



1. INFORMATION ON THE ACTION	
Grant Agreement N°	INEA/CEF/A2016/1297076
Action Title (Art. 1 of G.A.)	Open European Location Services (Open ELS)
Action number (Art. 1 of the G.A.)	2016-EU-IA-0046

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## 2. IMPLEMENTATION OF THE ACTION

### 2.1. Overall completion of the Action

Planned Start/End date <sup>1</sup>		Actual Start/End date		Completion <sup>2</sup>
01/05/2017	30/04/2019	01/05/2017	30/04/2019	100%

### 2.2. Completion per activity/work package

Activity 1	Title <sup>3</sup>	Planned Start/End date <sup>3</sup>		Actual Start/End date		Completion
	Governance	01/05/2017	30/04/2019	01/05/2017	30/04/2019	100%
Milestone no	Title <sup>3</sup>	Planned date <sup>3</sup>		Actual date		Reached (Y/N)
1	Terms and conditions for the web-services to be accredited to open ELS products are defined	28/02/2018		31/03/2018		Y
2	Plans for the long-term sustainability of Open ELS are arranged	31/12/2018		31/12/2018		Y

Activity 2	Title <sup>3</sup>	Planned Start/End date <sup>3</sup>		Actual Start/End date		Completion
	Technical infrastructure	01/05/2017	30/04/2019	01/05/2017	30/04/2019	100%
Milestone no	Title <sup>3</sup>	Planned date <sup>3</sup>		Actual date		Reached (Y/N)
3	Final Open ELS platform	01/03/2019		30/04/2019		Y
9	Implementation of eTranslation	30/04/2019		28/02/2019		Y <sup>4</sup>

<sup>1</sup> As specified in Art. 2.2 of the Grant Agreement.

<sup>2</sup> The completion of the Action and of each activity/work package should be indicated as a percentage.

<sup>3</sup> As specified in the Grant Agreement.

<sup>4</sup> See section 2.3 for further information

Activity 3	Title <sup>3</sup>	Planned Start/End date <sup>3</sup>		Actual Start/End date		Completion
		Data supply content	01/05/2017	30/04/2019	01/05/2017	30/04/2019
Milestone no	Title <sup>3</sup>	Planned date <sup>3</sup>		Actual date		Reached (Y/N)
4	Compliance with the MQA (Metadata Quality Assurance) applied by the European Data Portal	31/03/2019		12/04/2019		Y
5	Open ELS support desk	30/10/2017		30/09/2017		Y
6	EGHO right to license the data in Open ELS is granted	03/12/2018		31/03/2019		Y

Activity 4	Title <sup>3</sup>	Planned Start/End date <sup>3</sup>		Actual Start/End date		Completion
		User orientation and requirements	01/05/2017	30/04/2019	01/05/2017	30/04/2019
Milestone no	Title <sup>3</sup>	Planned date <sup>3</sup>		Actual date		Reached (Y/N)
7	Standard Open ELS licenses and terms of use	30/04/2018		31/07/2018		Y
8	Samples of Open ELS use case applications showing benefits of Open ELS in defined market segments	31/01/2019		30/04/2019		Y

**2.3. Description of the implementation of the Action, including the actual status at the end of the Action and possible deviations from the planned activities, and, if applicable, compliance with any relevant specific provisions as indicated in the Annex I of the GA**

**Activity 1 – Governance**

The purpose of Activity 1 was two-fold: to ensure timely delivery of the Action's Outputs and to develop key policy elements required for the implementation of the Action. The Activity involved 4 key tasks.

**Task 1.1 Project Management**

Due to the large number of project partners charged with implementing the project action, robust project management procedures and tools were required in order to maximise its efficiency and effectiveness. Strong financial management procedures were also put in place by the project coordinator in order to ensure that costs incurred by grant beneficiaries were both necessary and eligible for reimbursement. A governance model, reporting and monitoring tool were implemented and applied for managing the direction and project outcomes.

Regular quarterly meetings with the Activity Leaders and the Programme Board were conducted. Regular quarterly technical and financial updates were produced and submitted to the Programme Board which acted as a Steering Group for the action. This enabled monitoring and evaluation of progress and early identification of any deviations from the plan or potential issues arising. An annual project partner meeting was held which was attended by all partners in person which provided a valuable opportunity to review progress, discuss open issues and to plan next steps. In addition to these formal project management and reporting mechanisms, regular team meetings for tasks and activities were held both in person and in

the form of web meetings or calls to ensure good communication and information sharing between the various partners and EuroGeographics (EG) as the Co-ordinator of the Action and to enhance shared learning across the partners.

### **Task 1.2 Cross Border Representation**

The task focused on the development of policy principles on how data should be visualised and represented in international border areas where two or more neighbouring countries provide different content of spatial data which do not agree. For example, more than one data provider might contribute data and web-services that conflict or show different content in the dispute areas. Rules therefore need to be agreed on how the data should be accommodated and presented to pan European users through Open ELS.

A report on the policy principles was produced that describes a proposal for a unified approach to the presentation of geo information in areas struggling with different kinds of disputes over administrative or territorial competence regarding provision of authoritative data in the border areas between neighbouring countries. This policy paper attempts to define the EuroGeographics approach to the conflicted data supplied as a result of a declared dispute between two countries, for the purpose of Open ELS project and applicably for all other data products and projects maintained by the Association.

The report on "Open ELS principles on presentation of data content on disputed territories" is available at:

[https://openels.eu/wp-content/uploads/2019/05/20190423\\_OpenELS\\_Principles-on-presentation-of-data-content-on-disputed-territories.pdf](https://openels.eu/wp-content/uploads/2019/05/20190423_OpenELS_Principles-on-presentation-of-data-content-on-disputed-territories.pdf)

### **Task 1.3 Open Data Policy**

A key task of the project was to develop and implement a policy framework required for the implementation of Open ELS products and services based on open authoritative geospatial data from EuroGeographics' members. The "Open Data policy for Open ELS" was developed during the first project year by running a survey first aiming to analyse national and European variations and differences of open data policies and interpretations, identifying policy obstacles and approaches for sharing the data amongst providers of national, authoritative, open and geospatial data. The results of the survey are summarised in a report: <https://openels.eu/wp-content/uploads/2018/07/1.3-OpenELS-report-NMCA-survey-results2017.pdf>

EuroGeographics recognises varying interpretations of the "open data" definition, as well as differences in approach to the licensing of data classified as open, implemented by its Members. The objective of the "Open Data policy for Open ELS" was therefore to clarify the definition of open data for the Open ELS Project. The document, by defining what is meant by Open ELS, distinguishes it from other datasets being served through different platforms and services. It sets up a common vision and approach to open data for Open ELS. It also sets up a framework of principles that will guide the users in accessing and reusing the data and a clear understanding of how the data will be licensed through the Open ELS services.

The policy also provides a framework for establishing a licensing model that will clearly describe the user's rights and obligations resulting from reuse of the Open ELS data. This policy applies to the geospatial pan-European data and services developed and maintained by EuroGeographics AISBL and its Members through the Open ELS Project.

The policy document is available at: <https://openels.eu/wp-content/uploads/2019/04/OpenELS-1.3-Open-Data-Policy-for-OpenELS.pdf>

### **Task 1.4 Economic Appraisal for sustainability of Open ELS**

This task was completed by a sub-contractor for which a procurement processes was held. The contract was awarded to Deloitte who completed the analysis and delivered a report in November 2018. This study assessed the potential socio-economic benefits of the Open ELS project for the European Union. The study identified a number of domains and players which are likely to be most positively affected by Open ELS.

The study concluded that Open ELS has clear potential in terms of socio economic benefits. Due to the importance of geo-spatial information in the context of the Data Economy, it could help accelerate the digital transformation of Europe by enabling public and private stakeholders to rely on authoritative information which is 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.

The full study is available at the Open ELS website:

[https://openels.eu/wp-content/uploads/2019/04/Open\\_ELS\\_socio\\_economic\\_benefits\\_final\\_report\\_Website.pdf](https://openels.eu/wp-content/uploads/2019/04/Open_ELS_socio_economic_benefits_final_report_Website.pdf)

A toolbox document for national authorities has been developed as an accompanying document to the Economic appraisal. The purpose of this toolbox is to help the National Mapping and Cadastral Authorities (NMCAs) in their journey towards open geo-spatial data and participation in pan-European infrastructures and notably to present:

- The key steps for NMCAs willing to open their geo-spatial data at the national level and participate in pan-European products or infrastructures (such as Open ELS).
- The typical questions and challenges NMCAs face when embarking in this journey
- The material and support NMCAs can rely on to overcome their doubts and challenges, and especially with respect to the measurement and monitoring of benefits.

The support material this toolbox leverage has been primarily developed in the context of the Open ELS project, material from other sources and projects has also been referenced.

The "Toolbox for National Administrations" is available at the Open ELS website:

<https://openels.eu/wp-content/uploads/2019/05/Open-ELS-Toolbox-for-national-administrations.pdf>

The activity also aimed to produce an operational plan (business plan) to ensure the sustainable maintenance of Open ELS. However, at the end of the Open ELS project, the project has not yet reached the stage of sustainable maintenance. Therefore the present plan for Open ELS describes the scenario for developing Open ELS into operational services over the next 2 years after the project end. The purpose of the development plan is to provide to EuroGeographics and its stakeholders a clear picture of the planned activities and resources for the further development of Open ELS – if funding is available and therefore the actions are affordable. The implementation of this plan has certain constraints which prevent an immediate implementation of the proposed actions after the project end (30 April 2019). EuroGeographics clearly states that developing sustainable funding for these services will be critical to their continued operation.

This development plan describes activities in the timeframe of 2 years after ending of the Open ELS project (May 2019 – August 2021) and the high-level tasks and resources as well as it includes an estimation of costs for the defined time frame. Further investment in ELS / Open ELS depends on affordability. EuroGeographics has explored the potential for private sector partnership, but indications are that there is no interest. The major demand for such data is the EU and its related institutions; however, further funding has not been forthcoming from these bodies. In the absence of further funding, then the project unfortunately has to conclude. Implementation of the development plan will depend on affordability of the actions and the strategic direction for Open ELS.

The report "Development plan – Open ELS" is attached at Annex 1.

### **Milestones**

As outlined in Section 2.2 all milestones linked to Activity 1 have been fully achieved as follows:

Milestone 1: Terms and conditions for the web-services to be accredited to open ELS products have been defined within the Open Data Policy which has been agreed amongst EuroGeographics' members and is being implemented for Open ELS. The development plan describes the next step required to achieve long-term sustainability.

Milestone 2: An economic appraisal of the impact of Open ELS has been undertaken which provides an analysis of the long-term sustainability of Open ELS.

### **Activity 2 – Technical Infrastructure**

The purpose of this activity was to further develop and maintain the technical infrastructure for accommodating the national web services and launching Open ELS. It built on the existing infrastructure which was developed through the European Location Framework (ELF) project and consisted of 5 key tasks.

#### **Task 2.1 Organising and running the technical infrastructure**

The aim of the task was to run and strengthen the technical platform and to manage and provide technical support. The ELS technical infrastructure, on which the Open ELS activities operate or are related to is based on the technical infrastructure inherited from the European Location Framework (ELF) project.

##### Organising and running the technical infrastructure

The key activities were:

- Running the technical infrastructure (by Kartverket Norway and NLS Finland)
- Extending the technical platform by increasing the server capacity to being operational. A development and staging infrastructure was set up to implement the necessary means for operation and production environment. Five new servers with extensive storage were set up in this process.
- The security solution inherited from the ELF project was based on the off the shelf software provided by the ELF project partner con terra software GmbH. It was decided to implement a minimum security solution after the license expired. The minimum solution was implemented by Activity 2 technical experts.
- It was decided to terminate the license for the ELF monitoring tool (from the company Spatineo) and to implement a "Monitoring light" solution based on Kartverket's developments in the Norwegian national SDI portal. The solution was adapted to ELS requirements. "Monitoring light" is now running in the ELS environment for all relevant services included in the Open ELS products.
- In order to improve the support for validation of metadata and services for the Open ELS platform download services, view services and metadata it was decided set up an Open ELS instance of the INSPIRE validator. The Open ELS metadata validator was set up to overcome some of the weaknesses – consume secure services and privacy of test results - of the INSPIRE validator primo 2018. The service was set up on a new, separate server by Activity 2 technical experts.

##### Testing a WFS Central Prototype

The Open ELS platform is built on the ELF technical infrastructure. The ELF project implemented a European spatial information infrastructure, where INSPIRE-based services are provided by each NMCA and are presented through Showcase Application. Users were managed through a centralized security manager and were offered the opportunity to acquire either

a test or development license for interface services. WFS services were implemented by compiling the services into one access point called 'cascading' architecture. This decentralized architecture has caused quality deviations and major differences in service response times.

The Open ELS project team decided that the project could test a centralized architecture prototype where the data (GML files) are uploaded to a centralized database and are offered as a WFS interface. At the same time, an attempt was made to simplify the data model so that services are easier to implement and also easier to use. This work was done as a one-day hackathon (plus preparation and follow up activities). The prototype was built and tested but not implemented as a platform solution during the project. By using the centralized architecture it is easier for a centralized database and service to offer homogeneous quality, and the functionality of the service can be better guaranteed e.g. by clustering of databases and web services.

The report "Organising and running the technical infrastructure" is available upon request.

The report "WFS Central Prototype" is available upon request.

### **Task 2.2 APIs and Linked data**

The aim of the task was to develop technical approaches for making open data easier to use and more flexible through implementing APIs and demonstrating the "Linked data" concept.

The project team generated Linked Data versions of two INSPIRE datasets, namely Administrative Units and Geographical Names. These data can be queried via national SPARQL endpoints. The results can be visualised on the country's own official base maps. To store relevant queries, and to demonstrate the results, the team have created a Data Story. This section provides further detail on the methods and tools used to generate and publish the data. Quantitative characteristics of the resulted datasets are given followed by the description of the GeoLocator service.

The report "Next Generation of Spatial Data Infrastructure: Lessons from Linked Data implementations across Europe" is available at: [https://openels.eu/wp-content/uploads/2019/04/V2\\_Next\\_Generation\\_SDI\\_Lessons-from-LD-implementations-across-Europe\\_1.pdf](https://openels.eu/wp-content/uploads/2019/04/V2_Next_Generation_SDI_Lessons-from-LD-implementations-across-Europe_1.pdf)

The data story is available at <https://data.labs.pdok.nl/stories/OpenELS/>.

### **Task 2.3 Arrangements for European Data portal**

The aim of the task was to link Open ELS to the European Data Portal (EDP). The task included two subtasks:

- 1) Linking the Open ELS platform to the European Data Portal (based on The Gold Book and harvesting guidance),
- 2) Testing, validation and consideration of the Automatic Translation Building Block (eTranslation).

#### *Linking the Open ELS platform to the European Data Portal*

The results of the first subtask are that the Open ELS metadata services (csw) serving the metadata for the Open ELS services are harvested by the European Data Portal. The Open ELS metadata catalogue and metadata services have been established in the ELS technical infrastructure. It is based on the open source software Geonetwork. The subtask was jointly undertaken with team of task 3.1 (Data and metadata quality). Metadata for the Open ELS products has been created and made available for harvesting by EDP. The results of the work are described in the report on MOA compliancy (see Annex 3).

#### *The Automated Translation Building Block (eTranslation)*

The second subtask focused on testing, validating and considering the implementation of The Automated Translation Building Block (eTranslation). The initial considerations included the decision on the test approach, selection of appropriate documents for testing, selection of the domain provided by eTranslation for testing and selection of languages (all test originals in English) to be translated.

The following approach for testing was decided:

- Translation of selected documents into selected languages with the One-off translation method from the eTranslation website,
- Validation of the results,
- If results from 1) are positive and valuable, continue testing in machine-to-machine mode by interfacing to the eTranslation web-service API.

Three types of documents were selected for testing: Open ELS metadata records INSPIRE profile in plain XML-format, a 21 pages Open ELS report in docx format; and 2 web articles from an Open ELS Project Partner in .docx format, text only. All the chosen documents are regarded as typical for the geospatial domain and are domain specific in the sense that they include technical expressions and wordings.

The testing results showed that the documentation provided on the eTranslation website is good and guided the project team in an intuitive way through the man-machine test process. It was straightforward for us to obtain credentials for use of eTranslation. The documentation for the API (machine-to-machine) has been evaluated by experts concluding that it can be integrated in a wide range of applications with reasonable efforts.

The translated documents were then validated/ reviewed by representatives of Project Partners in the various languages and classified in 3 categories (1 = fairly good useable; 2 = – Medium useable require more editorial work; 3= Unusable use of human translator required).

The results for the testing and validation of the metadata records do not vary much between languages. This is not surprising because the document contains very little text. Only three of the mandatory fields are free text and often of limited length. The rest of the contents come from code lists and/or vocabularies. The validators comment for improvements for translation of metadata documents is that significant improvements for eTranslation can be achieved by translating the code lists and vocabularies. The translation of the Open ELS report had more severe weaknesses, in particular limited capabilities of translation technical 'language and expressions' but also constructing meaningful sentences from the original English version.

The overall results demonstrate for the geospatial domain a limited benefit because:

- The geospatial domain is a small domain compared to e.g. health and justice and resources for supporting eTranslation in this domain from countries is probably not high priority.
- The geospatial domain is very technical with special words, terms and also the use of words and sentences. This also means that technical terms and words do not have necessarily have to be translated.
- The benefit of using eTranslation in some of the partner countries (e.g. Finland and Norway) is probably limited, thus the machine learning parts of eTranslation has not proven the potential value for the geospatial domain.

Based on the test results and validations it the project team decided not to implement the machine to machine interface (API):

- The translation to most of the languages for performed tests on typical documents in the geospatial domain has several weaknesses – translation of words and phrases- and also building meaningful understanding of the text in a broader.
- The Open ELS User Interface was under development and built at the end of the project, therefore Open ELS had not have any proper application or website available to integrate with. A small test application with some more or less fake test data could have been developed, but it was not found meaningful because of the reason mentioned above (currently low level of maturity for geospatial domain).

The report "Arrangements for the European Data Portal" is attached at Annex 2.

#### **Task 2.4 Exploring opportunities for user defined visualisation**

The aim of the task was to evaluate and improve the flexibility of geospatial data visualisation of web services developing options for users to define the portrayal of styling for Open ELS and the national services.

##### Exploring opportunities for user defined visualization

The purpose of the task was to gain experience and propose possible ways forward to enable more flexible user defined visualization of geospatial data provided through web services. Two subtasks were carried out:

1. User defined visualization of WMTS (ELS Topographic Basemap),
2. Exploring vector tiles for National Mapping Agency authoritative topographic data.

The first subtask was carried out by NLS Finland and focused on vector tiles, which are data packets for delivering geographical data. A demonstration application for editing the map style on the web browser was developed, to test the benefits of vector tiles for map visualization. It retrieves building data from Finland and Spain, and allows flying between the two countries. The application allows altering the colour, opacity and width of the visual elements of buildings. Both fill and stroke properties can be altered.

The second subtask focused on the creation of INSPIRE view services based on vector tiles, the National Centre for Geographic Information (CNIG) has taken as reference the information of the Spanish view services, WMS and WMTS, called "Base Map of IGN" ("IGN Base" in Spanish). The outcomes of the work demonstrate as well that vector tiles is a very suitable format to enable flexible visualization of web maps. However, the functionality for enabling the flexibility must be implemented on the client side. And the work also demonstrates that vector tiles are not particularly suitable for cascaded solutions like the ELS Topographic Basemap as centralized data stores are strongly recommended.

The report on "Exploring opportunities for user defined visualization" is accessible at:

[https://openels.eu/wp-content/uploads/2019/05/Open-ELS\\_2.4\\_User-defined-visualisation\\_final.pdf](https://openels.eu/wp-content/uploads/2019/05/Open-ELS_2.4_User-defined-visualisation_final.pdf)

##### A prototype of a vector tile service using ERM

The project team developed a prototype of the European topographic and administrative reference data (ERM) vector tile service at regional level. The objective was to test the vector tile service visualization for ERM and to conclude potential actions for a future implementation.

EuroGeographics, in collaboration with the National Mapping and Cadastral Agencies, has created EuroRegionalMap (ERM), a Pan-European Dataset at Medium Scale. ERM is a pan-European seamless topographic database at regional level of detail; ERM is a vector-based product and is designed to support GIS applications and background display. With the implementation

of the prototyped vector tile service, the vector tiles have displayed a number of advantages over fully rendered image tiles compared with raster WMTS (for example: improved styling, enabling global high resolution maps, fast map loads, efficient caching and smaller storage space, greater processing capacity, faster response and greater display flexibility for end users).

The report "EuroRegionalMap Vector Tile - A prototype of a vector tile service using ERM" is available upon request.

### **Task 2.5 On-the-fly edge-matching service**

The aim of the task was the development of an automated pan-European edge-matching service using the ELF cascading service and using the agreed edge-matching reference dataset(s). The development of the "On-the-fly Edge-Matching Service" represents continuation of the actions taken in the area of edge-matching by previous projects, like European Spatial Data Infrastructure Network (ESDIN) and European Location Framework (ELF).

The main result of task is the development and a software implementation of on-the-fly edge-matching functionality. It can be seen as an experimental data processing component to be potentially attached to the ELS service platform in future.

The report "On-the-fly Edge-Matching Service" is available at:

[https://openels.eu/wp-content/uploads/2019/05/Open-ELS\\_On-the-fly-Edge-matching-service.pdf](https://openels.eu/wp-content/uploads/2019/05/Open-ELS_On-the-fly-Edge-matching-service.pdf)

The Open ELS on-the-fly edge-matching demonstration client can be found at:

<http://193.166.25.14/OpenELS-EM-Demo.html>

### **Milestones**

As outlined in Section 2.2 all milestones linked to this activity has been fully achieved and one partially achieved, as follows:

Milestone 3: Connection to Open ELS from the European Data Portal has been fully established (linked with Milestone 4).

Milestone 9: A connection to the eTranslation website was established, requests for machine translations were sent, and the service was tested. Machine translations were received during the testing period. As described above, based on the testing results the machine to machine interface (API) were not implemented in the technical Open ELS environment.

### **Activity 3 – Data supply content**

The purpose of this activity was to make geospatial data content available within Open ELS. The aim was also to strengthening capacities of ELF data providers, engaging additional data providers and addressing technical, organisation and legal requirements for reaching improved quality and harmonised ELS for regional or pan-European solutions.

#### **Task 3.1 Data and metadata quality**

Metadata that is available within Open ELS must be published in a catalogue that is harvested by the European Data Portal (EDP), under which the MQA (Metadata Quality Assurance) can be performed. The compliancy with the MQA tool is fundamental for the project being successful.

The Open ELS metadata is managed in a metadata catalogue based on the ISO19139 protocol. This is a GeoNetwork based open source application and the metadata for Open ELS products are stored there. The publisher of this metadata catalogue is EuroGeographics. A CSW API is made available for the harvest process of Open ELS metadata by the European Data Portal (EDP). Open ELS metadata has been made available in ISO19139 because the ISO19139 format is required by INSPIRE. EDP has an adapter that maps metadata in ISO19139 format to DCAT-AP, using the GeoDCAT-AP Core specification.

A procedure and guidelines for setting up metadata for Open ELS products have been defined and described (including templates and implementation of the INSPIRE validator within the Open ELS technical infrastructure). A process for ensuring metadata quality has been defined and implemented as well. The Open ELS Help Desk and metadata experts support data providers in solving issues. The product owners maintain the Open ELS product metadata.

As described above, the European Data Portal harvests the metadata of the launched Open ELS products. The Open ELS metadata catalogue can be accessed at:

<https://www.europeandataportal.eu/data/#/datasets?catalog=openels&showcataloguedetails=true>

The final conclusions are:

- Open ELS fulfils the requirements regarding MQA compliancy.
- The Grant Agreement states: "Relevant datasets (including metadata) resulting from the action are published on national portals or a catalogue that is harvested by the European Data Portal ..." Open ELS provides pan-European datasets and products, therefore the project team has chosen to publish the relevant datasets on the OpenELS metadata catalogue. The chosen approach is in line with the verification of the particular milestone in the Grant Agreement.
- The European Data portal creates a compliancy report on all datasets and metadata that has been harvested. These reports state that the metadata that is harvested is compliant. We have included the reports from EDP in this MQA compliance report.

The report on MQA compliancy is attached at Annex 3.

#### **Task 3.2 Cross-border edge-matching**

The aim of this task was to facilitate National Mapping and Cadastral Authorities (NMCAs), Open ELS data providers, in harmonisation of geospatial data features across international borders. The project team developed the "Guidance on implementation of cross-border harmonisation"; a template for cross border harmonisation and supplementary documentation. It also promoted and supported the NMCAs' activities utilising the guidance and provided consultations and methodological support.

The utilisation of the guidance and the documentation have been performed in the two use cases: 1. Cross-border harmonisation between France and Germany; 2. Cross-border harmonisation between Czech Republic and Poland. The applied guidance has been demonstrated as being fit for purpose and has been successfully used for performing the campaign for harmonising national topographic datasets along border areas.

The "Guidance on implementation of cross-border harmonisation" is available at:

[https://openels.eu/wp-content/uploads/2018/12/OpenELS\\_guidance\\_edgematching\\_version1\\_0.pdf](https://openels.eu/wp-content/uploads/2018/12/OpenELS_guidance_edgematching_version1_0.pdf)

The "Report on of cross-border harmonisation" is available upon request.

### **Task 3.3 Data contributors support**

The aim of the task was to set up a support desk to data providers on technical expertise, maintenance of service/ product specifications and operational capacities are offered to data providers and contributors. Also the centralised population of exonyms and variant names is executed linking those to national geographical names.

The project team defined, described and implemented the data supply process for Open ELS (including templates, knowledge base, specifications). An Open ELS help desk including 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> Level support has been implemented. The contact form for the Open ELS help desk is available on the Open ELS website: <https://openels.eu/help-desk/>

The team's activities focused on:

- Supporting data providers contributing to Open ELS web-services;
- Testing national web-services from Data providers;
- Helping Data providers in solving issues in national web-services;
- Undertaking a regular quality check of the available Open ELS web-services.

The population and management of exonyms and variant names comprised the following work results:

- Approximately 6,000 exonyms and variant names have been recorded into the database of the Regional Gazetteer Service. These exonyms are from 44 European countries and territories in 37 languages including all official languages of the European Union and in 4 different scripts.
- Essential parts of the results of the previous projects EuroGeoNames and European Location Framework (ELF) have been integrated into the Regional Gazetteer product.

The report on "Data contributors' support" is available upon request.

The report on "Population and management of exonyms and variant names" is available upon request.

### **Task 3.4 Capacity building & Task 3.5 Extension of coverage and content plan**

The aim of task 3.4 was to strengthen the capacities of data providers and candidates to become data providers for Open ELS. It included engagements with National Mapping and Cadastral Authorities (NMCAs) to find out more about issues in web-service setup and identify gaps in technical capacities. The project team contributed by sharing knowledge and experience and organising events with NMCAs (current and candidate data providers), or by making presentations at conferences and workshops.

The aim of task 3.5 was to bring more data providers amongst EuroGeographics members (NMCAs). The task has been carried out by engaging potential data providers and organising joint workshops, bilateral meetings, conferences, webinars, and by providing consultations by email communication and web tools. Tasks 3.4 and 3.5 complimented each other, so the project resources have been consolidated for managing and conducting activities of both tasks.

The direct engagement and capacity building activities guided NMCAs for contributions to the following Open ELS products:

- Cadastral Index Map (CIM);
- Web Feature services of Addresses (WFS-AD), Buildings (WFS-BU), Transport Networks (WFS-TN-Road and WFS-TN-Rail).

The project team investigated national authorities as potential Open ELS Data providers, guiding them to provide a full coverage of the national open data (certain theme) and INSPIRE compliant open web-services (WFS, WMS).

The selection of the NMCAs for engagement activities have been planned considering the following criteria:

- Availability of open data and web-services in the priority themes from the authorities;
- Willingness of the authorities contributing to Open ELS;
- Demands from European stakeholders (European Environment Agency, DG GROW, Eurostat, others) for the coverage;

- Possibility and probability in utilising the national data and web-services as open data and open web-services.

Some of the key conclusions of the action are:

The project widely promoted the requirement to implement the INSPIRE directive and offered Open ELS as a practical realisation of the INSPIRE vision to all members of EuroGeographics (63 authorities from 46 countries).

The project team established direct engagement with the teams of experts from 26 NMCAs explaining in detail the Open ELS data supply requirements and evaluating capacities of those NMCAs for contribution to Open ELS products.

12 key events were organised to brief Open ELS data providers and candidates on the technical and organisational aspects of setting up web-services according to the agreed common requirements for building Open ELS products.

Many potential data providers, especially from non-EU countries, were not able to contribute to Open ELS due to restricted terms of use of national data and web-services, or non-compliance of national data policies to the Open ELS data policy.

Project efforts were directed to strengthen those capacities, which constrained NMCAs in providing high quality data and web-services. However, it was found that a number of NMCAs were not able to resolve the issues in the national services when the tests and validation actions were performed.

The report on "Capacity building and extension of coverage" is available upon request.

### **Task 3.6 Agreement amongst data providers**

The aim of task was to deliver a data provider agreement (DPA) which included the relevant terms and conditions for Open ELS. The second part of the task was to gain agreement and signed data provider agreements from data providers for the services which were to be provided under Open ELS. The requirement for a Data provider agreement was to ensure two points:

- That all providers of open data to the Open ELS project understood the terms under which they were providing data.
- That the ELS Owner could offer one harmonised Open Data license for the use of Open ELS services for all end users.

With these points in mind there was a requirement to deliver a data provider agreement (DPA) for Open ELS. Data providers were required to agree to this, regardless of whether their data was already provided under an open data license in their country.

The key achievement of this task is that the data provider agreement is now available, and that it has already been signed by various data providers allowing the project to release key first services.

In a first step, the Open ELS data provider agreement template was drafted (this was based on the ELF data provider agreement). GDPR and IPR issues were also considered in the drafting of the agreement. The amendment of the agreement had to reflect an update from ELF to ELS, which originally had permitted evaluation and development licensing, but also had to be updated to permit the ELS Owner to onward license data under the Open ELS data license. In a second step, all existing ELF data providers were contacted and asked to review the amended agreement and confirm their acceptance of the changes to the ELS DPA. The next step was, in collaboration with the product group in Activity 4, to identify and gain permission for the first set of key services from target countries.

There were seven target members identified all of whom were existing ELF partners. Each were contacted, explaining what services of theirs had been selected to be included in the first release, and detailing how they should complete the Annexes to permit this. All seven completed the Annexes giving permission for their data to be included in the First release.

The product group decided to launch a new product, the Open Regional Gazetteer Service. More information about the product can be found in reports from Activity 4. At the close of the project there are 28 data providers included in this product and signed the required legal permissions to use their data for the Gazetteer Service.

The report on signed Data Provider Agreements is attached at Annex 4.

### **Milestones**

As outlined in Section 2.2 all milestones connected to Activity 3 have been achieved as follows:

Milestone 4: Compliance with the MQA (Metadata Quality Assurance) applied by the European Data Portal.

Milestone 5: Open ELS support desk is functional with inquiries from data providers managed and responses and support provided.

Milestone 6: EGHO right to license the data in Open ELS is granted through the signed Open ELS data provider agreements.

### **Activity 4 – User orientation and requirements**

The objective of this activity was to improve understanding of users' needs, and to design, develop and arrange Open products and services, facilitate and develop channels to users of open geospatial data web services, and raise awareness of the value and benefits from Open European Location Services both in the private sector and responding to the demands of European stakeholders, EU programmes and initiatives.

#### **Task 4.1 User Interface**

The objective of the task was the design and development of a website to make the user "experience" straightforward and informative. The User Interface pages will enable users to search, discover, acquire, license and use the Open ELS data and web services. It is envisaged that users of the User Interface will be a mix of individuals and organisations.

The creation of, maintenance and support the user interface to provide access to Open ELS services was subcontracted to the company ThinkWhere. The following functions are implemented:

- Search and discover services: Open ELS services are searchable against any element of the service metadata.
- Register and access services: the interface requires users to register as individuals. The collection of data complies with GDPR and a statement is included at registration, which includes user-selectable options.
- Administrative reporting of user activity is available to EuroGeographics, together with the authority to remove individual users' access if necessary.
- Acquire data: registered users select which services they wish to use and are issued with unique credentials once they have accepted the licence for that service. Once they have successfully made this selection (including licence step) they can return at any time to see the credentials they were issued with.
- License: The user should accept the licence for a specific service by means of a check box. The system allows for additional licences to be added in future. Information relating to the licence, such as a fair use policy and required attribution, is also clear to the user.
- Demonstrate: the interface provides an embedded web map to demonstrate the services.

In order to demonstrate the services on an embedded web map, using authoritative data, ThinkWhere were also commissioned to develop and host a simple basemap service. This is not licensable as a product, but is able to be used for promotional and display purposes, and adds context for user understanding of the Open ELS services.

Each Open ELS service is accompanied by user documentation.

The Open ELS User Interface is accessible at: <https://www.euro-geo-opendata.eu/>

In addition to the development of the user interface, a project website was developed to provide information and updates on the project during its duration. It is accessible at: [www.openels.eu](http://www.openels.eu)

#### **Task 4.2 Open data products and services**

The requirement for the definition of Open Data Products and services was to include qualitative and quantitative components, be developed with a strong user focus and with an understanding of source data (and terms of use) available for the project.

##### Requirements gathering process

A User Centered Design technique was employed to engage with and capture end user requirements. This approach provides numerous benefits for building relationships with end users and valuable and unique insights, from understanding their daily tasks, through proposition and product design, through to development and final user testing, and leads to the development of a product or service that is aligned with customer needs. Interviews and user workshops were conducted, allowing the development and analysis of user stories. Summaries on user requirements on a number of themes were used to aid discussions during later steps in prioritising work and defining services.

##### Availability of services from EuroGeographics members

There was a key requirement to understand the availability of Open Data from EuroGeographics members in order to develop the services. During the ELF project, a survey of members had been undertaken, but this work was now out of date and the situation on available data can change rapidly, in particular for open data. It was important in the context of Open ELS to identify data which could be made available under an open license. It was agreed to repeat the survey, with additional questions on licensing and open data. During the planning for this work, it became evident in communications with the Joint Research Centre that there was a shared interest in this. They were already planning a survey, and it was agreed to work in collaboration to ensure maximum response and re-use of the information.

The results of the survey are available on request.

##### Defining and Deciding Services to be Built

A workshop was held with the contributors to the task, which allowed review of the priorities from the users and the results from the data availability survey. A number of proposals and greater understanding of these was developed in the workshop, and further refined thereafter. Six Open ELS services were defined (five of which were developed into final services). The detailed product proposals were presented to the Open ELS Programme Board and at an All Project Partners meeting for feedback. All proposals were positively received, but with priority on EuroGlobalMap (EGM), Cadastral Map and Building services noted. The identified Open ELS products balance across a range of themes, potential users and data sources (INSPIRE services and existing EuroGeographics products).

##### User feedback and Understanding on Initial Definitions and Evaluation Services

Following the user interviews, the information captured and the theme information extracted was presented to the interviewees to ensure it was accurate. This step was important to ensure that the proposals would be well aligned to user

need. In addition, during the discovery phase, a selection of evaluation services were provided to the European Environment Agency CORDA team for feedback. A report was supplied to the product team and this identified a number of areas for improvement. This included some elements which could be achieved (improved communication on coverage and access), others more difficult within scope of project (additional attribution and change of architecture due to issues with working with cascaded services – considered out of scope against resource availability).

In addition, the early engagement with EuroStat, EEA, and JRC also enabled regular updates and sharing of progress during ongoing project communications at events and meetings to keep these key stakeholders informed.

Final services were developed, tested and refined by the project group. During development, it was decided not to include transportation data due to limited coverage availability, resulting in not being able to meet user need. It was decided instead to focus available resource on maximising coverage in the other services. Testing was undertaken by the data supply group, with detailed information on known issues or concerns considered by the product team. User Acceptance Testing (UAT) was also carried out by the product team. Minor known issues were included in the product release note, and major issues were resolved or coverage amended to ensure that the user received a good experience of the service.

The key achievement of this task is the development and launch of five Open ELS data services, with multiple countries' content, available under an open data licence with harmonised access point and specification. In addition, the connection with the user throughout the planning and development has ensured that the end result has provided the most effective use of resources to deliver services which were in high demand. In addition, the strong collaboration and communication with key stakeholders such as EuroStat, the European Environment Agency and then Joint Research Centre (JRC) has to be highlighted.

The Open ELS services are accessible by the User Interface: <https://www.euro-geo-opendata.eu/>

The report "Open Data products and services" is available upon request.

#### **Task 4.3 Licensing, terms and conditions of use and reuse of data from NMCA and third parties.**

One of the objectives of the overall action was the publication of data under a single licence framework that would be applicable to all data that is published through a set of services, under the title of Open ELS. The Open ELS Licence is developed in conjunction with the publishing data partners and consist of any dataset that was either already published under an "Open" licence". "Open data" in the context of Open ELS is defined by the "Open data policy for Open ELS" (developed in Activity 1).

The project team defined a set of licensing principles that would apply to any data or service published by Open ELS. The licensing principles that served as guidance for the development of the licensing framework for Open European Location Services are:

- Reflect the key customer requirements,
- Protect the intellectual property rights of data suppliers,
- Not conflict with national interests or national licensing terms,
- Respect national and European regulatory requirements,
- Enable terms that are adaptable to the changing needs of customers and data suppliers.

In the development of the license it is also acknowledged that success for the licensing will be recognised in the reuse of Open ELS data, rather than the number of initial datasets that are published. The Open ELS License is accompanied by an Open ELS Attribution. The attribution ensures that user of Open ELS products acknowledge the source of the Open ELS Data by linking to any attribution statement specified by the Licensor/s and where possible a link to this license.

The Open ELS License is available at the Open ELS website: <https://openels.eu/licence/>

#### **Task 4.4 SME engagement programme**

The aim of the task was to engage small and medium-sized enterprises of specific IT market domains and to analyse their demand and needs for establishing Open ELS as innovative and user oriented solutions. The engagement was to be facilitated by the initial release of Open ELS Products and Services and the purpose was also to encourage the use of the services by SMEs to develop strong relationships to support the use of the services.

The project team explored by a survey and interviews the extent to which the proposed services could fulfil the geospatial data needs of SMEs operating in key sectors, particularly those that provide value-added services. By understanding what interest SMEs might have in working with Open ELS, and what value might be gained on both sides, the team aimed to establish who SMEs might fit into a future Open ELS ecosystem.

To identify relevant SMEs, the project team adopted the European Commission definition of SMEs, which includes businesses having up to 250 employees and less than €50m annual turnover. The priority customer segments (environmental services, energy and infrastructure, emergency service, transport, real estate and finance and insurance) for Open ELS services and the characteristics of target firms (value-added resellers, cross-border or multi-country in scope, geographically spread across Europe) were defined. The survey was distributed to almost 330 identified SMEs.

The survey was designed primarily to obtain information from respondents that would enable the project team to select the most suitable firms for active engagement. Nevertheless the survey provided useful indications of how open location services

may prove economically beneficial in the SME sector. The team received a total of 32 responses, 26 responses were substantially complete and included contact details with the permission for further engagement.

Thirteen of the survey respondents were selected for initial contact, prioritising those with existing cross-border business and potential to act as value-added resellers while ensuring a good geographical spread. Finally, interviews were held with 7 companies to find out more about their current use of geospatial data and the benefits they might gain from Open ELS.

Key results from the survey and interviews are that more than 50% of respondents see the potential for developing new cross-border products and services as a benefit of Open ELS. The majority of the respondents believe that Open ELS could reduce the time and cost of dealing with multiple mapping and cadastral agencies, which serves as a strong endorsement of the Open ELS approach.

The report with the survey and interview results is available at:

[https://openels.eu/wp-content/uploads/2019/05/Open-ELS-SME-Engagement\\_report.pdf](https://openels.eu/wp-content/uploads/2019/05/Open-ELS-SME-Engagement_report.pdf)

#### **Task 4.5 Demonstration of Open ELS value added and benefits**

The aim of the task was to develop use case examples demonstrating Open ELS value added and benefits. Special focus was made on national, cross-border and pan-European use cases where Open ELS data is needed. The task focused on domains where Open ELS has potential to add most value. That is cross border (either a requirement for data that is directly crossing national boundaries or the same data from multiple countries); where official up to date data is critical and/or where an open data licence (or common licence) would lessen the barrier for the reuse of data.

Two domains were selected for focus – emergency planning and response; and land and property. Two cases studies were developed in each domain (four in total). The selection took into account regional and pan-European focus, and national authorities, institutional users and SMEs.

In addition, monitoring associated with these domains and activities was undertaken. Regular contact and discussions involving European Environment Agency (specifically regards Copernicus Emergency Mapping Service and CORDA), DG Justice (Land Registers Interconnect); EuroStat (policy activities, and use of Open ELS for analysis work); Joint research Centre (specifically around the ELISE programme, INSPIRE and development of a pan-European Gazetteer) have all been important in shaping the aim to be user focussed in the project approach.

At a regional level, regional networks were particularly helpful within the Nordic Emergency use case. Engagement with the Nordic Kris GIS Group (a network of Nordic mapping, police and rescue authorities) identified the use case for a search and rescue operation which formed the basis of the work undertaken to demonstrate the added value benefits of Open ELS.

In addition, attendance at the DGI defence conference, and connection with the Ordnance Survey Geovation Hub opened additional potential use case opportunities from this sector, which could be further explored in any future work.

#### Use case 1 - Kris GIS

The Kris GIS case demonstrates how Open ELS data and other cross-border geographic data can be used for planning search and rescue (SAR) operations. The Nordic Kris GIS group (a network of Nordic mapping, police and rescue authorities) has identified this use case as an important example that needs cross border spatial data. The use case includes a use case demonstrations that show how Open ELS data can be applied by different user groups. The value of the use case was evaluated by interviewing potential users – stating that the key benefits of cross-border use case are faster response times, better cooperation between authorities, more proficient work and emergency calls are more easily handled.

The demonstration of the use case is available at: <http://s3-eu-west-1.amazonaws.com/openels/ELS.html>.

The report "Demonstration of Open ELS benefits – use case Kris GIS" is available at: [https://openels.eu/wp-content/uploads/2019/05/Open-ELS\\_NLSFI\\_KrisGIS-use-case.pdf](https://openels.eu/wp-content/uploads/2019/05/Open-ELS_NLSFI_KrisGIS-use-case.pdf)

#### Use case 2 - Copernicus Emergency Management Service – Rapid Mapping

Pan-European datasets by National Mapping and Cadastral Agencies could be useful for the Copernicus Emergency Managements service. Accessing harmonised web-services for "Cross Border Emergency Response" cases with the possibility to download these data if needed could lead to an easier and faster handling during map production. The pan-European datasets are used alongside data from other sources e.g. Copernicus programme.

The pan-European data needs to be licensed for the use by the European Commission to support emergency response. The data must be harmonised (same specification and aligned on borders) and current – with the ability to customise the styling. Key themes of interest include assets at risk, hydrographic network, and land cover/use and transportation network. In principle, corresponding INSPIRE datasets from the National Mapping and Cadastral Agencies could contribute to a reference. European Location Services compiles pan-European, cross-border datasets that could be useful for CORDA users within the European Environment Agency (EEA).

The European Environment Agency (EEA) evaluated the inclusion of European Location Services into CORDA and the suitability of the datasets for the Copernicus Land Monitoring and Emergency Managements services.

The evaluation aimed to clarify the applicability of ELS in relation to Copernicus services' requirements for access to geospatial reference data, both in the short and long-term.

### Use case 3 – Land Registers Interconnect

The Land Registers Interconnect (LRI) portal is being developed by the European Commission (DG Justice). The portal allows a central places for users to search for and access national land registers of each country. The national registers are connected via service-based data exchange.

Many national websites and portals to access land registration information use a map interface (for example, in Ireland: <https://www.landdirect.ie/>). This serves multiple purposes, for example –

- Enabling spatial (location based) search
- Verification of text based search results through display of cadastral parcels on a map
- Allow users to view/ print cadastral map data for areas of interest
- Discover contextual geographical data related to a cadastral parcel (for example, municipality boundaries)

The concept of including a map interface to the LRI portal was explored for this use case. It was identified at early stages of concept as a user focussed requirement, however it has not been further developed in the initial beta release. Examples of national portals and prototype versions of OpenELS services were used in discussions and clarification of requirements, however the project was not mature enough to actualise this into a technical development. In particular, there was also a coverage mismatch between the two projects (with Austria and Estonia not within Cadastral Index Map coverage).

The value of bringing together the results from OpenELS and LRI in future remain a significant opportunity to add value to end users and the development and understanding in this case study is a foundation to build on in any future work.

### Use case 4– WestCor Global

The WestCor Global use case demonstrates interest from SMEs for access to official data on land and property to service a substantial component of the European economy. WestCor Global seek to use this data to build their own solutions for a range of users in this field, in both b2b and b2c models. It has been clear in discussion with WestCor Global that they are seeking opportunities to work with EuroGeographics to enable access to data, as they see the added value benefits in comparison to the complexities access data directly.

These are innovative insurance products for residential and commercial real estate transactions:

- Cross-Border Property Rights Insurance for buyers purchasing property in foreign countries
- Portfolio due diligence and insurance services for large property portfolio investors
- Digital property reports with optional title insurance
- *Value added “data as a Product”* sold through interactive web-site offering global property data

Open ELS product team have engaged with WestCor during the Open ELS project to further understand the use case to support development of services. Due to the maturity of the WestCor solutions (currently conceptual and being scoped) it was not possible to develop a demonstration working in WestCor systems, however a demonstration video was created to aid discussions and is reflective of the conversations on how Open ELS services could integrate into a solution.

The key achievement of this task has been the identification and investigation of four use cases. This is one more than initially envisaged in the task scope. Each of these investigations have allowed the demonstration of the value added benefits of OpenELS to users (application developers) through direct access to the services or through use of proxies (such as video demonstrations). This is important as it's allowed more detailed conversations than were previously possible. Information discovered was valuable in the delivery of the Open ELS project outputs as a whole, and is also a strong foundation for any future work.

The report “Demonstration of Open ELS value added benefits” including information on the use cases is attached at Annex 5.

### **Task 4.6 Marketing and awareness raising**

Please find the summary of the marketing and awareness raising activities in Section 3 of this report.

#### **Milestones**

As outlined in Section 2.2 all milestones linked to Activity 4 have been fully achieved as follows:

Milestone 7: Licenses and clear terms of use of Open ELS products and services are available on the Open ELS website

Milestone 8: 3 prototyped samples of Open ELS use case applications showing benefits of Open ELS in defined market segments are available

#### 2.4. Conclusions on results of the Action, including the impact of the possible deviation on 1) the objectives of the action, 2) the completion of the planned activities and 3) the cost-breakdown

The overall objective of this action was to develop Open Data services for the priority domain of geospatial information from European National Mapping and Cadastral Authorities. It aimed to improve the quality, availability and interoperability of data from different, cross-border Public Authorities, facilitating access to and encouraging the uptake and use of data. The action was designed to be strongly user-oriented, providing easy access to the data and to create a user support.

The overall objectives of the Action have been very successfully reached and several tangible results have been achieved.

- Open data from various European NMCAs have been made publicly available in a structured and above all in a useable way with the Open Data Services which are available via the Open ELS user interface.
- A legal and regulatory framework around the availability and use and reuse of open data has been developed and there is a higher level of clarity on the linkages between policy, licensing and products among both data providers and users. In this respect the development of the Open Data policy and a definition of “open data” is a major step forward. The license provides the user with legal clarity about the use and reuse of Open ELS data.
- The data supply processes have been improved to ensure the quality of the service and the metadata. The Open ELS Help Desk with a defined support structure ensures support of data providers and users.
- The Metadata Quality Assurance is a tool for monitoring the metadata quality – following the MOA process lead to the improvement of the metadata for Open ELS products. The Open ELS products’ metadata are stored in the Open ELS catalogue, are MOA compliant and harvested by the European Data Portal.
- Significantly more insight into what users expect and need has been achieved through the user engagement process. This has helped in the prioritisation and focus on design of a limited number of high quality services which have been developed in response to user requirements rather than what data is on offer.
- The SME engagement process lead also to an understanding of SMEs’ priorities regarding the value and the use of NMCAs authoritative open data. The project team acquired valuable contacts with > 30 interested companies and organisations. The presentation at the Geospatial World Forum in Amsterdam proved the interest in our Open ELS products and the interest of SMEs in accessing our members’ data. The next step after the project is to build a reliable relationship for developing further access to our members’ data. The identified use cases support also the understanding of the need for Open ELS.
- The “Open ELS economic appraisal” highlights the overall socio-economic impact of Open ELS. 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 with other EU level interventions. The report underlines that centralising access to official national geospatial and land information from Europe would enable SMEs to be more competitive by cutting costs and boosting their ability to scale up and enter new markets.
- The project delivered also solutions and guidelines to improve the interoperability of data from different cross-border Public Authorities. The solutions and guidelines have been developed in cooperation with EuroGeographics members. The guidance on cross-border harmonisation provides instructions for Open ELS data providers to edge-match topographical features along their borders. The guidance has already been successfully implemented in two locations (Germany/ France border and Czech Republic/ Poland border) and will play an important role in improving the interoperability of cross-border topographical data for other NMCAs. The “On-the-fly Edge-matching” tool helps to visualise edge-matching on agreed principles. The “Principles on presentation of data content on disputed territories” are also an instrument to encourage NMCAs to agree on how data will be visualised and represented in international border areas where two or more neighbouring countries provide different content of spatial data do not agree.
- The project team developed technical prototypes which could be a basis for future technical developments aiming to improve and simplify interoperability and making services easier accessible. In general, the technical capabilities of the user community together with the way the data is provided from a technical perspective, is crucial for the potential (re)usability of data at any level. The project work on Linked Data and on Vector Tiles proved that thesis.
- The Open ELS project experimented with the provision of geospatial Linked Data in the context of European-wide data dissemination. The results show that the linked data technology is proposed as a remedy for solving interoperability problems at technical, organizational and community levels. It was also concluded, based on the experience, that linked data technology is able to provide solutions for solving technical interoperability. The flexibility of the data model adds significant simplification to the process of creating Pan-European data services.
- Technical work was also undertaken to provide improved global high-resolution maps, enabling faster map loads, efficient caching and smaller storage space, greater processing capacity, faster response for queries on the map and a greater display flexibility for end users. Prototype work was carried out on “Vector tiles” as an efficient way to package geographic data into roughly-square shaped tiles. With the implementation of this service, vector tiles have displayed a number of advantages over fully rendered image tiles compared with raster WMTS.

- The work on the “Centralised prototype” also demonstrates the potential of implementing a centralised technical environment for building and providing pan-European services which are based on harmonised and edge-matched data.
- The awareness campaigns, public relations and communications work raised awareness and understanding of the benefits and use of open data and demonstrate the value of Open ELS services. In particular the project team received positive feedback on the Open ELS test services at the Geospatial World Forum 2019 in Amsterdam. a. The publishing of the study on the “Open ELS Economic appraisal” also lead to positive feedback from the open data community.
- The project also fostered and facilitated knowledge exchange amongst NMCAs and supported EuroGeographics members in preparing their open data for the Open ELS test services. Regular webinars about data supply issues, specifications, testing, and quality assurance were seen as very useful for the capacity building and progressing on making data available. The “Open ELS toolbox” also supports NMCAs in the process of making data as open data available. The toolbox provides links to additional guidelines and standards available at the European Data Portal.

In terms of implementation of the activities, there are no significant deviations from the original plan to report. As outlined in section 2.2, a number of the activities were completed slightly later than originally envisaged, but these did not affect the overall implementation of the activities and completion by the project end date.

Occurring deviations from the planned work (as defined in the Grant Agreement) were managed proactively by assessing the impact of deviations to the project objectives and completion of the action. As described in section 2.3, the scope for two deliverables had to be changed:

- A connection to the eTranslation service was established and tested. As described in section 2.3 the machine to machine interface (API) was not implemented in the technical Open ELS environment. The overall test results demonstrated limited benefit for the geospatial domain (please see details in section 2.3, task 2.3 and in Annex 2). The decision not to implement the eTranslation service in the Open ELS technical environment had not impact on the quality of the launched Open ELS products and services or other project deliverables.
- As intended in the Grant Agreement, one of the deliverables of the project was to create a business plan for the long-term sustainability of Open ELS. However, at the end of the Open ELS project the project team is not reaching the stage of sustainable maintenance yet. Therefore an Open ELS development plan is describing the scenario for developing Open ELS to operational services over the next 2 years after the project end. The development plan provides to EuroGeographics and its stakeholders a clear picture of planned activities and resources for a further development of Open ELS – if funding is available and therefore the actions are affordable. EuroGeographics reserves the right to change the direction of implementing the actions described in the plan - depending on the availability of sustainable funding and the decision on the strategic direction of Open ELS.

Finally there has been a substantial financial underspend on delivery of activities (see financial statement attached for full breakdown). However since all project objectives have been achieved and activities completed, the reduced spend has not had an adverse impact on delivery of the Action and in fact demonstrates sound financial management.

### 3. VISIBILITY OF UNION FUNDING

#### What measures have been taken to publicize the Action, including EU funding (GA II.7.1)?

Communications activities have targeted internal stakeholders, the National Mapping, Cadastral and Land Registry Authorities of Europe, and external stakeholders, primarily small to medium-sized enterprises (SMES) and application developers, as well as the wider community of geospatial data users.

The communications principles for the Open ELS Project specify that all communications must include the co-financed by the European Union Connecting Europe Facility logo. In addition, this wording is embedded within the key messages developed for use by partners:

*The Open ELS Project, co-financed by the European Union Connecting Europe Facility, is developing European open data services to maximise the:*

- *Benefits of authoritative geospatial information by making it easy to find, access and re-use.*
- *Use of authoritative geospatial information by providing certainty about what is free, what is charged for and under what terms and conditions.*
- *Contribution of public authorities responsible for mapping, cadastre and land registries to delivering policy, economic growth and market development, as well as wider operational European Location Services.*

Report, PowerPoint presentations and press release templates have been created, together with a package of wider materials, including a series of animations, FAQs and exhibition panels.

Particular emphasis has been placed on channels that have allowed the Project to self-publish its news with direct access to stakeholders, primarily through the extensive use of Twitter and the hashtags #OpenELS and #opendata, as well as the Open ELS Project website at [www.openels.eu](http://www.openels.eu) and regular articles in EuroGeographics newsletter for members. News has focused on the delivery of milestones such as the Open ELS Data Policy and availability of open data from official national sources, the economic benefits of open data for SMEs, and the development of test services. Partners have also promoted the project at relevant events across Europe and dedicated webinars, meetings and conferences, for National Mapping, Cadastral and Land Registry Authorities.

Communications activities culminated in the launch of the test services and preview of the user interface at Geospatial World Forum 2019 in early April, which attracted considerable interest and positive feedback.

### 4. OTHER SOURCES OF EUROPEAN UNION FUNDS

**If applicable, provide information about other sources of EU funds (CEF, ERDF, Cohesion Fund, H2020, TEN, EEPR, EIPA, etc.) used for the action (including previous or subsequent phases not covered by the Grant Agreement).**

Not applicable.

## 5. COMPLIANCE WITH EU LEGISLATION

**Where relevant, provide information on the compliance with EU legislation regarding other matters (notably public procurement, competition, regulatory matters, etc...).**

All procurement undertaken during the Action was implemented according to the relevant EU procurement legislation (Directive 2004/17/EC) and in accordance with Articles 11.9.1 and 11.9.4 of the General Conditions of the Grant Agreement. A total of 5 procurement procedures were conducted during the course of the Action which covered:

1. Development of the Open ELS website and associated products (Task 4.1);
2. Technical support to ELS Data Supply activities (Task 3.3);
3. Study on socio-economic impact of Open ELS (Task 1.4);
4. Technical support to geographical names and exonyms Management (Task 3.3);
5. Development and delivery of Open ELS User Interface (Task 4.1)

In accordance with EU procurement thresholds, suppliers were invited to tender, an independent panel evaluated the tenders based on the selection criteria outlined in the ITT / tender specification documentation and in all cases the contracts were awarded to the tenderer that provided the best value for money using the standard methodology for calculating the most economically advantageous tender. Full records of each procurement process have been retained including tender dossiers, tenders received and evaluation reports, and can be made available on request.

## 6. COMPLIANCE WITH CORE PLATFORM AND POLICY OBJECTIVES

**Information on the compliance with the core service, including conformity with relevant technical specifications and alignment with the policy objectives of the Digital Service Infrastructure (as specified in the relevant CEF Telecom Work Programme).**

Open ELS meets the requirements for the deployment of the Digital Service Infrastructure described in Chapter 3 of the CEF Telecommunications Work Programme 2016.

The Work Programme defines that "the infrastructure providing Open Data digital services is based on two components, the Core Service Platform and the Generic Services supporting the creation and/or harmonisation of content."

Open ELS brings together existing open geospatial data sets from Member States, and makes them available through cross-border, harmonised open geospatial data services, available for re-use for both commercial and non-commercial purposes. The Open ELS services demonstrate the potential of cross-border geospatial services.

The availability of harmonised cross-border services facilitates the cross-border re-use of geospatial data and delivers benefits to citizens, business and administrations across Europe through the development of value added services. The study on the socio-economic impact of Open ELS ("Economic appraisal") indicates that Open ELS fully supports the EU policy objective of open data being a driver for innovation, growth and better and more transparent policy making both at national and EU level. The SME engagement during the project demonstrated well that start-ups could benefit from Open ELS services

Open ELS provides a User Interface to these services; it engages and reaches out to users to better understand their needs, explains the benefits of open services, and encourages the use of the data. The User Interface is setting up an access point that provides a one-stop-shop to Open ELS services across the EU. The cross-border Open ELS services are also linked to the European Data Portal and therefore the metadata which are stored in the Open ELS metadata catalogue are searchable and accessible at EU level. The Open ELS compliance with the Metadata Quality Assurance (MQA) tool supports the implementation of a metadata quality process for Open ELS services and the metadata catalogue.

Open ELS achieves cross-border interoperability and facilitating easy access to users through its data supply chain and the publication of the Open ELS services. The “API and Linked Data” experiment also concludes that the implementation of those concepts could improve and simplify interoperability of cross-border services.

Finally, the Open ELS toolbox supports EuroGeographics members to implement open data policies and open data within their organizations.

## **LIST OF ANNEXES**

ANNEX 1: Development plan – Open ELS

ANNEX 2: Report on “Arrangements for European Data Portal” (including evaluation of Automated Translation Building Block)

ANNEX 3: Report on MOA compliancy

ANNEX 4: Report on signed Data Provider Agreements

ANNEX 5: Report on “Demonstration of Open ELS Value Added Benefits” incorporating reports on the 3 Use Cases

ANNEX 6: Financial statement