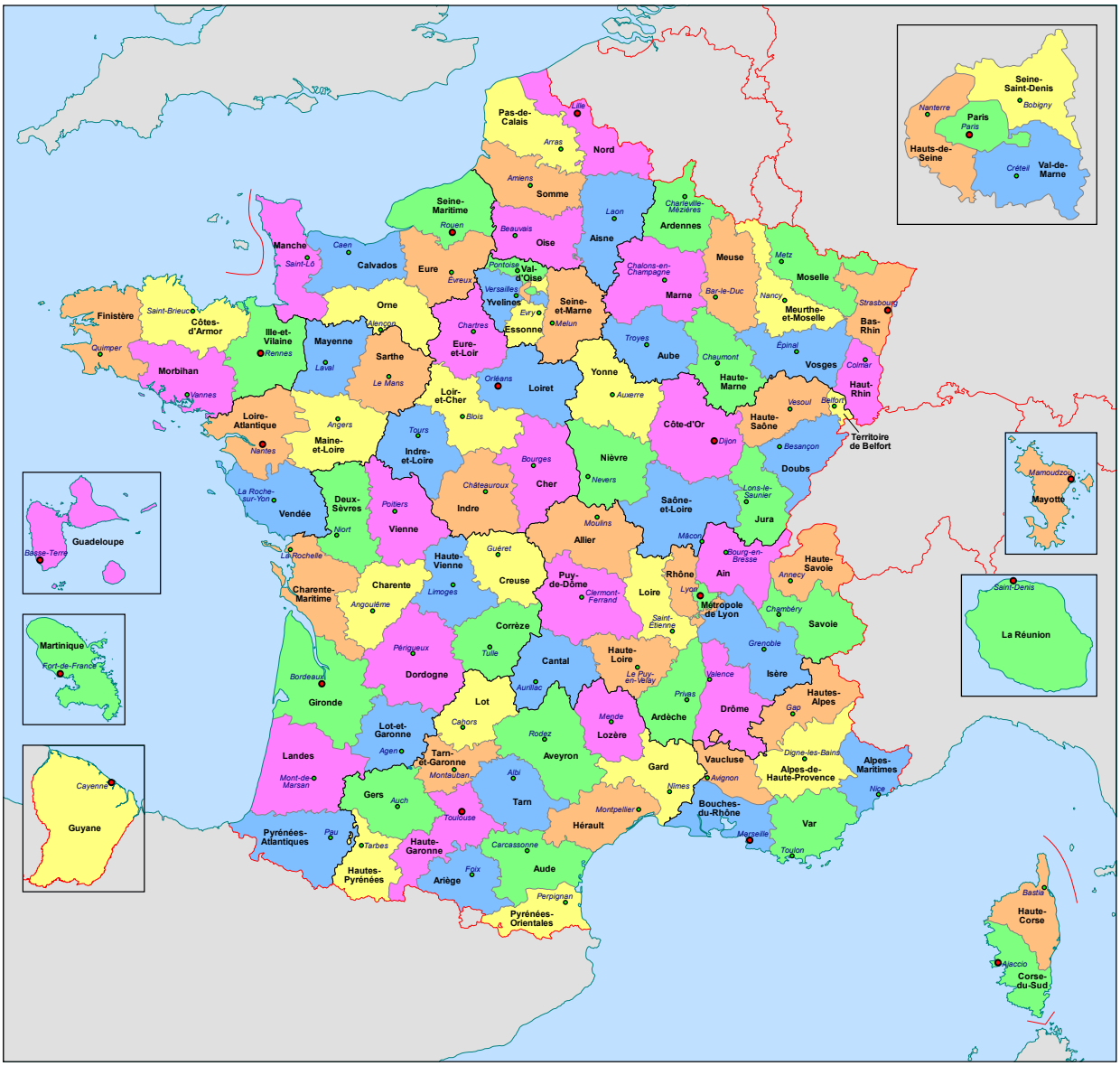
Annex 1: Map of departments



Annex 2: European Commission PDR Alsace Factsheet

Factsheet sur le programme de développement rural 2014-2020 de l'Alsace (France)

La Commission européenne a formellement adopté le Programme de développement rural (PDR) de l'Alsace le 23 octobre 2015. Le programme développe la stratégie pour l'utilisation des 180,5 millions € de fonds publics disponibles pour la période 2014-2020 dont 119,2 millions € du budget de l'UE (1,03 % de l'enveloppe octroyée à la France) et 61,3 millions € de contreparties nationales. Ces montants tiennent compte du transfert du premier pilier de près de 15,9 millions € provenant du budget UE.

Le PDR Alsace met l'accent avec 53 % de ses ressources sur le **développement de pratiques agricoles préservant les écosystèmes et la biodiversité** et ceci principalement par des opérations **agroenvironnementales et climatiques** ainsi que par l'**accompagnement dans le développement des surfaces en agriculture biologique (13 % de la surface agricole y sera concernée).**

L'autre grand objectif du PDR (27 % des dépenses publiques) est de soutenir les exploitations agricoles afin de renforcer leur compétitivité et de pérenniser leur activité. Ainsi, le programme soutiendra des projets de **modernisation et de développement pour environ 1 000 exploitations et 700 projets d'installation de jeunes agriculteurs** en vue de garantir le renouvellement générationnel. S'ajoutera à cela l'accompagnement des agriculteurs par des **actions de formation.**

Enfin une part **significative (13 %** des ressources du PDR) sera consacrée à **l'amélioration de la qualité de vie et l'attractivité des zone rurales** et ceci par le développement du tourisme et **des services ainsi que la préservation et la valorisation du patrimoine culturel**. La zone rurale bénéficiera également des **stratégies de développement local**.

Le développement rural est le deuxième pilier de la Politique Agricole Commune, mettant à disposition des États membres une enveloppe financière européenne pour gérer des programmes cofinancés, au niveau national ou régional, dans le cadre d'une programmation pluriannuelle. Au total, 118 programmes sont prévus dans les 28 États membres. Le nouveau règlement de développement rural pour la période 2014-2020 identifie six priorités économiques, environnementales et sociales, parmi lesquelles les programmes établissent leurs objectifs stratégiques, les mesures mises en œuvre pour les atteindre et les résultats escomptés. En outre, afin de mieux coordonner les actions et de maximiser les synergies entre les différents fonds européens structurels et d'investissement (FESI), un Accord de Partenariat a été convenu avec chaque État membre pour développer la stratégie pour les investissements financés par l'UE.

Le soutien aux activités agricoles des zones à contraintes naturelles à haute valeur environnementale vise à préserver l'environnement agricole mais aussi à répondre aux difficultés socio-économiques de ces zones. Le soutien du PDR passe par les indemnités compensatoires des écarts de revenus, ainsi que par des investissements pour les exploitations de montagne et par des actions de mise en valeur des espaces pastoraux.

Pour la préservation des ressources naturelles, les mesures agro-environnementales et climatiques (MAEC) seront activées sur environ 30 000 ha (9 % de la surface agricole totale) pour répondre aux besoins de préservation de la biodiversité, de l'eau et des sols. Le soutien à la conversion et au maintien de l''agriculture biologique (5 % des surfaces agricoles) ainsi que la protection des sites Natura 2000 par des actions identifiées dans le cadre d'actions prioritaires Natura 2000 pour la France contribuent aussi à cet objectif.

Environ 1,5 million € d'investissements en forêt seront consacrés aux actions en faveur de la biodiversité et de l'eau.

De plus, les aides aux investissements dans les exploitations agricoles ont des conséquences bénéfiques sur la préservation des ressources naturelles puisqu'elles visent, au-delà de la compétitivité économique, la performance environnementale.

L'efficacité des ressources et le climat

Le montant des investissements pour développer l'approvisionnement et l'utilisation des énergies renouvelables en agriculture s'élèvera à près de 19 millions €. Le PDR soutiendra des investissements dans des infrastructures de méthanisation qui permettront de diversifier les revenus agricoles..

Promouvoir l'inclusion sociale, la réduction de la pauvreté et le développement économique des zones rurales

Le programme contribuera dans les territoires ruraux à améliorer l'accès aux services de base et le cadre de vie. Environ 7 % des ressources du programme seront utilisées pour ces actions avec l'objectif d'atteindre environ 900 000 personnes bénéficiant de services et infrastructures améliorés.

Le PDR Alsace mise aussi sur les projets de coopération LEADER comme outil de développement local. L'objectif est de soutenir les stratégies de développement local portées par 5 groupes d'action locale dont environ 500 000 personnes pourront bénéficier et qui généreront 27 emplois.

Les quatre mesures les plus importantes du programme sont les suivantes (entre parenthèses la proportion de l'enveloppe financière totale du programme) :

- Mesure 10 (agri-environnement-climat) : 41 333 333 € (23 %)
- Mesure 04 (investissements) : 36 981 133 € (20 %)
- Mesure 13 (ICHN) : 24 852 969 € (14 %)
- Mesure 07 (services de base et rénovation de villages ruraux) : 22 754 717 € (13 %)

Annex 3: European Commission PDR Champagne-Ardenne Factsheet

Fiche d'information sur le programme de développement rural 2014-2020 de Champagne-Ardenne (France)

La Commission européenne a officiellement **adopté le programme de développement rural (PDR) de la région de Champagne-Ardenne le 30 octobre 2015**. Le programme élabore la stratégie régionale pour l'utilisation des 319,16 millions d'euros de fonds publics disponibles pour la période 2014-2020 dont 201,76 millions d'euros du budget de l'UE (1,77 % de l'enveloppe octroyée à la France) et 117,40 millions d'euros de contreparties nationales. Ces montants tiennent compte du transfert du premier pilier vers le second pilier de la politique agricole commune (PAC) de 26,59 millions d'euros provenant du budget de l'Union européenne.

L'objectif du PDR Champagne-Ardenne est de développer durablement l'économie rurale sur les plans économique, environnemental et énergétique. Le programme soutiendra environ 1 700 **projets de modernisation et de développement** touchant autant d'exploitations agricoles. Il visera également **l'installation de jeunes agriculteurs**, par la création ou la transmission de près de 1 600 exploitations. Dans l'optique d'améliorer la qualité de la ressource en eau en Champagne-Ardenne, 135 projets d'investissements seront soutenus.

Environ 14 % de la surface agricole sera concernée soit par des **mesures agro-environnementales** soit par des mesures de soutien à l'**agriculture biologique,** dont l'ambition est de doubler les surfaces engagées. Enfin, 90 opérations bénéficieront d'un accompagnement pour les entreprises ou en faveur des peuplements pour les gestionnaires forestiers (soit plus de 400 ha de **surfaces boisées**) et environ 250 000 ha de forêt sous contrat **Natura 2000**. Au moins 7 projets de création ou de révision de document d'objectif du réseau Natura 2000 seront soutenus. Des actions de **coopération** (25 projets, dont au moins 2 portés par des Groupes Opérationnels du Partenariat Européen pour l'Innovation) et de **formation** (4 800 participants) sont aussi envisagées. La coopération visera notamment le domaine technique avec le développement et le déploiement de nouveaux systèmes de production agricole.

Le développement rural est le deuxième pilier de la politique agricole commune, mettant à disposition des États membres une enveloppe financière européenne pour gérer des programmes cofinancés, au niveau national ou régional, dans le cadre d'une programmation pluriannuelle. Au total, 118 programmes sont prévus dans les 28 États membres. Le nouveau règlement de développement rural pour la période 2014-2020 identifie six priorités économiques, environnementales et sociales, parmi lesquelles les programmes établissent leurs objectifs stratégiques, les mesures mises en œuvre pour les atteindre et les résultats escomptés. En outre, afin de mieux coordonner les actions et de maximiser les synergies entre les différents fonds

L'objectif est de soutenir, *à minima*, 15 stratégies de développement local portées par des groupes d'action locale.

Les quatre mesures les plus importantes du programme sont les suivantes (entre parenthèses la proportion de l'enveloppe financière totale) :

- Mesure M04 (investissements) : 63 747 547 € (20 %)
- Mesure M10 (agri-environnement-climat) : 59 686 667 € (19 %)
- Mesure M06 (développement agricole) : 59 167 925 € (18,5 %)
- Mesure M13 (ICHN) : 41 733 333 € (13 %).

Annex 4: European Commission PDR Lorraine Factsheet

Fiche d'information sur le programme de développement rural 2014-2020 de la Lorraine (France)

La Commission européenne a officiellement adopté le Programme de développement rural (PDR) de la région Lorraine le 24 novembre 2015. Ce programme élabore la stratégie pour l'utilisation d'environ 533 millions d'euros de fonds publics disponibles pour la période 2014-2020 dont 329 millions d'euros du budget de l'UE (soit environ 3 % de l'enveloppe octroyée à la France). Ces montants tiennent compte du transfert du premier pilier de la politique agricole commune (PAC) de près de 34 millions d'euros.

Ce programme de développement rural soutiendra des **projets de modernisation et développement dans 2 100 exploitations** et vise **1 200 exploitations gérées par des jeunes agriculteurs** afin de garantir le renouvellement générationnel. Sont également envisagés des **actions de formation pour 5 000 participants, des services de conseil personnalisé pour 4 000 bénéficiaires et des opérations de coopération dans des domaines très divers (120 projets)**. Avec l'objectif de réduire l'empreinte des activités agricoles sur l'eau, le sol et la biodiversité, **le programme financera des mesures agroenvironnementales et climatiques concernant environ 147 000 hectares de surface agricole.** Afin de promouvoir une gestion efficace, multifonctionnelle et durable des forêts, **500 opérations d'infrastructures et d'équipements forestiers** seront financées. Par ailleurs, 50 500 ha seront soutenus pour le maintien et la conversion à l'agriculture biologique. La **population bénéficiant de meilleurs services et infrastructures dans les zones rurales s'élève à 1 581 455 habitants**.

Le développement rural est le deuxième pilier de la politique agricole commune (PAC), mettant à disposition des États membres une enveloppe financière européenne pour gérer des programmes cofinancés, au niveau national ou régional, dans le cadre d'une programmation pluriannuelle. Au total, 118 programmes sont prévus dans les 28 États membres. Le nouveau règlement de développement rural pour la période 2014-2020 (Règlement (UE) N°1305/2013) identifie six priorités économiques, environnementales et sociales, parmi lesquelles les programmes établissent leurs objectifs stratégiques, les mesures mises en œuvre pour les atteindre et les résultats escomptés. En outre, afin de mieux coordonner les actions et de maximiser les synergies entre les différents fonds européens structurels et d'investissement (FESI), un Accord de partenariat a été conclu avec chaque État membre pour développer la stratégie pour les investissements financés par l'UE.

En France, au cours de la période 2014-2020, la politique communautaire de développement rural sera mise en œuvre à travers 30 programmes. Le Fonds européen agricole pour le développement rural (Feader) cofinancera 22 programmes pour les régions de l'Hexagone et pour la Corse, 5 programmes pour les départements d'outre-mer, 1 programme national dédié à la gestion des risques et l'assistance technique et le

L'évolution des pratiques agricoles sera accompagnée par environ 25 projets d'investissements non productifs liés à la réalisation d'objectifs agro-environnementaux.

Afin d'améliorer la résilience et la valeur des écosystèmes forestiers, 400 opérations d'investissement seront soutenues.

Le programme soutiendra la conversion et le maintien de l'agriculture biologique de 50 500 ha.

Promouvoir l'inclusion sociale, la réduction de la pauvreté et le développement économique des zones rurales

Promouvoir l'attractivité et la compétitivité de tous les territoires est l'une des orientations stratégiques du PDR. Ces objectifs passeront par le soutien à 210 projets de développement économique basés sur la valorisation des richesses naturelles des territoires ruraux et de développement d'une gamme complète de services (emploi, santé, social, culture, sport) en milieu rural. La population qui bénéficiera des meilleurs services et infrastructures en zone rurale s'élève à environ 1,5 million d'habitants (soit 67 % du total).

Le programme inclut un total de 14 mesures dont les plus importantes sont (entre parenthèses figure la proportion de l'enveloppe financière totale) :

- Mesure 13 (ICHN) : 147 988 387 EUR (28 %)
- Mesure 04 (Investissements physiques) : 104 114 054 EUR (20 %)
- Mesure 10 (Mesure agri-environnement-climat) : 83 901 333 EUR (16 %)
- Mesure 07 (Services de base) : 54 086 812 EUR (10 %)

Annex 5: Questionnaire (original version)

La numérisation dans les communes

Questionnaire réalisé dans le cadre d'un mémoire de recherche. La protection des données est garantie au titre de la RGPD et du règlement intérieur des universités partenaires.

Note: les termes "digital" et "numérique" sont interchangeables

*Obligatoire

1. Veuillez renseigner s'il vous plait votre nom et votre fonction: *

2. Veuillez renseigner s'il vous plait la commune que vous représentez: *

3. Question 1: Votre commune a-t-elle une stratégie numérique ? (projets autours du numérique, numérisation des services publiques, ville/village intelligent)

   Une seule réponse possible.

   - ◯ Oui, à l'échelle communale
   - ◯ Oui, à l'échelle du GAL ou de l'intercommunalité
   - ◯ Non

4. Question 2: Est-ce que votre commune emploie un technicien spécialiste du numérique ?

   Une seule réponse possible.

   - ◯ Oui
   - ◯ Non

5. Question 3: Est-ce que votre commune a un budget dédié au numérique ?

   Une seule réponse possible.

   - ◯ Oui, il existe un budget dédié
   - ◯ Oui, mais le budget numérique fait partie d'un autre budget
   - ◯ Non, il n'existe pas de budget

6. Question 4: Votre commune a-t-elle mise en place l'une des initiatives suivantes:

   (plusieurs réponses sont possibles)

   Plusieurs réponses possibles.

   - ☐ Communication sur un site internet
   - ☐ Communication sur les réseaux sociaux
   - ☐ Support technique aux particuliers et aux entreprises
   - ☐ Consultation publique en ligne, vote électronique, démocratie participative
   - ☐ Initiative de transparence et de partage des données (open-data)

7. Question 5: Pensez-vous que les services publics numérisés soient suffisamment accessibles ?

   (plusieurs réponses sont possibles)

   Plusieurs réponses possibles.

   - ☐ Oui
   - ☐ Non, tous les concitoyens n'ont pas les connaissances numériques nécessaires
   - ☐ Non, tous les agents municipaux n'ont pas les compétences numériques nécessaires
   - ☐ Non, certains services publics ne sont pas accessibles à distance
   - ☐ Non, les services publics numériques sont mal-conçus

8. Question 6: Bénéficiez-vous d'un soutien financier ou logistique concernant les questions numériques ?

   (plusieurs réponses sont possibles)

   Plusieurs réponses possibles.

   - [ ] Oui, au niveau local (GAL, intercommunalité)
   - [ ] Oui, au niveau régional (département, région)
   - [ ] Oui, au niveau national
   - [ ] Non

9. Question 7: Seriez-vous prêt à investir dans la transition numérique avec un soutien financier ?

   Une seule réponse possible.

   - ( ) Oui
   - ( ) Non, ce n'est pas une priorité
   - ( ) Non, ce n'est pas le rôle de ma commune

10. Question 8: quelles sont selon vous les principales faiblesses de votre territoire ?

    (plusieurs réponses sont possibles)

    Plusieurs réponses possibles.

    - [ ] Qualité des infrastructures (ADSL, 4G, fibre)
    - [ ] Manque de compétences numériques des agents publics
    - [ ] Manque de compétences numériques dans la population
    - [ ] Accès limité aux services publics
    - [ ] Absence d'entreprises et de structures d'innovation
    - [ ] Autre : _____

11. Question 9: Identifiez-vous la numérisation comme une priorité ?

Une seule réponse possible.

	1	2	3	4	5	
Absolument pas prioritaire	◯	◯	◯	◯	◯	Parfaitement prioritaire

12. Question 10: La France et l'Union Européenne ont conçu un plan de relance pour les 10 ans à venir. La stratégie commune s'appuie sur la double transition numérique et écologique. Cette stratégie vous semble-t-elle pertinente ?

Une seule réponse possible.

	1	2	3	4	5	
Absolument pas pertinente	◯	◯	◯	◯	◯	Parfaitement pertinente

13. Question finale: Pensez-vous que les communes soient suffisamment soutenues en matière de numérisation ?

Une seule réponse possible.

- ◯ Oui
- ◯ Non

Annex 6: Municipalities participating in the questionnaire

Number	Participant	Position	Municipality	Department	Rural typology	Population
1	AGUSTI Didier	Maire	Denipaire	88	4	254
2	MINUTIELLO Bruno	Maire	Bénaménil	54	3	595
3	PORT Karim	Technicien	Saint-Avold	57	2	15767
4	DA SILVA Kelly	Secrétaire	Poivres	10	4	161
5	KRAEMER	Maire	Hatten	67	3	1935
6	CARLIER Marina	Secréatire	Saint-Jean-Aux-Bois	08	4	102
7	Gérard Benoît	Maire	Outines	51	4	131
8	DUHOUX Audrey	Maire	Viéville	52	3	349
9	MOMPER Patricia	Maire	Hundling	57	3	1365
10	RABAULT Corinne	Maire	Ferrette	68	3	825
11	MILLE Joël	Maire	Dammartin-sur-Meuse	52	4	199
12	BERNARD D.					
13	CORNEC Jacques	Maire	Bourgheim	67	2	641
14	COGNIAR Ch.	Maire	Juniville	08	3	1263
15	GODIN					
16	SUR RIEGEL Anny	Adjoint	Sand	67	2	1386
17	BOYER Jean	Maire	Montbras	55	4	22
18	PICARD	Maire	Monswiller	67	2	2069
19	COURTEAUX Joel	Adjoint	Vauchamps	51	4	377
20						
21	BACHET Michel	Maire	Vieux-Lixheim	57	3	256
22	NEUMAYER Laurence	Adjoint	Oeting	57	2	2759
23	ROTHON Anne Marie	Maire	Thélod	54	4	250
24	VILLAUME Patrick	Maire	Hurbache	88	3	332
25	FOURRIERE Denis	Maire	Mandres aux Quatres Tours	54	4	192
26	ALTAN Francis	Maire	Belval	88	3	163
27	GOTTRI Rémy	Maire	Berstheim	67	3	459
28	HASSLER Rachel	Secrétaire	Lapoutroie	68	3	1911
29						
30	CANON-BOULANGER Ludivine	Agent	Villers-Semeuse	08	2	3639
31						
32	SCHMITT Guy	Maire	Soultz-les-Bains	67	2	979
33	DEMYNCK Arnaud	Maire	Antilly	57	4	184
34	PIERSON	Maire	Greux	88	4	155
35	ROZOT Romain	Secrétaire	Void Vacon	55	3	1659
36	GUILLEMIN Danièle	Maire	Haussignemont	51	3	305
37	STAPF Christian Maire		Droupt Sainte Marie	10	4	239
38	POUGET Pascale	Secrétaire	Morelmaison	88	4	202
39	LANG Matthieu	Adjoint	Ettendorf	68	3	767
40	HECK Laura	Secrétaire	Balgau	68	3	1004
41	ROCK					
42	MULLER Richard	Maire	Landrecourt-Lempire	55	4	217
43						
44	SCHUSTER Rachel	Secrétaire	Hohengoeft	67	3	547
45	WAECKERLI Jean-Luc	Maire	Oberlarg	68	4	141
46	SCHUE Thomas	Secrétaire	Guemar	68	3	1450
47	BERGEON Jean-Marie	Maire	Villeret	10	4	65
48	BRAYETTE Nicolas	Technicien	Montmédy	55	3	2137
49						

50	KRAUSE Guillaume	Maire	Sturzelbronn	57	4	177
51	CROUZILLE	Secrétaire	Laneuvelotte	54	3	437
52	RAMPONT Kathy	Adjoint	Bourcq	08	4	52
53	COLLINET	Adjoint	Saint-Loup en Champagne	08	3	351
54	DECGANET Didier	Maire	Saint Maurice	52	4	133
55	BESSOIS Stéphane	Maire	Chambley-Bussieres	54	3	715
56	DEVEY Anne	Secrétaire	Dietwiller	68	3	1430
57	POIRSON Henri	Maire	Dieulouard	54	3	4817
58	BRUNELLA Stéphane	Technicien	Hoerdt	67	2	4565
59	MUNIERE Véronique	Maire	Ahéville	88	4	75
60	BACH					
61	GODINAT Annie					
62	CHAMPAGNE	Secrétaire	Saint Oulph	10	3	307
63	HANRION Philippe	Adjoint	Elzange	57	3	713
64	BERNARD Daniel	Maire	Beney-en-Woëvre	55	4	132
65	HUART Sonia	Maire	Villers-lés-Moivrons	54	3	144
66	VERDUN Marie-Pierre	Maire	Levoncourt	55	4	61
67	FERBACH Dominique	Maire	Oberdorf-Spachbach	67	3	392
68	SCHMALTZ Isabelle	Maire	Mothern	67	3	1976
69	MARTIN Hervé	Maire	Thimonville	57	4	154
70	ROHRBACH Eddy	Maire	Weyer	67	3	574
71	VOISIN DIT LACROIX Noel	Maire	Marson	51	4	292
72	MEUNIER Maxence	Maire	Ferreux-Quincey	10	3	420
73	DUBS Eric	Maire	Heidwiller	68	3	659
74	SEGUINIOL Alexandre	Maire	Angluzelles-et-Courcelles	51	4	143
75	SAUNOIS Christian	Maire	Han-lès-Juvigny	55	4	124
76	THERY Roland	Maire	Coupray	52	4	158
77	MARIEMBERG Jean-François	Maire	Allondrelle-la-Malmaison	54	3	656
78	MATHIAS Frédéric	Maire	Boult-aux-Bois	08	4	140
79	MATKEVICIUS Corinne	Secrétaire	Kerprich-aux-Bois	57	4	177
80	DALLA COSTA Bruno	Adjoint	Gosselming	57	3	598
81	HOCHARD Guy	Maire	Kerling-lès-Sierck	57	3	615
82	MARTINEZ Luc	Maire	Florent-en-Argonne	51	4	233
83	FABRE André	Maire	Loisy	54	3	328
84	PLANTEGENT Lionel	Maire	Apremont-la-Forêt	55	4	422
85	MARTIN	Secrétaire	Venteuil	51	3	538
86	LELUBRE David	Maire	Fravaux	10	4	38
87	LAGARDE Patrick	Maire	Cleurie	88	3	659
88	SCHUNCK Jacqueline	Maire	Ohnenheim	67	3	1085
89	THIRIAT Daniel	Maire	Mandre-sur-Vair	88	3	569
90	RHUL Daniel	Maire	L'Echelle	08	4	147
91	PRIEUR Benoir	Maire	Saint-Lumier-en-Champagne	51	4	273
92	VAUTRIN Luc	Maire	Mareilles	52	4	144
93	BERBARD Patrick	Maire	Anderny	54	4	265

94	WURTZ Jacques	Adjoint	Furdenheim	67	3	1389
95	CRETINEAU Patrice	Maire	Maisoncelles	52	4	62
96	VERMANDE André	Maire	Frolois	54	3	706
97	COULY Gérard	Maire	Saint-Maurice-sous-les-Côtes	55	3	351
98	DEMANGE Jean-Claude	Maire	Koeur-la-Grande	55	3	162
99	LAURENT Stéphane	Maire	Amance	54	3	355
100	AUTREAU Sophie	Maire	Pougy	10	3	292
101	UHLERICH Marie Odile	Maire	Neubois	67	3	688
102	WEISS Damien	Maire	Durrenbach	67	3	**1098**
103	**DUSSOUL Gil**	**Maire**	**Tincry**	**57**	**4**	**179**
104	GUILLERMET Mélanie	Secrétaire	Doncourt-les-Longuyon	54	4	297
105	LACORDE Vincent	Maire	Frémeréville-sous-les-Côtes	55	3	129
106	HORNY-GONIER Marianne	Maire	Rhinau	67	3	2701
107	ROYER Sandrine	Secrétaire	Vesigneul-sur-Marne	51	4	236
108	LERDUNG Christian	Maire	Illtal	68	3	1338
109	JAILLARD John	Maire	Val-d'Auzon	10	4	384
110	CHAMPION Philippe	Maire	Hannapes	8	3	138
111	WALDER Agnès	Secrétaire	Spechbach	68	3	1416
112	RICHARD Xavier	Maire	Doncieres	88	4	134
113	SIFFER Christine	Secrétaire	Saint-Maurice	67	3	355
114	MARGERIE Thomas	Secrétaire	Liepvre	68	3	1716
115	MONIOT	Secrétaire	Blumeray	52	4	108
116	BOUR Antoine	Maire	Fouligny	57	4	197
117	BETTINGER Patrick	Maire	Oberbronn	67	3	1581
118	RAGASSE	Secrétaire	Lenoncourt	54	3	603
119	BONNET Ghislaine	Maire	Dosnon	10	4	107
120	PERUSSAULT Véronique	Adjoint	Contrexéville	88	3	3414
121	BOYER Alain	Maire	Barbuise	10	4	479
122	LEMONNIER Francis	Maire	Chanoy	52	4	124
123	HAZOUARD Frédéric	Maire	Avon-la-Peze	10	3	194
124	PATE Delphine	Secrétaire	Saint-Quentin-le-Petit	8	4	122
125	DOUEL M	Secrétaire	Dommary-baroncourt	55	3	739
126	KOEHLER Daniel	Maire	Rossfeld	67	3	1033
127	FRANCAIS Joel	Maire	Avranville	88	4	72
128	PEULTIER	Adjoint	Oudrenne	57	3	756
129	ZINS Florence	Maire	Petit-Réderching	57	3	1479
130	L'HUILLIER Guy	Maire	Gremecey	57	4	105
131	BERNARD Didier	Maire	Marsal	57	3	263
132	BOLAY Patrick	Maire	Jouy-aux-Arches	57	2	1458
133	RONDOT Jean-Luc	Maire	Rhodes	57	4	129
134	GRIENENBERGER	Maire	Hirsingue	68	3	2172
135	GUIGNON Estelle	Adjoint	Vieux-Thann	68	2	2666
136	UNDREINER Magali	Secrétaire	Montigny-sur-Vence	08	4	260
137	NITTING Laurent	Maire	Verdenal	54	4	166
138	BOURCERET Jacques	Maire	Vesvres-sous-Chalancey	52	4	46

139	BONNIN Laura	Adjoint	Saint-Mards-en-Othe	10	3	649
140	CAQUEL Fréderic	Maire	Mollau	68	2	351
141	GEYER	Secrétaire	Zinswiller	67	3	761
142	SANCIER Jean-Claude	Maire	Frenelle-la-petite	88	4	46
143	FEGER Serge	Maire	Champenoux	54	3	1505
144	KAARSBERG	Maire	Senaide	88	4	184

Annex 7: answers to the questionnaire

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11
C	B	C	0	B	D	B	C	1	1	B
C	B	C	A B	A	D	B	E	3	3	B
A	A	A	A B E	B D	C	A	A	3	3	B
C	B	C	C	B D	B	C	A C	2	3	B
C	B	C	A B D	B C	A	B	B C	3	3	B
C	B	C	0	B D E	D	A	A C D	4	4	B
C	B	C	A D	B D	D	B	C E	2	3	B
C	B	C	B	B	D	B	C	3	4	B
B	B	C	A B C D	B	D	B	0	2	4	B
A	A	A	A B C	B C	C	A	A B C	1	3	B
C	B	C	A	A	D	A	A	5	4	B
A	B	B	A	A	D	B	C	3	2	A
A	B	B	A B C	B	C	A	C D	4	4	B
C	B	C	A B	B	D	B	C	2	2	B
C	B	C	B	B	A	B	A C E	1	2	B
C	B	C	A	B C D E	D	B	B C D	2	3	B
A	B	C	B	B C D	D	B	C D	4	5	B
A	B	B	A B	B C	D	B	C E	3	3	B
C	B	C	A B	B	D	B	B C D	4	5	B
C	B	C	B	B C D	A	B	C	3	3	B
C	B	C	A B	B C D	D	A	B C F	4	4	B
A	B	C	A B C	B	D	B	A C D	3	4	B
C	B	C	0	B	D	B	C	1	1	B
B	B	C	A	B E	D	A	A C D	4	4	B
C	B	C	0	B	D	B	C	1	1	B
B	B	C	A B	B C D	D	B	C D	4	4	B
C	B	C	A B	B C D	D	A	C D E F	3	2	B
A	A	B	A B C D	A	D	A	0	5	3	A
C	B	C	A	B	D	B	A	3	3	B
B	B	C	A B E	B D	D	A	F	3	3	B
C	B	C	A B	B	D	A	C	5	4	A
A	B	C	ABD	BE	A	A	ABD	5	4	B
A	B	C	ABD	BCD	D	B	A	3	3	B
A	B	C	ABD	B	D	B	C	2	1	B
A	B	B	CD	BD	A	B	CE	3	1	B
C	B	C	A	B	D	B	C	3	2	B
A	B	C	AB	BCD	D	A	AE	3	3	B
C	B	C	AB	BD	C	B	C	3	3	B
A	B	B	AB	B	B	B	ACDE	3	2	A
C	B	C	0	BCD	D	B	C	1	3	B
B	B	B	AB	B	A	A	BC	2	3	A
C	B	C	A	BE	D	A	F	3	3	B
C	B	C	AB	BE	D	B	BC	1	2	B
C	B	C	A	BCD	E	B	BC	2	3	B
C	B	C	0	B	D	B	BCF	5	5	B
A	A	B	AB	BCE	B	A	ABCE	4	4	B
C	B	C	AB	BD	B	C	BCD	4	2	B
A	B	C	AB	BD	D	A	ACDF	3	3	B
A	B	C	A	B	D	B	BC	3	3	B

C	B	C	B	BCE	A	C	ABCE	3	3	B
C	B	B	C	BCDE	D	A	BC	5	4	B
A	B	A	0	BE	D	C	B	3	3	B
C	B	C	AB	C	D	B	BC	3	3	B
C	B	C	AB	BD	A	B	AC	3	3	B
A	B	B	ABC	BD	B	A	CD	4	4	B
A	B	B	AB	B	D	A	C	3	3	B
C	B	C	0	C	D	C	AE	3	3	B
A	B	B	ABD	A	D	B	ABCE	4	4	B
C	B	C	A	BC	D	C	BCD	2	3	B
A	B	C	B	B	AB	A	EF	3	4	B
C	B	C	AB	B	ABC	B	CE	3	4	A
C	B	B	A	A	A	A	C	5	5	A
C	B	C	AB	B	D	B	CDE	4	4	B
A	B	C	AB	A	D	C	BC	4	4	B
C	B	C	B	A	A	B	F	1	1	A
A	B	C	AB	B	D	B	C	3	4	B
C	B	C	BD	BD	D	B	D	4	3	A
C	B	C	A	B	D	B	C	3	3	B
C	B	C	A	BC	D	B	CEF	4	4	B
C	B	C	0	BC	D	B	ABCE	3	3	B
B	B	C	0	B	AB	A	CE	3	4	B
C	B	C	A	B	AB	B	ACD	1	1	A
C	B	C	0	BC	D	B	C	1	3	B
C	B	C	D	B	D	C	ACD	4	4	B
A	B	B	AC	B	D	A	E	3	3	B
C	B	C	0	D	D	A	B	3	3	B
C	B	C	0	BC	A	B	BCD	3	3	B
C	B	C	AB	BC	D	B	BC	3	3	B
A	B	A	AB	B	D	C	CF	3	3	B
C	B	C	0	B	D	B	ABCE	1	1	B
0	A	C	A	B	D	0	0	2	0	B
C	B	C	0	B	D	A	BC	3	3	B
C	B	C	AB	BC	D	B	CE	3	4	B
A	B	B	A	B	D	A	C	4	4	B
C	B	C	A	BC	D	A	CDE	3	4	B
C	B	B	AB	BCD	C	B	BC	3	3	B
C	B	C	A	BCE	D	A	BC	5	5	B
C	B	C	0	BC	D	B	F	1	1	B
A	B	C	B	BC	D	A	ACD	4	3	B
C	B	C	0	BC	D	C	BC	1	1	B
C	B	C	ABD	BD	D	B	BC	4	4	B
A	B	B	AB	A	D	B	0	4	3	B
C	B	C	0	BE	D	C	ADE	1	3	B
B	B	C	ABC	B	A	B	C	4	4	B
C	B	B	ACD	D	D	A	DF	3	3	B
A	B	C	B	BC	D	B	AC	3	3	B
A	B	C	A	BC	D	A	BC	3	3	B

B	B	C	BC	B	D	C	C	4	5	B
C	B	C	AB	BCDE	D	B	BCD	3	4	B
A	B	C	AB	B	D	B	C	3	4	B
C	**B**	**C**	**A**	**C**	**D**	**B**	**BC**	**3**	**3**	**B**
C	B	B	C	BD	D	C	D	1	2	B
A	B	C	AC	B	D	A	BC	4	5	A
C	B	C	AB	BE	D	B	A	3	3	B
C	B	C	AB	B	D	C	E	3	3	B
C	B	C	A	BC	D	A	BCF	5	2	B
B	B	B	AB	BCD	D	A	C	5	3	B
C	B	C	0	BC	D	C	F	1	1	B
C	B	C	AB	B	D	A	C	2	3	B
C	B	C	0	BC	A	B	BCE	2	2	B
C	B	C	AC	A	D	0	BCE	4	3	B
A	B	C	AB	B	A	0	C	3	2	B
A	B	C	B	B	D	B	CD	3	0	A
C	B	C	A	BD	D	C	CD	1	1	B
B	C	C	AB	B	A	B	C	4	4	B
C	B	C	B	C	D	C	ABCD	4	0	B
C	B	C	0	B	D	B	C	4	5	B
A	A	B	ABC	BC	D	A	ABCD	4	4	B
C	B	B	AB	B	D	A	BC	3	3	B
A	B	B	A	BDE	D	A	CD	4	2	B
C	B	C	B	B	D	B	AC	2	3	B
C	B	C	AE	BD	D	B	F	2	1	0
C	B	C	AB	C	D	B	A	4	4	A
A	B	C	AB	B	D	A	C	4	4	B
C	B	C	0	E	D	C	A	2	3	B
A	B	C	A	BE	D	B	C	3	3	B
B	B	B	AB	BC	A	A	C	5	5	B
C	B	C	0	BE	A	B	AC	3	2	B
C	B	C	B	BCE	D	A	ABCD	4	4	B
C	B	C	AB	BC	D	A	BC	3	4	0
C	B	C	AC	BE	D	C	C	4	1	B
A	B	B	AB	BE	B	A	CE	3	4	B
A	B	B	AB	BDE	D	B	CDE	2	2	B
C	B	C	D	BC	D	A	BCF	3	3	B
B	B	C	0	B	B	B	C	3	4	B
C	B	C	0	B	D	C	ACD	1	1	B
C	B	C	AB	BD	D	B	C	3	4	B
C	B	C	AB	B	D	B	A	3	3	B
A	B	C	AB	A	D	B	ABC	4	3	B
C	B	C	D	B	D	C	AB	3	4	B
B	B	B	AB	AB	D	A	C	4	3	B
C	B	C	D	A	D	0	BCDE	41	A	B

Annex 8: questionnaire full sample

Commune	URL	Department	Population	Typology
Adaincourt		MOSELLE	126	4
Alincourt		ARDENNES	160	4
Armaucourt		MEURTHE-ET-MOSELLE	232	4
Arriance	http://www.arriance.fr	MOSELLE	218	4
Arsonval		AUBE	311	3
Aubrives	http://www.aubrives.fr	ARDENNES	1002	3
Autruche		ARDENNES	61	4
Auxon	http://www.auxon.fr	AUBE	1033	3
Avillers		VOSGES	83	4
Bagneux-la-Fosse		AUBE	175	4
Barbey-Seroux		VOSGES	151	4
Bassing		MOSELLE	117	4
Batilly	http://www.communedebatilly.fr	MEURTHE-ET-MOSELLE	1293	3
Bayonville		ARDENNES	87	4
Bazeilles-sur-Othain		MEUSE	118	4
Belmont		HAUTE-MARNE	60	4
Bergères		AUBE	122	4
Berstheim	http://www.berstheim.fr	BAS-RHIN	459	3
Berthelming		MOSELLE	522	3
Bischoffsheim	http://www.mairie-bischoffsheim.fr	BAS-RHIN	3387	2
Blainville-sur-l'Eau	http://www.blainvillesurleau.fr	MEURTHE-ET-MOSELLE	4019	2
Blâmont	http://www.blamont.fr	MEURTHE-ET-MOSELLE	1075	3
Bocquegney		VOSGES	140	4
Bossus-lès-Rumigny		ARDENNES	98	4
Boureuilles		MEUSE	119	4
Bourg-Fidèle	http://www.mairiebourgfidele.fr	ARDENNES	868	3
Bourguignons		AUBE	278	3
Bourmont-entre-Meuse-et-Mouzon	http://www.goncourt.e-monsite.com	HAUTE-MARNE	815	3
Bouvellemont		ARDENNES	129	4
Bouxwiller	http://www.bouxwiller.eu	BAS-RHIN	3834	3
Braux-Sainte-Cohière		MARNE	99	4
Breitenbach	http://www.breitenbach.fr	BAS-RHIN	667	3
Brévonnes	http://www.vivre-a-brevonnes.fr	AUBE	685	3
Brienne-le-Château	http://www.ville-brienne-le-chateau.fr	AUBE	2798	3
Brinckheim		HAUT-RHIN	425	3
Brugny-Vaudancourt	http://brugny-vaudancourt.fr	MARNE	459	3
Buethwiller	http://www.buethwiller.fr	HAUT-RHIN	284	3
Buxières-les-Villiers		HAUTE-MARNE	217	4
Buxières-sous-les-Côtes	http://www.buxieres-sous-les-cotes.fr	MEUSE	293	4
Carignan	http://www.carignan-ardennes.fr	ARDENNES	2923	3
Ceintrey	http://www.ceintrey.fr	MEURTHE-ET-MOSELLE	945	3
Champaubert-la-Bataille		MARNE	124	4
Champigneulle	http://www.champigneulle-en-argonne.fr	ARDENNES	56	4
Champigny-sur-Aube		AUBE	112	4
Channes		AUBE	131	4
Chanoy		HAUTE-MARNE	124	4

Charency-Vezin		MEURTHE-ET-MOSELLE	610	3
Chatel-sur-Moselle	http://www.chatel-sur-moselle.fr	VOSGES	1758	3
Chatenay-Mâcheron		HAUTE-MARNE	101	4
Châtenois	http://www.mairie-chatenois.fr	BAS-RHIN	4287	2
Chavanges		AUBE	600	3
Chervey		AUBE	165	4
Choilley-Dardenay		HAUTE-MARNE	163	4
Cirfontaines-en-Azois		HAUTE-MARNE	190	4
Clérey-sur-Brénon		MEURTHE-ET-MOSELLE	65	4
Clesles	http://www.mairiedeclesles.fr	MARNE	622	3
Colmen		MOSELLE	204	3
Connantray-Vaurefroy		MARNE	151	4
Courcelles		MEURTHE-ET-MOSELLE	96	4
Courcelles-sur-Nied	https://www.courcellessurnied.com	MOSELLE	1183	3
Courjeonnet		MARNE	47	4
Courtémont		MARNE	61	4
Courteranges	http://www.mairie-courteranges.fr	AUBE	570	3
Creney-près-Troyes	http://creney.fr	AUBE	2016	2
Crépey	http://www.crepey.mairie54.fr	MEURTHE-ET-MOSELLE	398	4
Deuxville	http://www.deuxville.mairie.com	MEURTHE-ET-MOSELLE	417	3
Diemeringen	https://www.diemeringen.fr/	BAS-RHIN	1631	3
Dolancourt		AUBE	137	4
Dolancourt		AUBE	137	4
Dolcourt		MEURTHE-ET-MOSELLE	135	4
Dombasle-sur-Meurthe	http://www.ville-dombasle.fr	MEURTHE-ET-MOSELLE	9857	2
Donnenheim	http://www.donnenheim.fr	BAS-RHIN	353	3
Doulevant-le-Petit		HAUTE-MARNE	22	3
Effincourt		HAUTE-MARNE	64	4
Entrange	https://entrange.fr/	MOSELLE	1279	3
Erching		MOSELLE	431	3
Escherange	https://www.escherange.fr	MOSELLE	701	3
Flastroff		MOSELLE	328	4
Flize	https://www.flize.fr/	ARDENNES	1774	3
Fontaine-en-Dormois		MARNE	13	4
Fontaine-Mâcon		AUBE	635	3
Fraillicourt		ARDENNES	191	4
Franconville		MEURTHE-ET-MOSELLE	71	4
Fronville		HAUTE-MARNE	311	3
Génicourt-sur-Meuse		MEUSE	298	4
Gesnes-en-Argonne		MEUSE	62	4
Givet	http://www.givet.fr	ARDENNES	6624	2

Godoncourt		VOSGES	119	4
Goerlingen		BAS-RHIN	215	4
Gougenheim	http://www.gougenheim.fr	BAS-RHIN	557	3
Guerstling	http://www.guerstling.fr	MOSELLE	404	3
Gugnécourt		VOSGES	272	4
Hagécourt	https://sites.google.com/site/hagecourt88	VOSGES	129	3
Hagenthal-le-Haut	http://www.agglo-saint-louis.fr	HAUT-RHIN	725	2
Haraucourt		ARDENNES	725	3
Hauteville		MARNE	245	4
Hériménil	http://www.herimenil.fr	MEURTHE-ET-MOSELLE	973	2
Herrlisheim	http://www.herrlisheim.fr	BAS-RHIN	4804	2
Hestroff		MOSELLE	472	3
Heudicourt-sous-les-Côtes		MEUSE	167	4
Hilbesheim		MOSELLE	639	3
Hinsingen		BAS-RHIN	83	4
Hochfelden	http://www.schaffhouse-zorn.com	BAS-RHIN	4086	2
Houdilcourt		ARDENNES	138	4
Husseren-les-Châteaux		HAUT-RHIN	527	2
Jainvillotte		VOSGES	79	4
Jezainville	http://www.jezainville.mairie54.fr	MEURTHE-ET-MOSELLE	1004	2
Jully-sur-Sarce		AUBE	233	4
Koeur-la-Grande		MEUSE	162	3
La Chapelle-aux-Bois		VOSGES	680	3
La Chapelle-Lasson		MARNE	89	4
La Grande-Fosse	http://www.lagrandefosse.fr	VOSGES	135	4
La Petite-Pierre	http://www.la-petite-pierre.com	BAS-RHIN	628	3
La Rothière		AUBE	115	4
La Saulsotte	http://www.lasaulsotte.fr	AUBE	698	3
Lagney	http://www.lagney.commune54.fr	MEURTHE-ET-MOSELLE	503	3
Lamancine		HAUTE-MARNE	126	4
Lametz		ARDENNES	75	4
Langensoultzbach		BAS-RHIN	931	3
Langley		VOSGES	156	3
Larzicourt		MARNE	278	4
Launstroff		MOSELLE	271	4
Lauw	http://village-lauw.fr	HAUT-RHIN	932	3
Le Beulay		VOSGES	98	3
Le Mont		VOSGES	51	3
Lenoncourt	http://www.lenoncourt.mairie54.fr	MEURTHE-ET-MOSELLE	603	3
Lentilles		AUBE	128	4
Les Forges	http://www.mairielesforges.fr	VOSGES	1902	3
Les Hauts-de-Chée		MEUSE	727	4
Liffol-le-Petit		HAUTE-MARNE	323	4
Linthes	https://linthes.fr	MARNE	114	4
Livry-Louvercy	http://www.livrylouvercy.fr	MARNE	1105	3

Longpré-le-Sec		AUBE	95	4
Lostroff		MOSELLE	68	4
Loupershouse	http://www.loupershouse.fr	MOSELLE	927	3
Louvières		HAUTE-MARNE	94	4
Lupcourt	http://www.lupcourt.mairie54.fr	MEURTHE-ET-MOSELLE	437	3
Luttange		MOSELLE	904	3
Madecourt		VOSGES	51	4
Magny		HAUT-RHIN	305	3
Mailly-sur-Seille		MEURTHE-ET-MOSELLE	262	4
Maisons-lès-Chaource		AUBE	165	4
Manspach	http://manspach.fr	HAUT-RHIN	545	3
Marlemont		ARDENNES	135	4
Martigny-les-Gerbonvaux		VOSGES	107	4
Matignicourt-Goncourt		MARNE	156	4
Mécrin		MEUSE	225	4
Menaucourt	http://www.menaucourt.fr	MEUSE	243	3
Merten	http://www.ville-merten.fr	MOSELLE	1507	3
Mesnil-la-Comtesse		AUBE	47	4
Métairies-Saint-Quirin		MOSELLE	281	3
Metz-Robert		AUBE	64	3
Millery	http://www.millery.com	MEURTHE-ET-MOSELLE	624	3
Moiremont		MARNE	203	4
Mondigny		ARDENNES	189	4
Mont-Saint-Martin		ARDENNES	87	4
Mont-sur-Meurthe	http://www.mont-sur-meurthe.fr	MEURTHE-ET-MOSELLE	1128	3
Morangis		MARNE	415	3
Morhange	https://www.morhange.fr/	MOSELLE	3492	3
Mouacourt		MEURTHE-ET-MOSELLE	76	4
Nantois		MEUSE	90	3
Natzwiller	https://wwwnatziller.com	BAS-RHIN	539	3
Niederbronn-les-Bains	http://www.niederbronn-les-bains.fr	BAS-RHIN	4449	3
Niederschaeffolsheim	https://www.niederschaeffolsheim.fr/	BAS-RHIN	1393	3
Nonville		VOSGES	197	4
Oberdorf-Spachbach	http://www.oberdorf-spachbach.fr	BAS-RHIN	392	3
Ognes		MARNE	62	4
Ognéville		MEURTHE-ET-MOSELLE	99	4
Olizy-Primat		ARDENNES	246	4
Oron		MOSELLE	102	4
Ottwiller		BAS-RHIN	265	3
Pargues		AUBE	141	4
Pauvres		ARDENNES	191	4
Péas		MARNE	69	4
Pel-et-Der		AUBE	132	4

Piney	http://www.piney.fr	AUBE	1499	3
Pougy		AUBE	292	3
Rangen		BAS-RHIN	188	3
Raville		MOSELLE	258	4
Rebeuville		VOSGES	285	4
Reichsfeld	http://www.reichsfeld.fr	BAS-RHIN	307	4
Reinhardsmunster	http://www.reinhardsmunster.com	BAS-RHIN	454	3
Remilly-Aillicourt		ARDENNES	799	3
Rigny-le-Ferron		AUBE	332	4
Rittershoffen	https://rittershoffen.fr/	BAS-RHIN	924	3
Rocquigny		ARDENNES	693	4
Roizy		ARDENNES	223	3
Romelfing	http://www.romelfing.info	MOSELLE	350	3
Romont		VOSGES	383	3
Rouvres-la-Chétive		VOSGES	456	3
Rouvres-les-Vignes		AUBE	111	4
Ruppes		VOSGES	144	4
Rupt		HAUTE-MARNE	353	3
Saales	http://www.saales.fr	BAS-RHIN	840	4
Saint-Avold	http://www.mairie-saint-avold.fr	MOSELLE	15767	2
Saint-Baslemont		VOSGES	79	4
Saint-Blin		HAUTE-MARNE	362	3
Saint-Christophe-Dodinicourt		AUBE	34	4
Saint-Etienne-au-Temple	http://www.saintetienneautemple.fr	MARNE	832	3
Saint-Germain-la-Ville	http://www.mairie-saint-germain-la-ville.fr	MARNE	694	3
Saint-Germainmont		ARDENNES	833	3
Saint-Lupien		AUBE	235	4
Saint-Martin-aux-Champs		MARNE	114	4
Saint-Paul		VOSGES	168	4
Saint-Pierre-sur-Vence		ARDENNES	140	3
Saint-Remy	http://www.saintremy.mairie.com	VOSGES	530	3
Saint-Rémy-le-Petit		ARDENNES	50	3
Sandaucourt		VOSGES	172	4
Sanry-sur-Nied	http://www.sanrysurnied.fr	MOSELLE	328	3
Sarcey		HAUTE-MARNE	114	4
Sarraltroff	http://www.sarraltroff.fr	MOSELLE	783	3
Sauville		VOSGES	185	4
Senonges		VOSGES	132	4
Senuc		ARDENNES	163	4
Siersthal	http://www.siersthal.fr	MOSELLE	654	3
Sommerécourt		HAUTE-MARNE	84	4
Stosswihr	https://stosswihr68.fr/fr/	HAUT-RHIN	1383	2
Stotzheim	https://www.paysdebarr.frfrles-communes/stotzheim	BAS-RHIN	1103	3
Suzannecourt	http://www.suzannecourt.fr	HAUTE-MARNE	375	3
Sy		ARDENNES	54	4
Tailly		ARDENNES	180	4

Talus-Saint-Prix		MARNE	108	4
Thann	http://www.ville-thann.fr	HAUT-RHIN	7915	2
They-sous-Montfort	http://www.theysousmontfort.fr	VOSGES	134	4
Thiaucourt-Regniéville	http://www.thiaucourtregnieville.mairie.com	MEURTHE-ET-MOSELLE	1120	3
This	http://www.mairie-this.com	ARDENNES	234	3
Thuillières		VOSGES	121	4
Torcy-le-Petit		AUBE	85	4
Tours-sur-Marne	http://www.tours-sur-marne.com	MARNE	1397	3
Tronville		MEURTHE-ET-MOSELLE	202	4
Troyon		MEUSE	245	4
Valleret		HAUTE-MARNE	65	4
Vanlay		AUBE	299	4
Vatry		MARNE	157	4
Vauxbons		HAUTE-MARNE	56	4
Velaines		MEUSE	969	3
Verrières		ARDENNES	33	4
Véry		MEUSE	90	4
Vicherey	https://www.vicherey.fr	VOSGES	211	4
Villegusien-le-Lac	http://www.mairie-villegusienlelac.com	HAUTE-MARNE	1001	4
Villers-les-Mangiennes		MEUSE	84	4
Villers-lès-Moivrons	http://villers-les-moivrons.e-monsite.com/	MEURTHE-ET-MOSELLE	144	3
Villiers-sous-Praslin		AUBE	72	4
Vrécourt		VOSGES	355	3
Waldweistroff		MOSELLE	506	3
Wargemoulin-Hurlus		MARNE	48	4
Wegscheid		HAUT-RHIN	325	3
Willerwald	http://www.willerwald.fr	MOSELLE	1584	3
Williers		ARDENNES	44	4
Wiseppe		MEUSE	92	4
Woustviller	http://www.woustviller.fr	MOSELLE	3037	3
Zarbeling		MOSELLE	64	4
Zincourt		VOSGES	81	4

Annex 9: studied sample and results

Commune	1	2	3	4	5	6	7	8	9	10	11	12	NOTE
Arriance	1	1	0	0	0	0	0	1	0	0	0	0	3
Aubrives	0	0	0	0	0	0	0	0	0	0	0	0	0
Auxon	1	1	1	0	0	1	0	1	1	0	0	0	6
Batilly	1	1	1	0	0	0	0	1	0	0	0	0	4
Berstheim	1	1	0	0	0	0	0	1	0	0	0	1	4
Bischoffsheim	1	1	1	0	1	1	1	1	0	1	0	0	8
Blainville-sur-l'Eau	1	1	1	0	1	0	0	0	0	1			5
Blâmont	1	1	0	1	0	1	0	1	0	0	0	0	5
Bourg-Fidèle	1	1	0	0	0	0	0	0	0	0	0	0	2
Bourmont-entre-Meuse-et-Mouzon	1	1	1	1	0	0	0	1	0	0	0	0	5
Bouxwiller	1	1	1	1	1	1	1	0	0	0	1	0	8
Breitenbach	1	1	1	0	1	1	0	1	0	0	0	0	6
Brévonnes	1	0	1	0	0	0	0	1	0	0	0	0	3
Brienne-le-Château	1	1	1	0	1	1	1	1	0	1	0	0	8
Brugny-Vaudancourt	0	0	0	0	0	0	0	0	0	0	0	0	0
Buethwiller	1	0	0	0	0	0	0	0	0	0	0	0	1
Buxières-sous-les-Côtes	1	1	0	0	0	0	0	0	0	1	0	0	3
Carignan	1	1	1	1	1	1	0	1	1	0	0	0	8
Ceintrey	1	1	1	1	0	0	0	0	0	0	0	1	5
Champigneulle	1	0	0	0	0	0	0	0	0	0	0	0	1
Chatel-sur-Moselle	1	1	1	0	0	1	0	1	0	1	0	0	6
Châtenois	1	1	1	0	0	1	0	1	0	0	0	0	5
Clesles	1	0	0	0	0	1	0	0	0	1	0	1	4
Courcelles-sur-Nied	1	1	1	0	0	1	0	0	0	1	0	1	6
Courteranges	1	1	1	0	1	1	0	0	0	1	0	0	6
Creney-près-Troyes	1	1	1	1	0	1	1	1	0	1	0	0	8
Crépey	1	1	0	1	0	1	0	1	0	1	0	0	6
Deuxville	1	1	0	0	0	0	0	1	0	1	0	0	4
Diemeringen	1	1	1	1	0	1	0	1	1	1	0	0	8
Dombasle-sur-Meurthe	1	1	1	1	1	1	1	1	1	1	0	0	10
Donnenheim	1	1	1	1	1	1		1	0	1	0	1	9
Entrange	1	1	1	0	0	0	0	0	0	1	0	1	5
Escherange	1	1	0	0	1	1	0	0	1	1	0	1	7
Flize	1	1	0	0	0	0	0	0	0	0	0	0	2
Givet	1	1	1	1	0	0	0	1	0	0	0	0	5
Gougenheim	1	1	1	1	1	1	0	0	0	1	1	0	8
Guerstling	1	1	0	0	0	0	0	1	0	0	0	0	3
Hagécourt	1	1	1	0	0	0	0	0	0	0	1	1	5
Hagenthal-le-Haut	1												1
Hériménil	1	1	1	0	0	0	0	1	0	0	0	0	4
Herrlisheim	1	1	1	1	1	1	0	1	1	1	0	0	9
Hochfelden	1	1	1	1	0	0	0	1	0	0	0	0	5
Jezainville	1	1	0	1	1	0	0	1	0	1	0	0	6
La Grande-Fosse	1	1	0	0	0	1	0	0	1	1	0	0	5
La Petite-Pierre	1	1	1	0	0	0	0	1	0	1	0	0	5
La Saulsotte	1	1	0	0	0	0	0	0	0	1	0	0	3

Lagney	1	1	1	1	0	1	0	1	0	1	0	0	7
Lauw	1	0	1	0	0	0	0	0	0	0	0	0	2
Lenoncourt	0	0	0	0	0	0	0	0	0	0	0	0	0
Les Forges	1	1	1	0	0	1	0	1	0	1	0	1	7
Linthes	1	1	0	0	0	0	0	0	0	1	0	0	3
Livry-Louvercy	1	1	1	1	0	0	0	1	0	1	0	0	6
Loupershouse	1	1	1	0	0	0	0	0	0	1	0	0	4
Lupcourt	1	1	0	1	0	0	0	1	0	0	0	0	4
Manspach	1	1	1	0	0	0	0	1	0	0	0	0	4
Menaucourt	1	0	0	0	0	0	0	1	0	0	0	0	2
Merten	1	1	1	0	0	1	0	1	0	1	0	1	7
Millery	1	1	1	1	1	0	0	0	0	1	0	0	6
Mont-sur-Meurthe	1	1	1	1	0	0	0	1	0	0	0	1	6
Morhange	1	1	1	1	0	1	0	1	0	0	0	0	6
Natzwiller	1	1	1	0	1	0	1	0	0	1	0	0	6
Niederbronn-les-Bains	1	1	1	1	1	1	1	1	0	1	0	0	9
Niederschaeffolsheim	1	1	1	0	0	1	0	0	0	1	0	0	5
Oberdorf-Spachbach	0	0	0	0	0	0	0	0	0	0	0	0	0
Piney	1	1	1	0	0	0	0	0	1	0	0	0	4
Reichsfeld	1	0	0	0	0	0	0	0	0	0	0	0	1
Reinhardsmunster	1	1	0	0	0	0	0	1	0	1	0	0	4
Rittershoffen	1	1	1	1	0	1	0	1	0	1	0	0	7
Romelfing	0	0	0	0	0	0	0	0	0	0	0	0	0
Saales	1	1	1	0	0	0	0	1	0	0	0	0	4
Saint-Avold	1	1	1	1	1	1	0	1	1	1	1	0	10
Saint-Etienne-au-Temple	1	1	1	0	1	1	1	1	0	0	0	0	7
Saint-Germain-la-Ville	1	1	0	0	0	0	0	1	0	1	0	1	5
Saint-Remy	0	0	0	0	0	0	0	0	0	0	0	0	0
Sanry-sur-Nied	1	0	1	0	0	1	0	0	0	0	0	0	3
Sarraltroff	1	1	1	0	0	0	0	1	0	0	0	0	4
Siersthal	1	1	0	0	0	0	0	0	0	0	0	1	3
Stosswihr	1	1	1	0	0	0	0	0	0	0	0	0	3
Stotzheim	1	0	0	0	0	0	0	0	0	0	0	0	1
Suzannecourt	1	1	1	0	0	1	0	1	0	1	0	0	6
Thann	1	1	1	1	1	0	0	0	0	1	0	1	7
They-sous-Montfort	1	1	1	0	0	0	0	1	0	0	0	0	4
Thiaucourt-Regniéville	1	1	1	1	0	0	0	1		0	0	1	6
This	0	0	0	0	0	0	0	0	0	0	0	0	0
Tours-sur-Marne	1	1	1	0	0	0	0	0	0	1	0	0	4
Vicherey	1	1	0	1	0	0	0	1	0	1	0	0	5
Villegusien-le-Lac													0
Villers-lès-Moivrons	1	1	1										3
Willerwald	1	1	1	1	1	1	0	1	1	1	0	0	9
Woustviller	1	1	1	1	0	1	0	1	0	1	0	0	7