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OpenELS | European Location Services

Final Report

The Socio Economic Impact of Open ELS

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Summary

If in the past centuries "everything had to do with geography[1]" today everything has to do with geo-spatial data. "With location becoming all-pervasive in our everyday life, we are witnessing an exponential growth in the amount of spatial data being generated and captured[2]". Geo-spatial information constitutes the basis for the development of Data Economy. With this explosion of the geo-spatial industry, many new players and data providers (e.g. Google, OpenStreetMap) have entered the market but National Mapping and Cadastral Agencies (NMCAs) still retain a very important role as sole providers of "*authoritative*" geo-spatial information[3]. *Authoritative information can be defined in this context as data which are validated by governments and public authorities and are, in such respect, coming from an official source.* At the European level, the potential economic and social benefits linked to the use of authoritative geo-spatial data is not fully exploited yet. This also due to fragmented data provision which cannot satisfy the needs and demand for cross-border and interoperable data[4]. In fact, different NMCAs would provide authoritative data in different ways, through different licensing schemes and at different costs. Furthermore, not all NMCAs would provide the same data in the same format. This led EuroGeographics to partner with NCMAs and to start a number of projects (the European Location Framework project first and then Open ELS) aimed at developing pan-European data services using authoritative geo-spatial information and an associated business model[5].

This paper aims at assessing what could be the **socio-economic benefits** of the Open ELS project for the European Union. Building the analysis of the current situation and on the identified needs in terms of broader access and use of authoritative geo-spatial information, this study identified a number of domains and players which should be the most affected by Open ELS and namely:

- The EU market for geo-spatial services;
- The use of authoritative geo-spatial information amongst businesses and especially Small and Medium Enterprises (SMEs);
- The establishment of cross-border products, services and applications;
- The creation of jobs; and
- The establishment of policies at different governance levels.

Bearing these key stakeholders and domains in mind, this study attempts to provide a preliminary answer to the question of **what will be the benefits and effects of the project on the overall geo-spatial market at the European level**. Through a combination of desk research, interviews and a survey targeting SMEs, this paper highlights and illustrates the possible benefits of Open ELS while also suggesting how these should be further measured in the future. In fact, as emerged from the analysis, a full quantification of the

[1] Judy Martz at the ESRI's Senior Executive Seminar in San Diego, 2004, https://www.directionsmag.com/article/3448
[2] Shimonti Paul, "What is Geo-spatial Industry's value and impact in world economy?", Geo-spatial world, 2018, https://www.geo-spatialworld.net/blogs/geo-spatial-industrys-value-world-economy/
[3] See for instance Joep Crompvoets and Bruno Broucker, "Geo-spatial Information broker, a new role of National Mapping Agencies", Geo Information, N. 4, 2015, https://www.researchgate.net/publication/280035457_GEO-SPATIAL_INFORMATION_BROKER_A_NEW_ROLE_OF_NATIONAL_MAPPING_AGENCIES
[4] Asedie Infomediary Sector report 2018: http://www.asedie.es/assets/asedie-sector-infomediary-report-2018.pdf
[5] https://openels.eu/about/

benefits and impact of Open ELS is not entirely possible today. This is due to a) the stage of development of the project but also b) the lack of reliable data for building a baseline scenario. However, this difficulty in quantifying the benefits of Open ELS does not entail that such benefits do not exist and cannot already be apprehended today. On the contrary, this study has identified a number of expected positive effects both in terms of Open ELS' economic and social impact.

In terms of **economic benefits**, multiple studies have proven the strong link between increase in the availability of (authoritative) geo-spatial information and increase in the value of the market and number of business users. According to the most optimistic scenarios, when data becomes more easily available (e.g. through Open ELS), demand increases in between 1.000% and 10.000%[6] and businesses using geo-spatial information grow up to 10- 15% faster [7]. Furthermore, Open ELS will benefit SMEs in particular. As shown in this and other studies, SMEs in Europe have an appetite for authoritative geo-spatial information but they are, at the same time, those suffering the most from the barriers linked to data accessibility, costs and lack of resources from dealing with multiple NCMAs. It was found that, by establishing one single point of access to information and by reducing other types of barriers, Open ELS will strongly support SMEs operating in the data economy and will hence multiply the number of SMEs using geo-spatial data. Furthermore, Open ELS can help SMEs to scale up at the European level much faster and more efficiently as highlighted by the SMEs stories collected for this report. Finally, although there is limited data on this aspect, this study shows how Open ELS can strengthen the emergence of more cross-border services and products, which is one of the objectives of the European Commission in the context of the Digital Single Market (DSM).

In terms of **social benefits**, this study shows that Open ELS will have a positive effects both on job creation, in line with the strong literature linking more data availability to the establishment of high quality jobs, and on the quality of policy making, which will also lead to broader economic benefits. Indeed, policy makers at the European, national and regional levels have a strong need for geo-spatial data which should be interoperable cross-border and provided through a unique access point. The case studies examined in the context of this report are only a few examples of how Open ELS could make policy makers' life easier and, by consequence, policy making and society better.

To conclude, **Open ELS has a huge potential in terms of socio economic benefits.** Due to the importance of geo-spatial information in the context of the Data Economy, it can help accelerating the digital transformation of Europe by enabling stakeholders (public and private) to rely on authoritative information compatible across-borders. This will lead to more cross-border services and products, more companies scaling up at the EU level, a more integrated Digital Single Market and better policies and lives for citizens. In this respect, **Open ELS should be understood as complementary to many of the policies and projects launched by the European Commission in support to the Data Economy**, such as the Data Sharing Support Centre[8] and the Communication on Building A European Data Economy[9].

[6] See: Study on the Pricing of Public Sector Information – POPSI Study, October 2011, Deloitte, https://ec.europa.eu/digital-single-market/en/news/pricing-public-sector-information-study-popsis-models-supply-and-charging-public-sector

[7] See : « Does Marginal Cost Pricing of Public Sector Information Spur Firms Growth ? », Heli Koski, The Research Institute of the Finnish Economy, 2011, https://www.etla.fi/wp-content/uploads/2012/09/dp1260.pdf

[8] https://ec.europa.eu/digital-single-market/en/news/open-call-tenders-setting-support-centre-data-sharing

[9] https://ec.europa.eu/digital-single-market/en/policies/building-european-data-economy

1 Introduction

1.1. Purpose and structure of the document

This document constitutes the Final Report of the study on the "Socio Economic Impact of Open ELS", carried out by Deloitte on the behalf of EuroGeographics and in the framework of Activity 1 – Governance of the Open ELS project. The study provides an assessment of the benefits and impacts of Open ELS project from the economic, social and policy perspectives.

This final report is structured as follows:

- *Chapter 1* provides a short introduction to the assignment and describes the methodological tools and steps adopted for its completion as well as the limitations of the analysis.
- *Chapter 2* explains the context of the assignment and illustrates the needs and barriers for the use of authoritative geo-spatial information in the European Union (EU) which led to the establishment of the Open ELS project.
- *Chapter 3* details the findings on the overall impact of Open ELS (from a socio economic perspective) and with a particular focus on the impact on Small-Medium Enterprises (SMEs) and policy makers.
- *Chapter 4* elaborates on the results of the analysis and provides some conclusions and recommendations for the future.

The document also contains the following Annexes:

- *Annex A* provides some highlighted results of the SMEs survey which was carried out during the project.
- *Annex B* lists the bibliographic sources used for the report and analysis.

1.2. Our approach and methodology

The objective of the present assignment is to **conduct an economic appraisal of the impact of the Open ELS project**. To achieve this objective, the team developed a three-step approach:

- Step 1 – Development of an intervention logic;
- Step 2 – Data collection activities; and
- Step 3 – Data analysis and reporting.

The first methodological step consisted in the development of an intervention logic showing the needs, objectives, activities and expected results of the Open ELS project in the broader context of the EU geo-spatial market. The outcome of this step and the intervention logic are thoroughly described in the next chapter. Based on the expected results and impacts of the project, it was decided to focus the analysis on:

- *Economic impact:* defined as the impact of Open ELS on the market, the use of geo-spatial authoritative data and on the establishment of cross-border services and applications.

- *Social impact:* defined as the impact of Open ELS on jobs and policy making.

Within these categories of impacts, it was decided to pay particular attention to the impact of Open ELS on Small and Medium Enterprises (SMEs) and policy makers. This choice was linked to the fact that these categories of stakeholders might benefit the most from the services provided by the project and are specifically targeted by some of the project activities. Policy makers are, today, amongst the main users of authoritative geo-spatial data[10] while SMEs, which represent 99% of businesses in the European Union, are still not making use of these information to their full extent[11].

The second step of the approach involved data collection activities on the impacts of Open ELS and with respect to key stakeholders identified. To ensure data availability and capture different perspectives on the impact of Open ELS, the team relied on different data collection methods including:

a) **Desk research and literature review**: the team collected relevant publications on the impact of increasing availability of geo-spatial data all through the assignment and included the findings emerging from this exercise in the final report. An indicative list of the publications consulted is available in Annex B.
b) **SMEs survey**: the Open ELS team launched a SME survey to gather feedback on the needs and use of geo-spatial data amongst selected SMEs in a number of Member States[12]. The study team had the opportunity to develop one specific question on the benefits of Open ELS and the analysis of the replies to this and other questions fed this report. The aim of this survey was not to provide a *complete and comprehensive picture* of SMEs' needs in all sectors and all countries but rather to offer an indication of trends and to complement findings from other data collection tools. Indeed, the SMEs which have been contacted for the survey are already active in the geo-spatial information market and hence the responses are subject to selection bias. Therefore, the input of the survey should be considered more as a picture of the status quo for "data active" companies rather than a full view of SMEs activities in this domain. Further information on the Survey is provided in Annex A.
c) **Interviews with stakeholders**: the study team interviewed a limited number of stakeholders (policy makers and SMEs) to gather more evidence on the possible impacts of Open ELS on these categories of users. For confidentiality reasons, the full list of interviews is not disclosed in this report.

The third and final methodological step consisted in the data analysis, triangulation and reporting of the findings. The team triangulated and validated the data collected through all previous activities and all along the project. The present report includes the outcome of this final step and also highlights the limitation of this analytical exercise in order to provide some lessons learnt and perspectives for future assessments.

[10] See for instance the results of the study on the "Assessment of economic opportunities and barriers related to location information in the context of the Digital Single Market", 2018, https://joinup.ec.europa.eu/sites/default/files/inline-files/SC395_ELISE_Webinar_3.00.pdf
[11] See the "Study on emerging issues of data ownership, interoperability, (re-)usability and access to data, and liability", 2018, https://ec.europa.eu/digital-single-market/en/news/study-emerging-issues-data-ownership-interoperability-re-usability-and-access-data-and
[12] It is important to note here that at the time of submission of this report the SME survey is still ongoing.

1.3. Limitations of the study and need for better impact monitoring

The lack of data availability on many of the aspects covered by this study is the main reason why a strong and precise quantification of the situation today (baseline) and of the possible impacts of Open ELS (in the future) is not possible at this stage[13]. This situation is not only due to the early phase of the implementation of Open ELS activities but also to the general lack of monitoring and information on the authoritative geo-spatial data market at the European level, which is independent from the Open ELS project. Arguably, today there is little visibility on:

- What is the number of cross-borders products and services based on authoritative data;
- What is the number of companies in the EU using authoritative data from more than one NCMAs;
- What is the value of services/products provided by those companies and therefore what is the total value of the market for these companies/services/products;
- What are the costs for such companies to deal with multiple administrations and sources of data; and
- What is the number of companies that decide not to enter a new market due to the costs and resources needed to deal with multiple NCMAs (administrative burden).

The anecdotal information collected by this study (e.g. in terms of costs of dealing with multiple NCMAs and amount of time spent by companies on data gathering – see the case studies on SMEs) cannot be generalised at the European level and cannot replace statistically relevant information on the abovementioned aspects.

Although Open ELS' role is not to collect data on the authoritative geo-spatial data market, in order to better characterise the impact this intervention and prove its added value in the future, it is important to reflect upon possible ways of collecting the missing information. To this purpose, a specific study could be launched in order to clearly identify possible data sources, gather data from all the NCMAs and establish a baseline scenario. Gathering quantitative evidence on the number and specificities of users of authoritative geo-spatial information at the European level would not only help NCMAs with their mission but would also support the European Commission's initiatives towards the data economy.

Additionally, Open ELS could develop a wider customer survey which could help identifying how many of them switched to Open ELS from dealing with different NCMAs and how many on the other hand are *first time users* of authoritative data. Distinguishing between these two categories of users would allow to understand whether Open ELS had a higher impact on companies *already* providing a number of products and services in multiple countries or rather on companies deciding to scale up thanks to the services provided by the project. This would allow to grasp whether Open ELS improved the efficiency of a number of well-established data companies or rather increased the number of data users overall. This type of information is needed for establishing which is the impact, role and positioning of Open ELS in the EU context. Similarly, it would be helpful to understand how many policy makers switched to Open ELS from other existing sources and how many used these types of services for the first time due to the user-friendliness and advantages of the Open ELS platform. Differentiating between the types and history of users would also allow Open ELS to

[13] On this point, see also Section 3.1 of this report.

improve its services and product offering in a user centric way, through development of "personas" and identification of segments for specific services.

Overall, and in the context of the reflection upon the sustainability of this project, it is recommended to further invest in gathering more evidence on the authoritative data market at the European level and in improving customers' knowledge and proximity. Failing solid evidence on the status quo and the impact of Open ELS on the key stakeholders, the sustainability of the project will be more difficult to achieve.

2 State of play and Open ELS' objectives

2.1 State of play on the use of authoritative geo-spatial information and barriers

As already acknowledged back in 2012: "the geo-spatial information market is becoming increasingly globalised and competitive[14]", with a multiplication of players involved. The boom of this industry is linked to a growing demand for geo-spatial information: according to the latest figures, this market segment will grow by 13,6% between 2017 and 2020[15]. Governments are amongst the biggest clients of geo-spatial information, accounting for over 28% of the market demand in 2016[16]. Nonetheless, private sector and SMEs are also increasingly re-using geo-spatial information as "geo-spatial data has become an integral element in how companies and organisations conduct business throughout the world"[17]. The demand for qualitative geo-spatial information is hence increasing over time and National Mapping and Cadastral Agencies (NMCAs) have an important role to play in providing authoritative geo-spatial data to the market.

The market for geo-spatial information is not only growing but also changing rapidly. As the needs of users change, so does the market for geo-spatial information and some of the needs that drive this market transformation are:

- **The need for user friendly and sustainable access to the data:** as more and more businesses and stakeholders enter the data economy, there is a need to facilitate access to geo-spatial information for all players (including "data beginners[18]" and SMEs) and to render this access sustainable over time. Indeed, without easy and sustainable access, organisations will not invest in developing new products and services. APIs have been identified as one of the possible solutions for data provision and there is a growing number of such infrastructures around Europe. There is also a global trend towards rationalisation and simplification of license regimes as it was acknowledged that "licenses proliferation" was hampering the use and reuse of data. In general, NCMAs are considered as trusted geo-spatial data providers as the sustainability of their services is widely recognised. However, the user centricity and the simplicity of NCMAs data provision can still be improved.

[14] See « Market study for Pan-European Geo-Spatial products – Final Report to EuroGeographics", 2012
[15] GeoBuiz 2018 report, Geo-spatial Industry Outlook and Readiness Index, 2018, https://www.geo-spatialworld.net/news/geobuiz-2018-report-now-available/
[16] See : "Geographic Information System (GIS) Market – May 2017, P&S Market Research", https://www.gislounge.com/global-gis-industry-continues-grow/
[17] http://trajectorymagazine.com/past-present-future-geo-spatial-data-use/
[18] Data beginners are defined here as companies which did not consider data at the core of their business until recently and are now exploring possibilities and opportunities linked to the data economy.

- **The need for reduced costs and burden for data use:** in the EU**,** policy interventions such as the Directive for Reuse of Public Sector Information have significantly driven down the costs of data. Geo-spatial information provided by NCMAs are often still charged for (with some exceptions, e.g. in France due to the Loi pour une République Numerique[19]) but businesses and SMEs ask for an even greater reduction of costs and burdens[20]. Single points of access to data can facilitate the life of users and limit administrative burden: however, to have a single point of access for different types of data, there are significant efforts to be deployed in back-end infrastructures and significant costs to be borne.
- **The need for comparable cross-border data**: in a globalised economy, country borders do not shape business anymore and most products and services can be scaled up at the continental, if not global, level. In the EU and within the context of the Digital Single Market, cross-border data are even more important; 28 countries constitute the same economic space and data start-ups and businesses need to be able to grow in this economic area without encountering "data" barriers. The deletion of barriers (including interoperability of datasets and challenges to data access) is one of the priorities for the European Commission in the context of the Communication on "Building a European Data Economy"[21]. However, despite the efforts deployed so far, the EU does not constitute a single data space yet and this prevents companies from scaling up rapidly at the continental level. NCMAs therefore need to collaborate in order to align their datasets and make sure that this cross-border dimension can be exploited.

Although the market is growing very fast and new needs emerge, the literature also acknowledges the persistence of a number of barriers that prevent possible users (be them from the public or private sector) from fully exploiting the potential of authoritative geo-spatial information across borders. Different types of users might face specific barriers but all categories share some common concerns.

The table below summarises the main obstacles identified by the literature (e.g. the study on the Assessment of economic opportunities and barriers related to location information in the context of the Digital Single Market[22]) divided per category of stakeholders, and notably:

- public sector users,
- business users and
- SMEs users.

As their needs distinguish them from other businesses, SMEs are considered as their own category. This also serves to highlight the different availability of resources that they face compared to larger businesses. Common challenges are also highlighted in the table.

[19] See : LOI n° 2016-1321 du 7 octobre 2016 pour une République numérique, 2016, https://www.legifrance.gouv.fr/affichLoiPubliee.do?idDocument=JORFDOLE000031589829&type=general&legislature=14

[20] See the results of the public consultation on Building a European Data Economy, 2017, https://ec.europa.eu/digital-single-market/en/news/public-consultation-building-european-data-economy

[21] https://ec.europa.eu/digital-single-market/en/policies/building-european-data-economy

[22] See "Assessment of economic opportunities and barriers related to location information in the context of the Digital Single Market", 2018, https://joinup.ec.europa.eu/sites/default/files/inline-files/SC395_ELISE_Webinar_3.00.pdf

Table 1 - Barriers for the use of authoritative geo spatial information per type of stakeholder

	Public sector	Businesses	SMEs
Lack of awareness on the availability of authoritative geo spatial information		X	X
Lack of comparable cross-border data	X	X	X
Technical barriers including interoperability between datasets, edge matching issues etc.	X	X	X
Lack of knowledge/skills for using authoritative geo spatial information	X	(X)	X
Costs of data (including indirect costs such as time and resources spent on administrative tasks linked to data usage)		X	X
Licensing issues	X	X	X

Source: Deloitte, 2018

The barriers shown in the table and the challenges linked to unfulfilled needs described in the previous section all contribute to limit the exploitation of geo-spatial data at the European level and therefore slow down the digital transformation and the journey towards a European Data Economy. In this context, the Open ELS project constitutes a possible tool for removing some of these obstacles and unblocking the potential of authoritative geo-spatial information within the European Union.

2.2 Open ELS intervention logic

Open ELS is the direct heir and stems from the work carried out under the European Location Framework project (ELF). This project (which started in 2013 and ran until October 2016) aimed at "delivering the European Location Framework (ELF) required to provide up-to-date, authoritative, interoperable, cross-border, reference geo-information for use by the European public and private sectors."[23] The outcome of the project hence consisted in "a versatile cloud-based and cascade-supporting architecture which provided a platform of INSPIRE compliant geo-information, harmonised at a cross-border and pan-European level[24]".

ELF brought together many different organisations working on geo-spatial data and applications and in particular EuroGeographics[25], National & regional Mapping and Cadastral Agencies (NMCAs) of Member States, software developers, application providers and research & academia. At the end of the ELF project, EuroGeographics took the responsibility to ensure the continuity of the solution developed while at the same time establishing the basis for a follow-up project aimed at continuing the work on the platform and improving it.

The Open ELS project is a CEF funded initiative (winner of the 2016 CEF call on Open Data[26]) building on the achievements of the ELF project and aimed at fostering use and re-use of geo-spatial information at the European level by improving the quality, availability and interoperability of these data across borders. The project will run for two years (up until 2019) and consists of 4 main activities and related sub-activities:

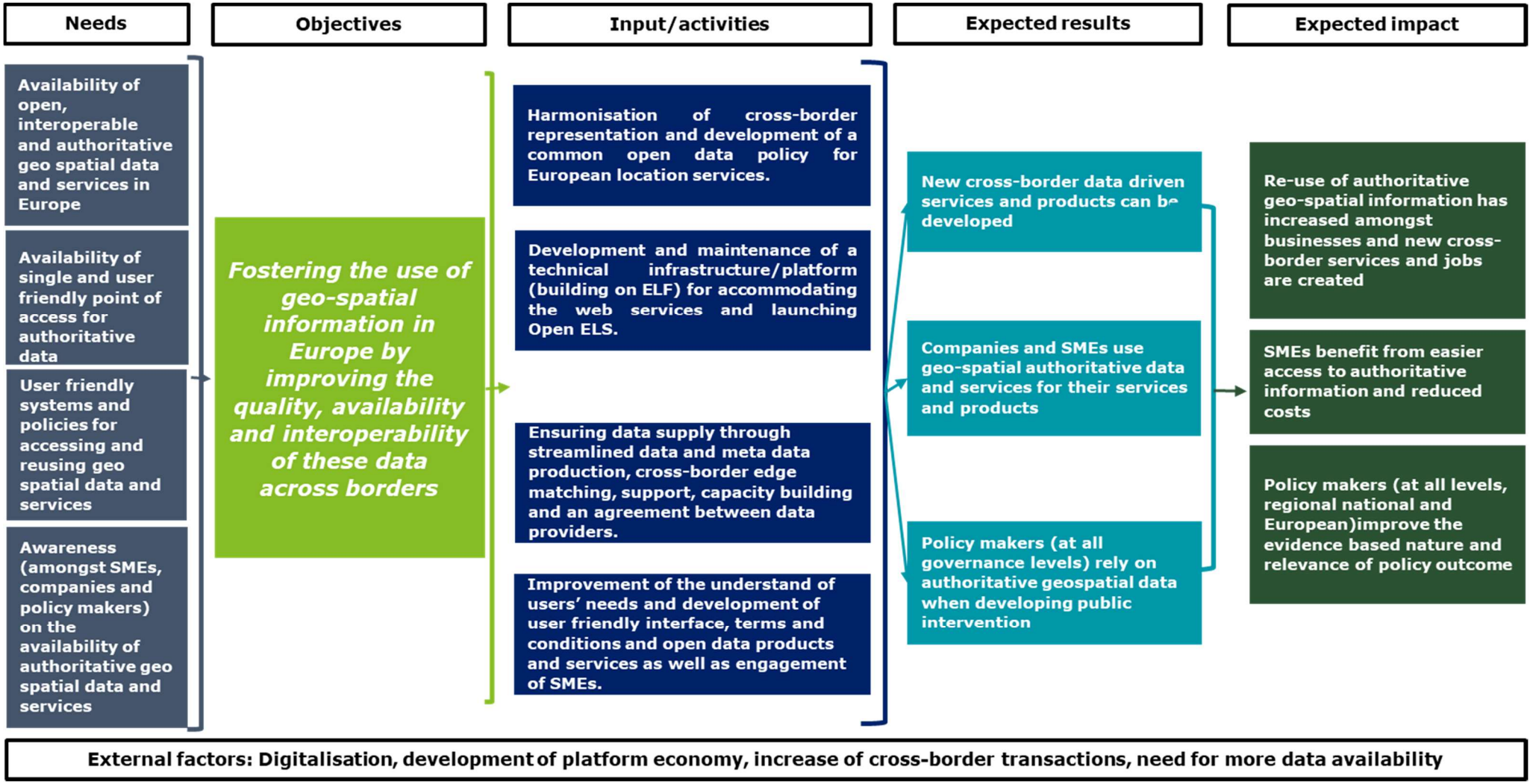
- **Governance**: this activity includes project management and development of key policies underpinning the work of Open ELS including an open data policy and a policy for representation and visualisation of data in cross-border areas. The analysis of the socio-economic impact of the project and of its sustainability outlook is also included in this activity as it feeds into the assessment of the project's sustainability.
- **Technical infrastructure**: this activity involves all steps linked to the further development and maintenance of the platform (established under the ELF project) such as running the IT solution, working on APIs and linked data and establishing connections with the European Data Portal (EDP[27]). This activity also aims at developing on the fly edge matching services and exploring opportunities for user defined visualisation.
- **Data supply contents**: the aim of these activities and the related sub-activities is to make geo-spatial contents available through Open ELS. To do so, this activity focuses on streamlining data and metadata quality, guiding data providers on cross-border edge matching, supporting them and carrying out capacity building initiatives. Finally, this activity also looks at how to engage with new data providers and how to establish agreements between the partners involved to enable continuous supply of data.
- **User orientation and requirements**: this final activity focuses on improving the knowledge of possible users' needs and on customising the products and services as well as their interface.

[23] http://www.elfproject.eu/
[24] http://www.elfproject.eu/
[25] https://EuroGeographics.org/
[26] https://ec.europa.eu/inea/en/connecting-europe-facility/cef-telecom/apply-funding/2016-cef-telecom-call-pod-cef-tc-2016-2
[27] https://www.europeandataportal.eu/en/homepage

Licensing terms and conditions of use are also to be developed under this task and the project foresees a SME engagement framework as well as some dissemination and marketing activities to increase awareness on Open ELS products and foster take up.

The objectives and activities of the Open ELS project can be easily structured in an **intervention logic** which helps capturing the entire flow of the intervention starting from the needs addressed (those discussed in the previous section) and ending with the expected results and impact (in the context of the broader geo-spatial information market) which constitute the main focus of this study. The picture below represents all these aspects and has been refined and validated based on discussion with the main stakeholders.

Figure 1 - Open ELS intervention logic



Based on the Open ELS intervention logic, the main questions underpinning this assignment are the following:

What is the impact of this project on the EU economy and society and especially on the key stakeholders identified?

What are the mains effects of this intervention?

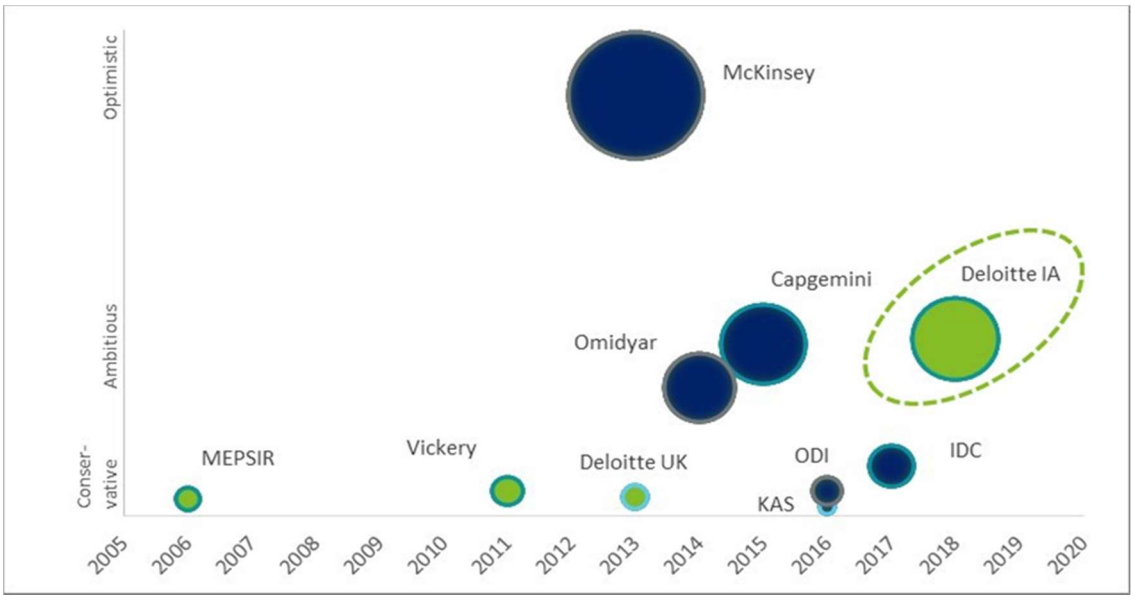
In the next sections we discuss the economic and social impact of the Open ELS project and we put forward a specific analysis of the effects of the intervention on SMEs and policy makers.

3 The economic and social impact of Open ELS

3.1 Economic impact

Quantifying and providing one comprehensive figure for the economic impact of Open ELS is difficult, considering a) the early stage of development of this project[28] and b) the lack of solid data for a baseline scenario. Indeed, there are many different (and sometimes contradicting) estimations for the value of the data economy in the EU and for the size of the geo-spatial information market. The figure below shows, for example, an overview of different estimations on the value of the data economy in the EU developed over time and providing a more or less optimistic view of the size of the market. The most recent estimations were developed in the context of the impact assessment study for the review of the Directive on Public Sector Information[29] and are shown in the picture below.

Figure 2 - Different measurements of the EU data economy



"The X-axis of the graph shows the year in which a specific study on which the estimates are based while the Y-axis displays the assessment of the ambition of the available estimates. The size of the bubbles shows the value of the total economic benefits of Open Data / Public Sector Information (PSI) estimated by each

[28] Instead of an ex-post evaluation, this assignment should be considered as an ex-ante impact assessment of the project.
[29] Impact Assessment Support Study for the Revision of the Public Sector Information Directive, 2018, https://ec.europa.eu/digital-single-market/en/news/impact-assessment-support-study-revision-public-sector-information-directive

of the studies. Bubbles with blue fill originally relate to estimates for the benefits of Open Data, whereas bubbles with green fill specifically concern PSI"[30].

The variety in the range of estimations shown in the picture (in terms of ambition, market size and market definition) makes it difficult to decide which would constitute a reliable basis for this economic assessment. Furthermore, there is a lack of monitoring mechanisms in place which would allow to establish changes from before and after the Open ELS intervention. Indeed, no preliminary study on the overall number of users of authoritative geo-spatial information has been carried out before the Open ELS project kicked off. This lack of data on the initial situation is also an obstacle for an in-depth economic appraisal.

However, building on the different figures gathered through the literature review, it is possible to provide a range of estimates for the economic impact, which is also corroborated by qualitative information on the effects of the Open ELS intervention. This analysis also helps developing some key recommendations on how to improve data availability and have more solid foundations for quantitative assessment in the future.

In order to measure the economic impact of Open ELS, the team developed an analytical framework in which the desired impact foreseen for the project is translated in 3 specific benefits to measure:

- Increased value of the market
- Increased use of authoritative geo-spatial data amongst businesses
- Increased establishment of cross/border services and applications

The extent to which the Open ELS project can contribute to the above mentioned benefits is described in the following section.

3.1.1. Impact of Open ELS on the market

As previously mentioned, the market for geo-spatial information in the EU and globally is growing rapidly. In the EU, this is also driven by a steady and constant growth in the general public sector information market (+57% in 2017 compared to 2010)[31] and in the value of the data market (+9,3% in 2017 compared to 2016)[32].

In this context, a number of studies have tried to assess the specific value and contribution of geo-spatial information to the overall economy and/or to specific markets. Some of these studies focused in particular on the value of **open geo-spatial data**:

- The study carried out in 2013 on the impact of OS Open Data to the Economy of Great Britain estimated a GDP increase of between 13 mio £ and 28 mio £ as a result of opening up these data

[30] Impact Assessment Support Study for the Revision of the Public Sector Information Directive, 2018, https://ec.europa.eu/digital-single-market/en/news/impact-assessment-support-study-revision-public-sector-information-directive

[31] See : "Study to support the review of Directive 2003/98/EC on the re-use of public sector information", 2018, https://publications.europa.eu/en/publication-detail/-/publication/45328d2e-4834-11e8-be1d-01aa75ed71a1/language-en

[32] See : « First Report on Facts and Figures: Updating the European Data Market Monitoring Tool", 2018, http://datalandscape.eu/study-reports

for reuse for free[33]. This should have also resulted in an increase in taxation revenues of 4 to 8 mio £ and in productivity gains of 8 to 18 mio £[34]. The OS OpenData is a portfolio of 11 digital datasets of Great Britain produced by OS. These were made available for free for use and re-use to all, including commercially, from 1 April 2010[35].

- The two studies on the economic impact of geographical data in Denmark (in 2012 and 2016) also provide interesting estimates. It was established that "the socio-economic value of open geodata was of 3.5 mio Danish Crowns in 2016 (around 500,000 euro)[36]" and that this grew from 1.5 mio Danish Crowns in 2012 (around 200k). The figure below provides additional details on the estimates obtained through the study and indicates that municipalities and private enterprises are amongst the biggest beneficiaries of opening geo-spatial data.

Figure 3 - the socio economic value of open geographical data in 2012 and 2016[37]

DKK in millions	2012	2016
Production effect of the open geodata	**1.402**	**2,542**
Private enterprises	116	446
Government agencies	321	373
Municipalities	965	1,376
Regions		151
Independent institutions, etc.		196
Efficiency effect of the open geodata	**190**	**999**
Private enterprises	40	726
Utility companies	100	229
Government agencies	50	22
Municipalities		18
Regions		2
Independent institutions, etc.		2
Total socio-economic value of the open geodata	**1.592**	**3,541**

Overall, the study shows that the main benefits would be for the public sector itself (if one considers the aggregated effects for government agencies, regions and municipalities) but that the private sector would also greatly benefit from the intervention.

Other studies had a **broader look** at the geo-spatial information market:

[33] See : "Assessing the value of OS Open Data to the Economy of Great Britain", 2013, https://www.gov.uk/government/publications/ordnance-survey-open-data-economic-value-study
[34] See : "Assessing the value of OS Open Data to the Economy of Great Britain", 2013, https://www.gov.uk/government/publications/ordnance-survey-open-data-economic-value-study
[35] https://www.gov.uk/government/publications/ordnance-survey-open-data-economic-value-study
[36] See « the Impact of Open Geographical data – Follow up study », 2017, https://sdfe.dk/media/2917052/20170317-the-impact-of-the-open-geographical-data-management-summary-version-13-pwc-qrvkvdr.pdf
[37] See « the Impact of Open Geographical data – Follow up study », 2017, https://sdfe.dk/media/2917052/20170317-the-impact-of-the-open-geographical-data-management-summary-version-13-pwc-qrvkvdr.pdf

- In Spain, the infomediary study 2018 highlights that the geographic information sub-sector counts for more than 25% of the total value of the infomediary market in 2016 (1.7 billion euro), that is to say around 436 mio euro[38]. This sub-sector grew of 1.6% compared to the previous reference year[39].
- In Ireland, the study on the assessment of the economic value of the geo-spatial industry in 2014 established that the value added to this market on the Irish economy was of around 120 mio euro per year and that the economic benefits counted for 104 mio euro in terms of competition benefits[40]. The study also highlighted that the economic value of geo spatial information in 2014 was of 0.01% of GDP in the UK, 0,25% in the Netherlands, 0,04% in Germany and 0,02% in England and Wales[41].
- A recent study on South Africa showed that geo-spatial industry generated 11 mio $ in 2016 and that productivity benefits are more than 20 times higher than the value of the industry itself[42].
- In Canada, a study of 2013 estimated that "the use of geo-spatial information contributed $20.7 billion – or 1.1% of national Gross Domestic Product (GDP) and the uptake of "open" geo-spatial data (data available a minimal or no cost and for use without restriction) provides an estimated additional $695 million to GDP[43]".

The studies mentioned above are just a sample of the literature on the subject. Although purely indicative what all these studies confirm is that: a) the geo-spatial markets already constitute significant portion of countries' economies and GDP, within the EU and elsewhere in the world (e.g. from 0.01% of the GDP in the UK to up to 1.1% of GDP in Canada) and b) that facilitating use and reuse of authoritative geo-spatial information has direct and significant positive effects on the market and on users (both public and private).

This second element is particularly important to understand the economic impact of Open ELS on the market. This project in fact surely facilitates access to information by "providing certainty of what is free and what is charged for, under what terms and conditions for use and reuse[44]" and it also reduces administrative burden for firms willing to access data (see also next sections). The literature has established in this context that:

- Moving from a cost recovery to more open access regimes doubles the value of the data[45];
- "Firms functioning in countries where public sector agencies provide fundamental (geographical) information either for free or at a marginal costs have grown, on average, by 15% more per annum than firms than the firms in the countries in which geographical information is priced according to the cost recovery principle[46]". Furthermore, the lower is the price and barriers for access to data the higher is the number of users. For instance, when geo-spatial data started to be provided at the

[38] See: Asedie Infomediary Sector report 2018: http://www.asedie.es/assets/asedie-sector-infomediary-report-2018.pdf
[39] See: Asedie Infomediary Sector report 2018: http://www.asedie.es/assets/asedie-sector-infomediary-report-2018.pdf
[40] See : « Assessment of the economic value of the geo-spatial information industry in Ireland », 2014, https://www.osi.ie/wp-content/uploads/2016/02/Economic-Value-of-the-Geo-spatial-Information.pdf
[41] See : « Assessment of the economic value of the geo-spatial information industry in Ireland », 2014, https://www.osi.ie/wp-content/uploads/2016/02/Economic-Value-of-the-Geo-spatial-Information.pdf
[42] See : « Economic impact of spatial services – South Africa Peer Review », 2017, https://www.bbrief.co.za/content/uploads/2017/10/Google_Geo-spatial-impact_South-Africa-report.pdf
[43] See : GeoConnections, "Canadian geomatics environmental scan and value study", 2013, https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R=296426
[44] Open ELS Open Data Policy, to be published
[45] European Data Portal, Analytical report number 9, The Economic Value of Open Data, 2017, https://www.europeandataportal.eu/sites/default/files/analytical_report_n9_economic_benefits_of_open_data.pdf
[46] See : « Does Marginal Cost Pricing of Public Sector Information Spur Firms Growth ? », Heli Koski, The Research Institute of the Finnish Economy, 2011, https://www.etla.fi/wp-content/uploads/2012/09/dp1260.pdf

marginal costs in Austria, "demand for digital cadastral maps increased over 250 percent and for digital landscape models over 1000 percent. An increase in the demand for data arose particularly from the small and medium sized firms[47]". Similarly, in Spain "the number of cartography data consultations increased from the year 2004 to 2005 about 700 percent, from over million consultations to over 41 million consultations. In 2010, the corresponding number was over 124 million indicating over 2300 percent growth in usage compared to that of 2004[48]".

Based on these premises it can be argued that **one of the main economic benefits of the project consists in contributing to increase the growth of firms using geo-spatial information by up to 10-15% (in an optimistic scenario[49]) and to multiply the number of business and non-business users, hence accelerating the growth of the data market at the European level**. Nonetheless, this finding is based on the assumption that users will be aware of the services offered by Open ELS and that the project will be continued and made sustainable over time. Indeed, Open ELS contributions to the geo spatial market can only be incremental and dependent on users' take up, which cannot be fully estimated at this stage.

3.1.2. Impact of Open ELS on the business use of authoritative geo-spatial data

European businesses are becoming more and more active in the data economy and this also involves building products and services based on geo-spatial information or simply using these information for internal purposes and processes. The study on the measurement of the data market established that in 2017, there were around 690,000 businesses that could be considered as "data users" in the EU, around 500,000 without counting UK based firms[50]. The study also mentioned that "long term growth in the number of data user companies is highest in the data intense industries such as Professional services and ICT, and lowest in Mining and Construction, as well as Education"[51]. Numerous studies also contend that SMEs do not use data to the same extent large companies do[52].

As explained in the Open ELS intervention logic, one of the desired effects of this project is to increase the use of authoritative geo-spatial information amongst businesses. This entails convincing new companies to use authoritative information (in general, and from sectors where data take up is lower) and also focusing on SMEs and fulfilling their needs to give them the opportunity to participate in the data economy.

In both cases, *Open ELS' approach consists in lowering barriers for accessing data and in trying to provide answers to new and emerging needs*. As previously discussed, barriers and needs might vary depending on the type of stakeholders but there are some common concerns with respect to the use of authoritative geo-

[47] See : « Does Marginal Cost Pricing of Public Sector Information Spur Firms Growth ? », Heli Koski, The Research Institute of the Finnish Economy, 2011, https://www.etla.fi/wp-content/uploads/2012/09/dp1260.pdf
[48] See : « Does Marginal Cost Pricing of Public Sector Information Spur Firms Growth ? », Heli Koski, The Research Institute of the Finnish Economy, 2011, https://www.etla.fi/wp-content/uploads/2012/09/dp1260.pdf
[49] The study of Heli Koski is based on the findings from 15 countries and the growth rates of firms across countries varied.
[50] See : « First Report on Facts and Figures: Updating the European Data Market Monitoring Tool", 2018, http://datalandscape.eu/study-reports
[51] Interestingly, the number of business users of data in the education sector is not growing so rapidly but the number of data professionals is. See : « First Report on Facts and Figures: Updating the European Data Market Monitoring Tool", 2018, http://datalandscape.eu/study-reports

[52] See several studies including See "Assessment of economic opportunities and barriers related to location information in the context of the Digital Single Market", 2018, https://joinup.ec.europa.eu/sites/default/files/inline-files/SC395_ELISE_Webinar_3.00.pdf

spatial information (e.g. the lack of comparable cross-border data or the issues related to the plethora of different licenses). The Open ELS project foresees specific remedies and actions for all these barriers. Furthermore, it attempts to address some of the emerging needs such as those linked to the availability of APIs provision and to the need for reduced costs and administrative burden. Additionally, thanks to Open ELS' license, companies will have clarity on the terms of conditions for the use of data as well as on the costs for additional services. Finally, they will have a single point of access and interlocutor for their questions and a single API/platform to which they can connect.

Several studies suggest that the removal of barriers for use leads to a direct and exponential increase in the number of users. For instance, as mentioned above, "in cases where the public authority moves to zero or marginal costs charging, the number of re-users increases by between 1.000% and 10.000%"[53]. This means that reducing the costs of data directly multiplies the number of users by thousands. However, as the "study on emerging issues of data ownership, interoperability, (re-)usability and access to data, and liability[54]" also argues, addressing other non-cost related barriers also leads to significant increase in number of re-users although this is very difficult to quantify[55]. The European Commission is also very conscious of this link between legal and technical barriers for data usage and number of users overall: this is shown by the fact that it recently launched a project aimed at establishing a Data Sharing Support Center with the objective of guiding data sharers and users facing these types of obstacles[56].

Open ELS hence contributes to the European efforts for the removal of barriers and pays a specific attention to SMEs, which is also one of the key attention points for the European Commission.

SMEs in the spotlight

SMEs constitute 99% of European businesses and the EU cannot succeed in the transition to the data economy without them participating in the digital transformation. As users of authoritative geo-spatial information, SMEs face particular challenges and have special needs which are linked to their size and availability of resources. For instance, they might be less aware of the possibilities of using authoritative geo-spatial information and suffer more from skills scarcity (especially if "data beginners"). They might also be less able to deal with high levels of administrative burden. At the same time, these companies are very innovative and extremely interested in scaling up cross-border and they might need some support in this respect. This translates for instance in a demand for harmonised data across border and for datasets with matching topographies, as is shown in the figures below.

[53] See: Study on the Pricing of Public Sector Information – POPSI Study, October 2011, Deloitte, https://ec.europa.eu/digital-single-market/en/news/pricing-public-sector-information-study-popsis-models-supply-and-charging-public-sector

[54] See : "Study on emerging issues of data ownership, interoperability, (re-)usability and access to data, and liability", 2018, https://ec.europa.eu/digital-single-market/en/news/study-emerging-issues-data-ownership-interoperability-re-usability-and-access-data-and

[55] See : "Study on emerging issues of data ownership, interoperability, (re-)usability and access to data, and liability", 2018, https://ec.europa.eu/digital-single-market/en/news/study-emerging-issues-data-ownership-interoperability-re-usability-and-access-data-and

[56] https://ec.europa.eu/digital-single-market/en/news/open-call-tenders-setting-support-centre-data-sharing

Figure 4 - SME survey - question on data harmonised across national borders

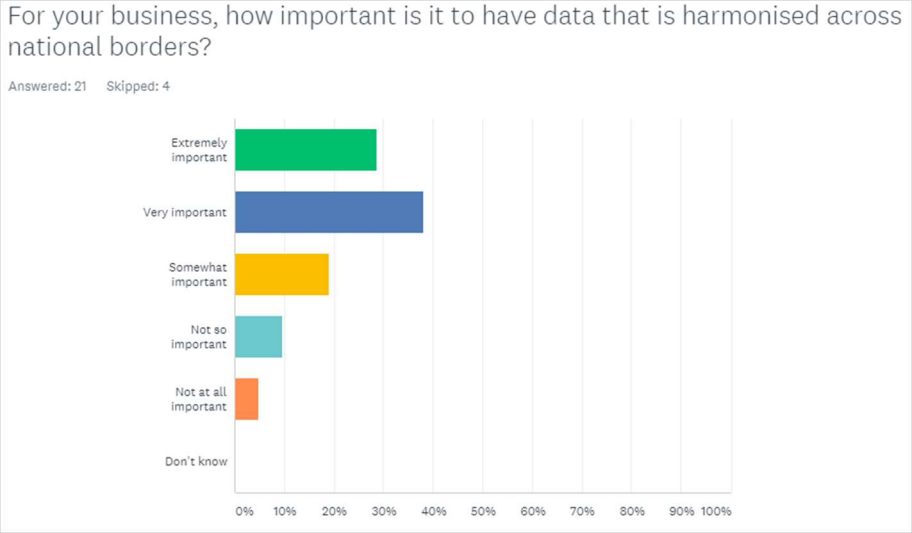
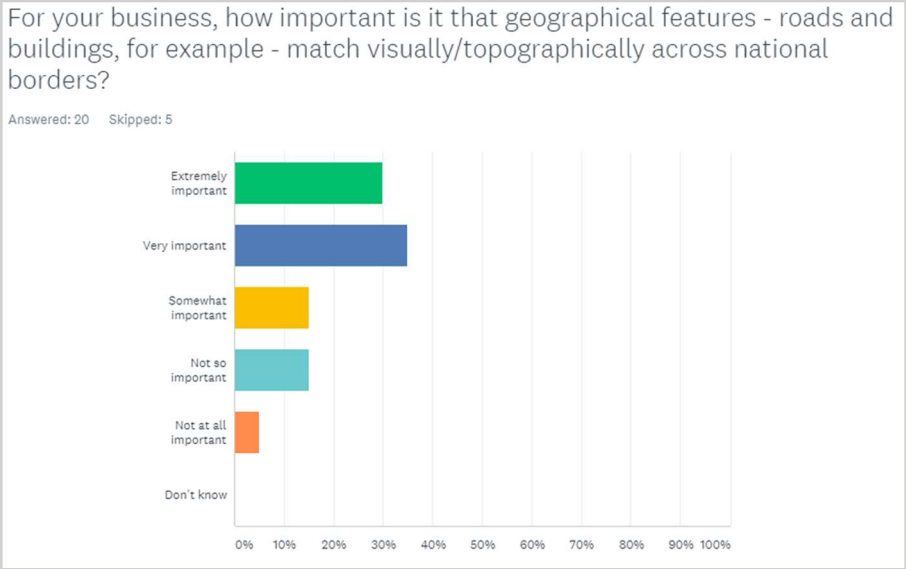


Figure 5 - question on geographical features matching



When specifically asked about the possible benefits of Open ELS, SMEs highlighted in particular four:

- The possibility to improve existing products and services offering
- The possibility to develop new products and services
- The reduced time and costs of dealing with different national mapping and cadastral agencies
- The reduced time and costs for acquiring/accessing data

Figure 6 - SME Survey - Question on benefits of Open ELS

ANSWER CHOICES		RESPONSES	
Possibility to improve your internal business processes		42.86%	9
Possibility to improve your existing products and services offering		76.19%	16
Possibility to develop new products and services		71.43%	15
Possibility to develop new cross-border products and services		57.14%	12
Reduced costs for acquiring/accessing data		66.67%	14
Reduced time and costs of dealing with different national mapping and cadastral agencies		71.43%	15
Reduced time and costs linked to data cleaning and handling		57.14%	12
Don't know		0.00%	0
Other (please explain)	Responses	4.76%	1
Total Respondents: 21			

At the same time, SMEs also referred to the possibility of developing new cross-border products and services and the reduced time and costs for data cleaning as advantages linked to the Open ELS project.

Examples of companies such as Realo and PitPoint help illustrating how these theoretical benefits translate concretely into gains for SMEs, both in terms of improvement of existing services/products/business processes and with respect to time and cost reduction.

Realo is an online real estate marketplace platform which aims at becoming the market leader in "automated valuation of properties" in Europe[57]. Currently, the company operates in Belgium, Spain, France and Switzerland. Realo's clients are individuals willing to buy or sell a property, banks which need to have property estimates for their loans, real estate agencies and also public authorities. It gathers data from multiple sources including OpenStreet Maps, Open Data from various public authorities, energy data from energy companies etc. **90% of the time and resources of the company go in collecting data from these different sources.**

For entering a new European market, the initial effort of gathering data is even more significant in the case of Realo and this is slowing down the scale up ambitions of the firm. Additional barriers consist in language and interoperability issues of datasets as well as timeliness of data. In fact, Realo needs at least monthly-old data on cadastre, transport networks etc. to offer an attractive service to its customers. In this context, Open ELS' benefits for Realo could consist in:

A) A single point of access for cadaster and transport network data at the European level, with edge-matching services and interoperable datasets (also including gazetteers services);
B) A single license for accessing these datasets and reduced time and burden in dealing with different cadaster and public authorities.

Therefore, Open ELS could help Realo reducing the time spent in gathering the data and hence focusing more on the real added value of the company: the services it provides.

[57] https://www.realo.be/en/about

PitPoint is a Dutch company "designing, building, financing, maintaining, operating and servicing public and private fuelling stations for LNG, CNG, biomethane, hydrogen, as well as electric charging points, for companies and governments[58]" in multiple countries. It is currently active in four European countries: the Netherlands, Belgium, Germany and France and it has more than 15.000 charging points in multiple locations. The establishment of a charging spot in a certain location is either demand-driven (e.g. a public authority or private company asks for a point to be established) or based on the identification of so-called "white spots" where charging stations are missing.

For the identification of these white spots, PitPoint relies on a mix of data including cadastre and buildings information, data on transport infrastructures and data from OpenStreetMap[59]. The challenges linked to the data used are twofold:

- OpenStreetMap data needs to be verified (with visits carried out in person to the interesting sites identified) as it is not authoritative data and the quality might vary.
- The collection of cadastre and other types of public data is labour-intensive. In Germany for instance each Lander has its own cadastre and has a different level of digitisation of services. For some Landers, a physical visit to the cadastre is needed to gather the data which is required for the assessment of a possible area of installation.

Open ELS could help addressing both these challenges. On the one hand it would provide authoritative information on cadastre, buildings and transport networks at the European level, also characterised by edge-matching services. This would entail a higher level of trust in the data and better and more efficient assessment of the white spots. On the other, it would allow PitPoint to gain in efficiency: in fact, it costs up to 2000 euro per site, for PitPoint, to send employees collecting and verifying information on the ground. Every year, PitPoint carries out around 30 site visits. **This means that Open ELS could help PitPoint saving part of the 60 000 euro spent in travel and physical data collection.**

In general, it emerged from the interviews that *centralisation of data in a limited number of points of access, at the European level*, is strongly required to help smaller companies to scale up quicker and enter new markets efficiently. As such, Open ELS could be a first step in this direction of centralisation of authoritative data. As these examples and the results of the SME survey show, SMEs have a strong appetite for more cross-border authoritative data, as these could help them improve their product and service offerings but also, and especially, to cut costs and be more competitive at the European level. It is important to remind at this point that Open ELS has a dedicated work-stream on SMEs and that the work on this aspect will continue in the near future.

Based on this analysis and on the findings coming from the assessment of the Open ELS impact on SMEs, it can be argued that the project will have a clear positive effect (although not entirely quantifiable) on the number of users of authoritative data in the EU. By removing barriers for different types of businesses,

[58] https://www.pitpoint.nl/en/#about-pitpoint
[59] https://www.openstreetmap.org/#map=8/50.510/4.475

including SMEs, it will facilitate access and use of cross-border datasets and it will multiply the number of businesses using those, thus also sustaining the growth in the number of data user companies in the EU. Furthermore, as illustrated by the SMEs examples presented above, the Open ELS project can make small European businesses more competitive by cutting the costs and administrative burden these companies face due to the multiple national administrations involved in the provision of authoritative geo-spatial data.

3.1.3. Impact of Open ELS on the establishment of cross-border services and applications

As also argued in the study supporting the review of the PSI Directive, "measuring the establishment of new cross-border services and applications in Europe is extremely difficult[60]". In general, there is a positive feeling amongst stakeholders on the correlation between more cross-border data availability and increase in the development of more cross-border services. It is clear in fact that the more data (compatible across border and across countries) is available the easier it is to develop cross-border products and services. However, besides anecdotal evidence, there is very limited data on the number of cross-border services and applications already existing and therefore it is very difficult to have a clear picture of the market status quo for these types of products. Furthermore, the evidence collected for this assignment shows that, although many businesses and SMEs operate in more than one EU market (e.g. 80% of those responding to the SME survey[61]) there are very few truly cross-border services. Most companies offer the same product or service in multiple national markets but they do not have a cross-border focus or dimension. Start-ups operating in the transport sector, such as Trainline[62] and SeaPilot[63], represent exceptions in this respect but they remain a minority.

What is certain in the context of Open ELS and with respect to geo-spatial information is that, despite the lack of data on already existing cross-border services, there is a strong demand for cross-border interoperable data and for solving issues such as edge-matching or topological connection across borders. This was highlighted during the course of the ELF project and by the results of the analysis of the SME survey. To the question "for your business, how important is it to have data that is harmonised across national borders?", a strong majority replied "extremely" or "very" important, as shown in the picture below.

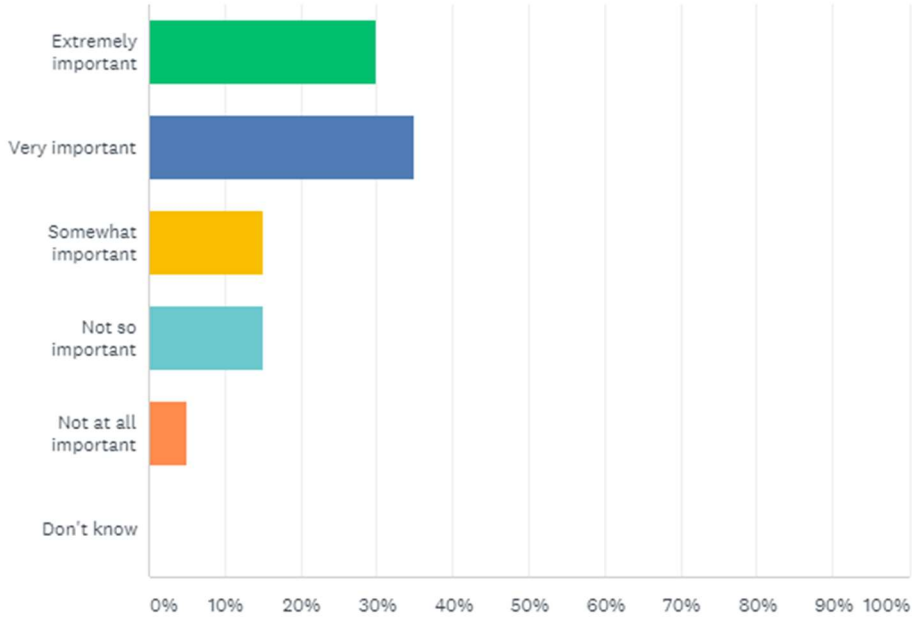
[60] See : "Study to support the review of Directive 2003/98/EC on the re-use of public sector information", 2018, https://publications.europa.eu/en/publication-detail/-/publication/45328d2e-4834-11e8-be1d-01aa75ed71a1/language-en

[61] See Annex A for more details on the results of the survey

[62] https://www.thetrainline.com/

[63] https://www.seapilot.com/

Figure 7 - Importance of data matching across borders



Furthermore, what is striking from the analysis of the survey, is that half of SMEs responding to the questionnaire consider Open ELS as service giving them the "possibility to develop new cross-border products and services" within the EU. In this respect and based on the data available, one cannot easily doubt the positive effects and benefits of Open ELS in terms of creation of cross-border services and applications. Even more importantly, this project seems to be a pre-condition for this to happen at the European level.

3.2 Social impact

Social impact is a rather broad category in impact assessment and it concerns many different aspects related to the effects of policy interventions on society. Generally speaking, positive social impact can be identified when societal welfare is enhanced. In the framework of Open ELS and based on the intervention logic developed, there are two main categories of social impact that are relevant:

- The impact on employment (that is to say the job creation effects of Open ELS)
- The impact on policies and policy makers (meaning the impact on quality of policy inputs and therefore of policy outcomes) and on citizens' lives (e.g. through better public services and policy outcomes)

These two aspects are investigated in the next sections.

3.2.1 Open ELS impact on jobs and employment

It is widely recognised that greater data accessibility directly translates in the establishment of new data related jobs. For instance, "a recent study on Transport for London (TfL) clearly indicated that the opening up of the data for re-use brought to the direct creation of around 500 direct and 230 indirect jobs for high skilled professionals"[64]. Furthermore, it was established that the PSI Directive resulted in 8,000 jobs created between 2010 and 2017 due to increased data availability[65]. Therefore, as clearly identified by the European Data Portal (EDP), in case of greater data availability "new jobs are created through the stimulation of the economy and a higher demand for personnel with the skills to work with data follows. In 2016, there will be 75,000 Open Data jobs within the EU 28+ private sector. By 2020, this number will increase to just under 100,000 Open Data jobs. Creating almost 25,000 new direct Open Data jobs by 2020.[66]"

Therefore, the link between greater data accessibility and establishment of new jobs is undisputed and this also applies in the context of authoritative geo-spatial data. In this domain, available data already suggest a positive trend towards more job creation and this trend can be further strengthened thanks to Open ELS. For instance:

- In Spain, the infomediary sector "closed 2016 with a total of personnel employed by infomediary companies of 19,347[67]". Furthermore, ", the "Geographic Information" subsector stands out in terms of employment reaching 29% of the total employees for the sector (which corresponds to around 5.600 employees), which along with the "Market Research" and "Economic & Financial" subsectors adds up to make 70% of the total infomediary companies[68]". The employment in this sector grew of 0,9% in respect to the previous year[69].

[64] See : Assessing the value of TfL's open data and digital partnerships, July 2017, Deloitte, http://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf
[65] See : "Study to support the review of Directive 2003/98/EC on the re-use of public sector information", 2018, https://publications.europa.eu/en/publication-detail/-/publication/45328d2e-4834-11e8-be1d-01aa75ed71a1/language-en
[66] https://www.europeandataportal.eu/en/using-data/benefits-of-open-data
[67] See : Asedie Infomediary Sector report 2018: http://www.asedie.es/assets/asedie-sector-infomediary-report-2018.pdf
[68] See : Asedie Infomediary Sector report 2018: http://www.asedie.es/assets/asedie-sector-infomediary-report-2018.pdf
[69] See : Asedie Infomediary Sector report 2018: http://www.asedie.es/assets/asedie-sector-infomediary-report-2018.pdf

- In Ireland, it was estimated that the number of jobs ranged between 1,600 direct and 3,000 indirect in 2016[70].
- In South-Africa alone, the number of jobs related to geo-spatial information ranged between 4,000 direct and 8,000 indirect jobs in 2017[71] while in Canada the number of jobs was estimated to be at around 19,000 in 2013[72].

Once more, the granularity of data and the stage of development of the Open ELS project makes it difficult to extrapolate and generalise these findings and develop a model to establish the precise impact that Open ELS could have in terms of jobs. Based on the information available, it is nonetheless clear that, by increasing data accessibility and discoverability and therefore by increasing the number of authoritative geo-spatial data users, Open ELS will have a positive impact in terms of jobs creation and will strengthen the data jobs demand by 2020. There is in fact a direct and strong link between the potential for developing new products and services, the cost reduction highlighted in particular by SMEs and the capacity of businesses of generating employment possibilities. Although not quantifiable today, the social impact of Open ELS in terms of job creation is therefore not negligible and could be more clearly established once the services will be activated and once there will be more visibility in terms of number of users.

3.2.2 Open ELS impact on policies and on citizens' lives

"Geo spatial information is a fundamental input to decrease uncertainty of decisions… and the benefits to society result from the use of these information in policy decision making.[73]" As mentioned in Section 2 of this report (state of play), policy-makers are amongst the main users of geo-spatial information and the trend toward data-driven and evidence-based decision making has put even more emphasis on the need to provide them with credible data. Policy makers want, and need, to use authoritative geo-spatial information to make informed decision as they cannot rely on imperfect data when playing with citizens' lives. Furthermore, policy makers need cross-border data: this does not apply only to EU level policy makers which develop policies at the continental scale but also to national and regional policy makers confronted with smaller scale challenges.

In the next sections we will examine how Open ELS could impact policy makers' decisions at the EU but also at the national and regional levels in order to derive some conclusions on the benefits of the project in terms of policy outcomes.

The European level: the Trans-European Transport Networks (TEN-T)

"The Trans-European Transport Network (TEN-T) is a European Commission policy directed towards the implementation and development of a Europe-wide network of roads, railway lines, inland waterways,

[70] See : « Assessment of the economic value of the geo-spatial information industry in Ireland », 2014, https://www.osi.ie/wp-content/uploads/2016/02/Economic-Value-of-the-Geo-spatial-Information.pdf

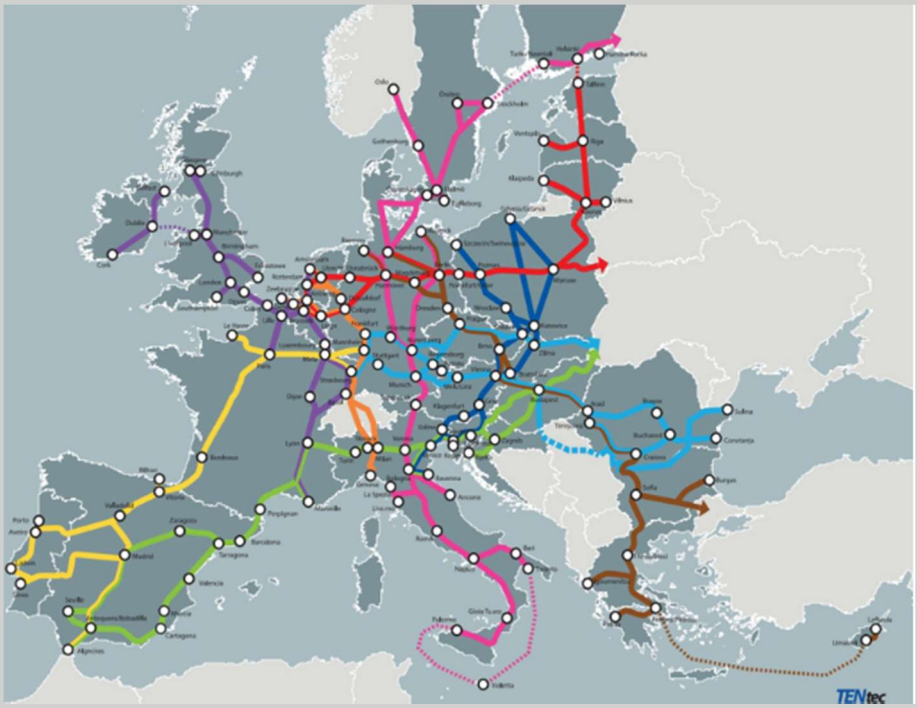
[71] See : « Economic impact of spatial services – South Africa Peer Review », 2017, https://www.bbrief.co.za/content/uploads/2017/10/Google_Geo-spatial-impact_South-Africa-report.pdf

[72] See : GeoConnections, "Canadian geomatics environmental scan and value study", 2013, https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R=296426

[73] See : Richard Bernknoof and Carl Shapiro, « Economic Assessment of the use value of Geo-Spatial Information", 2015, http://www.mdpi.com/2220-9964/4/3/1142

maritime shipping routes, ports, airports and rail-road terminals[74]". In the context of this policy, the European Commission distinguished between the Core Network (most important connections between the most important nodes) and the Comprehensive Network, which covers all EU regions. The Connecting Europe Facility Programme (2014-2020), the European Structural and Investment Fund and the European Fund for Strategic Investment all support, financially, the efforts done in this area[75].

Figure 8 - Ten T Core Network Corridors[76]



For transport policies and for the TEN-T policy in particular, there is a strong need for interoperable and cross-border data on transport networks. Unfortunately, these data have been historically difficult to compile as Member States were collecting and providing them in different ways and due to the combination of publicly and privately owned data (e.g. some data on railway infrastructures are owned by public-private or even entirely private network owners in some Member States). Furthermore, it emerged from the interviews carried out with EU officials that policy makers have very limited visibility on which data is currently available and where. In this respect, there seems to be a lack of awareness of possible sources and a lack of communication between data providers. For instance, officials from the Directorate General on Mobility and Transport are not always fully up-to-date in terms of which data on transport networks Eurostat and other statistical bodies collect and make available also due to the many data providers dealing with these datasets. For all these reasons, some interviewees expressed the need for:

a) One point of access to transport network data with up-to-date and reliable information;

[74] https://ec.europa.eu/transport/themes/infrastructure/about-ten-t_en
[75] https://ec.europa.eu/transport/themes/infrastructure/about-ten-t_en
[76] http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html

b) Services on top of data itself (such as viewers) as to facilitate the understanding of the information for policy-makers with a non-technical background.

Open ELS seems to be able to address both these needs. It can offer one single point of access to transport network data of the Member States coupled with services and helpdesk support for data users. Furthermore, acting as a central point of information, Open ELS could link to other data sources and redirect users elsewhere when relevant. In this respect, Open ELS could radically improve the way in which decisions on transport policies at the EU level are made and socialise a much higher number of policy makers to data-driven decision making.

The national level: geo-spatial information for emergency services

The value of authoritative geo-spatial information in the context of emergency services is unquestionable and, today, it is almost a cliché: "without any doubt, spatial information have become a mission critical attribute which offers tangible benefits for emergency services[77]". This is true not only for the EU of course, but rather at the global level, as many studies on the potential of geo-spatial information for emergency services suggest[78].

Authoritative geo-spatial information need to be used at every stage of emergency intervention including the planning, response and recovery phases. Emergency services normally obtain these data from National Mapping and Cadastral Agencies. Although NMCAs information are more and more interoperable (also thanks to the INSPIRE Directive[79] and other standardisation efforts) this is not the case yet for the full set of data required for emergency services[80].

Availability of interoperable authoritative data is crucial for the success of emergency response, including and especially for cross-border interventions. At the same time, management and use of geo-spatial information is not so simple: it requires skills and resources as well as trust in the quality of data, considering that lives are at stake[81]. Lack of data accuracy is in fact the primary cause of delays and hesitation in emergency intervention[82]. Furthermore, as shown by the case of Christchurch Earthquake in

[77] See : The value of geo-spatial information for emergency services, EENA Operations document, 10/01/2017, http://www.eena.org/download.asp?item_id=223
[78] See: Juliet McMurren, Stefaan Verhulst, Andrew Young, Open Data's Impact, Open Data's use after Christchurch Earthquakes, Open Data for Improving Emergency Response, January 2016
[79] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32007L0002
[80] See : The value of geo-spatial information for emergency services, EENA Operations document, 10/01/2017, http://www.eena.org/download.asp?item_id=223
[81] See : The value of geo-spatial information for emergency services, EENA Operations document, 10/01/2017, http://www.eena.org/download.asp?item_id=223
[82] See : The value of geo-spatial information for emergency services, EENA Operations document, 10/01/2017, http://www.eena.org/download.asp?item_id=223

New Zealand, in the immediate aftermath of a natural event, responsible for geo-spatial data might be overwhelmed with demands for data and services[83].

In this context and thanks to the authoritative nature of its data, Open ELS can contribute to the *stable and secure* provision of geo-spatial information (of different kind) for emergency services operating at the different levels. Thanks to features such as the edge-matching, this project could particularly support the planning of intervention in cross-border regions and/or coordinated across Member States. Being a trusted source of information and by pooling together data from different Member States, Open ELS can respond to the emergency services' critical needs for up-to-date and high resolution information both on a daily basis and during major catastrophes. Furthermore, as also highlighted in a recent report, emergency services do not only need data *per se* but also services linked to these data including guidance and support as well as helpdesk activities[84]. These needs can also be met by Open ELS service provision as the project goes beyond offering data and suggests a user centric and service based approach for the provision of authoritative geo-spatial information.

Therefore, there are three key advantages linked to the use of Open ELS over other data sources in the context of emergency services:

- first, Open ELS provides authoritative data which can be trusted by emergency services,
- second, it provides data from multiple countries (and NMCAs) in a harmonised and consistent way,
- third, it provides services on top of data, thus catering for the need of support and assistance in data management.

For all these reasons, Open ELS could become a trusted source of information for emergency service providers at the regional, national and European level and hence contribute to improving the effectiveness and efficiency of these services.

The regional level: macro regional strategies and other cross-border regional initiatives

"A macro regional strategy is an integrated framework endorsed by the European Council, which may be supported by the European Structural and Investment Funds among others, to address common challenges faced by a defined geographical area relating to Member States and third countries located in the same geographical area which thereby benefit from strengthened cooperation contributing to achievement of economic, social and territorial cohesion"[85]. There are currently four macro regional strategy in the EU and notably:

[83] See : Juliet McMurren, Stefaan Verhulst, Andrew Young, Open Data's Impact, Open Data's use after Christchurch Earthquakes, Open Data for Improving Emergency Response, January 2016
[84] See : The value of geo-spatial information for emergency services, EENA Operations document, 10/01/2017, http://www.eena.org/download.asp?item_id=223
[85] http://ec.europa.eu/regional_policy/en/policy/cooperation/macro-regional-strategies/

- The EU Strategy for the Baltic Sea Region (2009)
- The EU Strategy for the Danube Region (2010)
- The EU Strategy for the Adriatic and Ionian Region (2014)
- The EU Strategy for the Alpine Region (2015)

"Data are crucial for *macro-regional strategies*: as means to support policy-making, as a shared assets to support economic growth and as means of understanding the culture of a region's citizens. Data are needed to understand the status of the region at different stages of the policy cycle and to ensure that investments are targeted effectively"[86]. The need for cross-border authoritative data in the framework of macro regional strategies also translated in a number of initiatives aimed at ensuring the provision of comparable data across borders at a regional scale.

In particular, the Danube Macro Regional Strategy, in collaboration with the Joint Research Center of the European Commission, established the Danube Reference Data and Services Infrastructure (DRSDI)[87]. The establishment of this project was due to the acknowledgement that not all data needed in the context of the Danube Macro Regional Strategy was readily available. In particular, policy makers had limited (not cross-border and not-interoperable) data on cadastre, road and water transport networks. In the framework of the work package on corruption, the DMRS started to work on the cadaster data of the participating countries in order to create a system of digital borders providing information on land ownership and additional geo-spatial services on top. Of course, if such cadastral data would have already been available in a compatible and interoperable form, the Macro Regional Strategy would not have had to start from scratch collecting them.

As the example from the Danube Macro Regional Strategy shows, open ELS would have a direct and highly positive impact on cross-border policy making and on cross-border strategies. Many other border regions in Europe are involved in joint cross-border projects for which edge-matched and compatible data would be required and many of these projects start by pooling data together before kicking off the activities (e.g. see also the RiskNet AlcoTra project[88] or the EU Strategy for the Baltic Sea Region[89]), as this is a pre-condition for their success. By providing already some of these datasets in the desired form, Open ELS could enable cross-border regions and project to be more effective and efficient in their initiatives and to spare time and efforts on compilation of data. In this respect, Open ELS could:

a) Help developing better cross-border policies and initiatives, based on authoritative data;
b) Reduce costs and burden for cross-border regions linked to data compilation;
c) Facilitate dialogue and exchange of experiences, based on comparable information.

Although these benefits are not directly quantifiable at this stage, the potential of Open ELS in terms of benefits for cross-border regions and policy making is probably the most significant. In fact, the need of cross-border regions for comparable data is very high and, so far, it has remained unfulfilled.

[86] https://ec.europa.eu/jrc/en/news/jrc-6th-annual-forum-eu-strategy-danube-region
[87] http://drdsi.jrc.ec.europa.eu/
[88] http://www.risknet-alcotra.org/
[89] https://www.balticsea-region-strategy.eu/

As all these examples suggest, Open ELS will cater for the needs of policy makers at different territorial levels and would allow to improve policies and initiatives in many different domains. By providing to policy-makers already compiled authoritative information through one single point of access, Open ELS can speed up decision making process and make it more relevant and accurate for the territories concerned.

4 Conclusions

As mentioned thorough all this study, the overall socio-economic impact of Open ELS remains unquantifiable at this stage. Similarly to the domain of open data, precise figures and indicators on the impacts "show a fragile validity and necessarily limited scope[90]". However, the fact that this cannot be precisely measured does not mean that the impact of Open ELS on the EU economy and society is to be considered limited or negligible. On the contrary, it was possible to identify a considerable number of positive socio-economic impacts that could result from this intervention.

In particular, it should be highlighted that:

- **Open ELS will have a very positive impact on the overall EU geo-spatial information market and especially in the context of the EU data economy and when combined to other EU level interventions**. First of all, multiple studies on the effects of facilitating the provision of authoritative geo-spatial information at the national level show that the economic benefits greatly compensated for the costs of these initiatives. They also show how greater provision of authoritative geo-spatial data had significant effects in terms of markets and efficiency gains. Although it is difficult to establish the magnitude of such an impact for Open ELS, it must be mentioned that the provision of harmonised data from different NMCAs will multiply the economic effects of the intervention. Indeed, available studies focus on national level and analyse the effects on a single and specific country but the impact of Open ELS would be applicable for multiple Member States and at the EU level. In this respect, Open ELS could complement other EU level initiatives (e.g. the European Data Portal[91] and the Support Center for Data Sharing[92]) and help the European Commission fostering the overall EU data economy.
- Furthermore, **Open ELS will have a positive and direct effect on the number of companies using authoritative information and on the number of cross-border services and products available in Europe.** By lowering barriers for authoritative data use (e.g. administrative costs and time losses linked to the need to deal with different administration for obtaining the data), Open ELS will help increasing the number of companies using authoritative information (both "new" users and companies which will switch from other, non-authoritative, data sources). Additionally, the provision of information which are interoperable and harmonised across border will allow European business to scale up and develop new services and products which will be more easily available in multiple Member States. Also in this respect, Open ELS can complement the results of other initiatives carried out at the European level. SMEs will particularly benefits from the provision of Open ELS service as these are the type of companies which are more heavily confronted with barriers for the use of authoritative data and especially in terms of costs, resources and skills. As mentioned by this report,

[90] See: Sébastien Martin, Slim Turkin "Impacts of Open Data in Luxembourg and the Greater Region – 2018, Main Findings", https://download.data.public.lu/resources/study-impacts-of-open-data-in-luxembourg-and-the-greater-region-2018/20181004-093205/impacts-of-open-data-in-luxembourg-and-the-greater-region-2018.pdf
[91] https://www.europeandataportal.eu/en/homepage
[92] https://ec.europa.eu/digital-single-market/en/news/open-call-tenders-setting-support-centre-data-sharing

SMEs constitute 99% of EU businesses and they play a pivotal role in the EU economy. **By unleashing the potential of SMEs, Open ELS will hence help the European economy to accelerate its digital transformation**.

- At the same time, the social impact of Open ELS will also be highly significant**. Increased usage of authoritative data will result in job creation**, as proven by a number of studies that examined the direct link between data provision and the growth in employment opportunities. The number of jobs linked to geo-spatial information is already considerable in many EU countries (e.g. Spain and the United Kingdom[93]) and will only increase thanks to Open ELS and to the opportunities linked to more data availability. The benefits this project brings in terms of cost reduction for SMEs will also contribute to unblock resources and possibly lead to establishment of new jobs. Finally, **Open ELS can contribute to improving policy making at the EU**, **national and regional level**. While the territorial dimension becomes more and more relevant for the adoption of impactful public policies, availability of authoritative cross-border geo-spatial information remains limited, as also highlighted by some of the case studies examined for this report. This has serious consequences for policy makers at different governance levels which have limited evidence as basis for their decisions. By catering for policy makers' need for authoritative geo-spatial information (harmonised across borders) Open ELS can have a positive impact on many different public policies and services thus also leading to greater socio-economic benefits.

In general, Open ELS fills an existing gap in terms of data availability and caters for an existing need for more authoritative and cross-border geo-spatial information at the European level. This need, which constitutes the rationale of Open ELS, is even stronger today than when the project started, due to the acceleration of the digital transformation and the take up of the Data Economy in Europe. By filling this need, the benefits of Open ELS intervention are spread amongst many different sectors and stakeholders within the EU, ranging from SMEs to policy makers. Furthermore, Open ELS will help achieving the objectives that the European Commission has set for the EU data economy by lowering barriers to data usage, support business digital transformation and building a European strong data market.

[93] See : « First Report on Facts and Figures: Updating the European Data Market Monitoring Tool", 2018, http://datalandscape.eu/study-reports

Annex A – Results of the survey

The SME survey carried out by the Open ELS project consisted in 21 questions on different topics. However, not all questions have been used in the framework of this study.

This Annex provides some key information on the characteristics of the survey's respondents and it highlights the results of the key questions for this assignment. This annex considers the results of the 21 October 2018[94].

Characteristics of respondents

Total number of respondents: 25

Complete answers: 21

Uncompleted answers: 4

Approximate turnover of respondents:

- Less than €10 million (80%)
- €11-25 million (0%)
- €26-50 million (15%)
- €51-100 million (5%)
- More than €100 million (0%)

Countries on which the SMEs are based:

- Belgium (1 company)
- Finland (1 company)
- Germany (2 companies)
- Greece (1 company)
- Latvia (1 company)
- Netherlands (2 companies)
- Serbia (1 company)
- Spain (10 companies)
- Sweden (1 company)
- United Kingdom (1 company)

[94] The survey is still open at the time of the submission of this report.

Sectors in which the SMEs operate:

- Energy and infrastructure (15 companies)
- Emergency services (5 companies)
- Transport (11 companies)
- Real estate (12 companies)
- Finance and insurance (8 companies)
- Environmental services (12 companies)
- None of the above (2 companies)

Question: Other than your home country, how many other European countries do you or your customers serve?

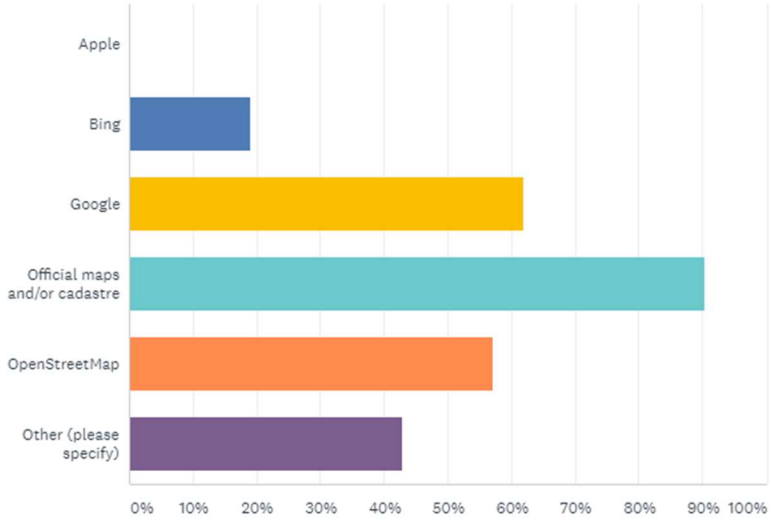
- None – we only serve our home country (19%)
- 1 (9,5%)
- 2 (9,5%)
- 3 (9,5%)
- 4 (9,5%)
- 5-10 (28,5%)
- More than 10 (9,5%)

Question 1: Does your business use geo-spatial data, such as digital mapping, addresses or other information about the location of objects on the earth?

ANSWER CHOICES	RESPONSES	
Yes - we use geospatial data to provide a service to our customers	84.00%	21
Yes - we use geospatial data but only to help run the business	12.00%	3
Not at present - but we foresee uses for geospatial data in future	4.00%	1
No	0.00%	0
TOTAL		25

Question 2: Which sources of geo-spatial data do you use at present?

Answered: 21 Skipped: 4

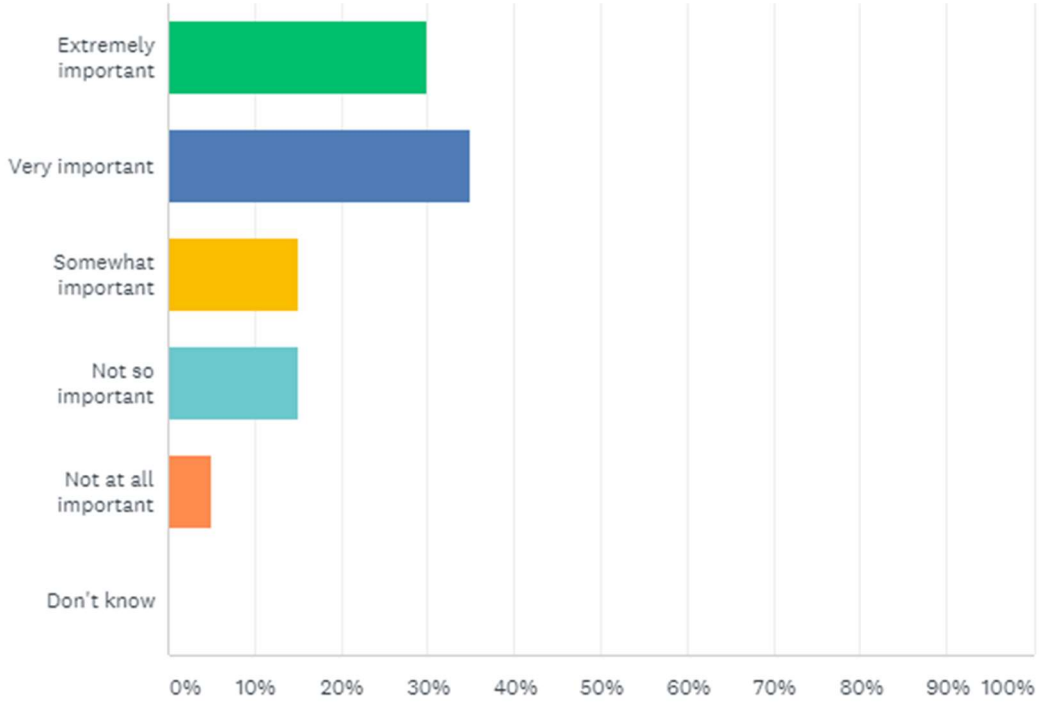


Question 5: For your business, how important is it to have data that is harmonised across national borders?

ANSWER CHOICES	RESPONSES	
Extremely important	28.57%	6
Very important	38.10%	8
Somewhat important	19.05%	4
Not so important	9.52%	2
Not at all important	4.76%	1
Don't know	0.00%	0
TOTAL		21

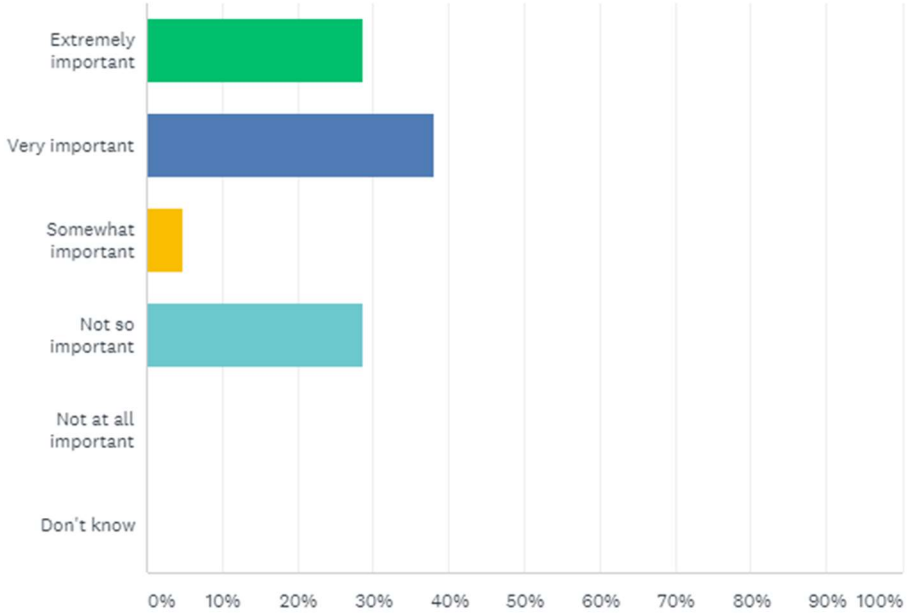
Question 6: For your business, how important is it that geographical features - roads and buildings, for example - match visually/topographically across national borders?

Answered: 20 Skipped: 5



Question 7: For your business, how important is it that network features - roads and rivers, for example - connect topologically across national borders?

Answered: 21 Skipped: 4



Question 8: What might be the main benefits for your business of having access to free-of-charge harmonised geo-spatial data services based on authoritative official sources?

ANSWER CHOICES		RESPONSES	
Possibility to improve your internal business processes		42.86%	9
Possibility to improve your existing products and services offering		76.19%	16
Possibility to develop new products and services		71.43%	15
Possibility to develop new cross-border products and services		57.14%	12
Reduced costs for acquiring/accessing data		66.67%	14
Reduced time and costs of dealing with different national mapping and cadastral agencies		71.43%	15
Reduced time and costs linked to data cleaning and handling		57.14%	12
Don't know		0.00%	0
Other (please explain)	Responses	4.76%	1
Total Respondents: 21			

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