European Commission

LIFO: Location Interoperability Framework Observatory

2019 State Of Play Report

ISA²

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1. Introduction

The **Location Interoperability Framework Observatory** (**LIFO**) is a domain-specific observatory relating to location interoperability. It provides a tool **to monitor, assess and report on the state of play of location interoperability in policy and digital public services of EU Member States and other countries implementing** INSPIRE**.**

The LIFO complements the National Interoperability Framework Observatory (NIFO) that monitors, assesses and reports the progress in implementing the **European Interoperability Framework** (EIF). The NIFO collects and shares details across all levels of the EIF relating to important initiatives in the Member States, uncovering best practices, areas needing improvement or where solutions could be developed.

The LIFO analytical model measures, through specific indicators, **the current level of adoption of the recommendations on location interoperability from the** EULF Blueprint[1], covering its five focus areas: *Policy and Strategy Alignment*; *Digital Government Integration*; *Standardisation and Reuse*; *Return on Investment*; *Governance, Partnerships and Capabilities*. The LIFO model is composed of primary indicators, based on information provided by respondents to a questionnaire, and secondary indicators, re-using information from existing sources, for example the INSPIRE monitoring. Results are presented in the form of factsheets for each country and, in this report, the European state of play is summarised for countries participating in the assessment.

The information collected through the observatory can be used to assess current location interoperability status, compare countries and plan appropriate measures, including potential partnerships and opportunities for sharing solutions. More in detail:

- it helps to achieve the objectives of the EULF, for example: policy coherence, effective use of location information in digital public services, standards-based approaches, attention to data quality, effective partnerships, and increased awareness and skills;
- as a complementary tool for NIFO (and thanks to the alignment between EULF and EIF), LIFO helps monitor how the EIF is implemented in the geospatial domain;
- it provides visibility and access to guidelines and best practices for each country and across countries, for reuse and/or suggestions of similar / connected developments;
- it can be used as a self-assessment tool for public administrations towards their implementation of location interoperability, both internally and cross-border.

The LIFO is coordinated by the European Location Interoperability Solutions for e-Government (ELISE) action in the Interoperability Solutions for European Public Administrations, Businesses and Citizens (ISA[2]) programme.

Appreciation is given to the ELISE ‘User Panel’ of 10 Member States and other countries (namely, AT, BE, CZ, DK, FR, IT, NO, PT, SI and SK) who validated the model, answered the survey, and provided further information to ensure the results are representative of the national state of play.

The LIFO will be extended to all ISA[2] and INSPIRE implementing countries in 2020 in order to capture the full status of location interoperability across Europe.

[1] The European Union Location Framework (EULF) is a geospatial domain interoperability framework allied to the EIF. Key EULF guidance is published in the EULF Blueprint.

2. Structure of the document

The aim of this State of Play Report is to provide an overview of the information collected on location interoperability from 10 participating countries in 2019 (European Union Member States and countries implementing INSPIRE).

The core chapter of this document, Location Interoperability State of Play, starts with an overview of the implementation of the EULF Blueprint recommendations in the five focus areas and provides an overall comparative assessment of the participating countries, through the LIFO Index. The status in each focus area is then described through:

- a brief summary of the current state of play across the participating countries, with reference to the target state (vision) and recommendations defined in the EULF Blueprint;
- a chart showing the focus area assessments for each country;
- graphs displaying the average scores[2] for each recommendation, together with highlights of some notable country-specific practices.

Callouts are included in each focus area to highlight selected 'location interoperability' good practices, which are initiatives and applications, demonstrating the benefits of consistent use and integration of location information and services in digital public services.

Annexes to the document are:

- the scoring method and normalisation applied to the indicators;
- a glossary of the most relevant terms used in this document;
- a summary of the index scores for all participating countries.

[2] For a comprehensive overview of the scores for individual countries, consult the LIFO Country Factsheets.

3. Location Interoperability State of Play

3.1. Overview

The EULF Blueprint contains practical guidance on "how" to implement its recommendations in five focus areas. These five focus areas are:

1. Policy and Strategy Alignment
2. Digital Government Integration
3. Standardisation and Reuse
4. Return on Investment
5. Governance, Partnerships and Capabilities

For the purpose of the LIFO assessment, the EULF focus areas are seen as equally relevant in the policies and practices adopted by the participating countries. However, adoption of all EULF Blueprint recommendations is not universal nor mandated. Either the degree of implementation of commonly accepted good practices is at different stages, or the priority given to the recommendations varies across European countries, due to their diversity of social, political, economic and technological contexts. In all cases, sharing good practices is worthwhile to guide ISA[2] countries towards increasing maturity levels by implementing cross-border interoperability of location information and services.

This report presents an assessment of the degree to which the practices implemented by the participating countries correspond to the EULF Blueprint recommendations and highlights best practices identified during this process. The level of implementation is calculated through a scoring mechanism based on indicators associated with recommendations in each of the focus areas of the Blueprint. Each indicator is calculated on a specific scale and normalised on a scale of 0-1, with 1 representing 'full implementation'. Indexes are then calculated as average scores for indicators of each recommendation, focus area and across all the LIFO countries. All indicators and indexes are equally weighted[3].

Figure 1 displays the values of the LIFO indexes for each of the five focus areas, computed as the arithmetic average of the focus area indexes for all ten countries. These indexes represent the maturity level of location interoperability implementation in the respective focus areas, measured against the target state expressed in the EULF Blueprint. The "Return on Investment" focus area obtained the highest LIFO index score of 0.60 in the 2019 data collection, followed by "Policy and Strategy Alignment" (0.57), "Digital Government Integration" (0.54) and "Standardisation and Reuse" (0.54). The "Governance, Partnerships and Capabilities" focus area was recorded as the lowest score for 2019 data collection with a LIFO index score of 0.44. In general, the 2019 data collection indicated that across all the focus areas most countries offered excellent examples of best practices, there were a few cases of countries with good scores in all the focus areas but, overall, the picture showed many countries with room for improvement.

[3] The scoring mechanism is described in detail in Annex 1: LIFO 2019 Scoring methodology

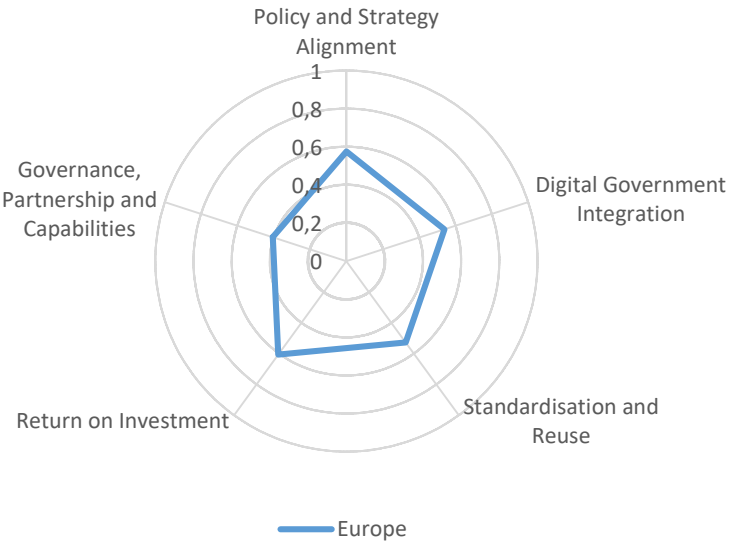

Figure 1 - Overall European EULF Blueprint implementation

An initial interpretation of these trends possibly indicates a balanced approach to geospatial interoperability by all surveyed countries, where particular attention is given to policy, digital public service and technical considerations, with a major focus on relevant financial and investment aspects of initiatives. It is only in some aspects of organisational interoperability (e.g. governance and partnerships) and capabilities (e.g. investment in skills) where the overall picture is more mixed.

In particular, with reference to the “Return on Investment” focus area, quite extensive and diversified measures are taken to optimise the investments in location information and solutions, for example to make the process of searching, finding, and accessing location data and services as easy as possible for interested parties. In addition, most of the participating countries promote the reuse of existing authentic data, data services, and relevant technical solutions. Interestingly, obtaining benefits through such investments is hampered by the lack of a consistent and systematic approach to monitoring the performance of location information activities and to communicating the availability of location-enabled digital public services, as well as their benefits.

It can be inferred from the relatively high value of the index in the “Policy and Strategy Alignment” focus area that the participating countries have invested significant resources towards the strategic development of location interoperability, by implementing location information strategies that are to a greater or lesser extent aligned with digital strategies. In particular, a strategically consistent approach to licensing and open data has been implemented in many countries, where most location data is available free of charge under an open licence without restrictions or under a common licensing framework.

Under the “Digital Government Integration” area, the potential of location information is partially exploited to bring improvements in digital public services. This is usually done where strictly required by the role of location information in the service or through incremental upgrades. However, apart from a few exceptions, the potential of location information for breakthrough improvements or innovative approaches to process integration and location-based analytics is not realised.

The SDI is seen as an enabler of digital public service delivery through sharing harmonised authoritative location data, although however this is often achieved through national frameworks rather than direct use of INSPIRE data and services. However, INSPIRE is increasingly being used for harmonisation of location data in cross-border digital public services. There is room for improvement in the use of the SDI outside government, to the extent that in less than half of the participating countries, the private sector and non-profit organisations use the SDI in an extensive way for delivery of innovative applications and services.

In the “Standardisation and Reuse” area, the level of maturity is twofold. On one side, it is significant in terms of reuse of existing datasets and of the definition of a common architecture for the development of solutions making consistent use of location information. On the other side, improvements in maturity are still to be made in terms of the application of widely acknowledged standards to facilitate the interoperability of location information and of a rigorous quality assurance approach to the treatment of location data.

“Governance, Partnerships and Capabilities” presents the lowest maturity of all the focus areas, although there are some examples of well-organised approaches in this respect. First and foremost, investments in communications and skills do not support enough awareness and capacity building to drive improvements in the use of location information in digital public services and support growth opportunities. Furthermore, limited opportunities are taken to involve different stakeholder groups such as, local administrations, agencies, associations etc., in decision making processes regarding geospatial matters, or to foster cooperation among digital government agencies and agencies in charge of national SDIs. Finally, public-private partnerships or formal agreements among different public authorities to finance, build, and operate digital public services using location data are quite infrequently found.

The **LIFO index**, calculated as the arithmetic average across the five focus area indexes, represents in a concise way the overall level of alignment of the practices implemented by each country across all EULF Blueprint recommendations.

As shown in Figure 2 below, the overall alignment can be grouped in two main country clusters, with exception of the two clear outliers of Czech Republic and Portugal. The first cluster comprises three countries, Belgium, Denmark and Norway, which are, on average, 0.13 points above the European average value of 0.54, and the second cluster comprises the five countries of Austria, France, Italy, Slovakia and Slovenia, which range between 0.03 and 0.13 points below the European average. The first country cluster scores higher than the European average across almost all focus areas, which may indicate a systematic and consistent approach to location interoperability in those countries.

The majority of the surveyed countries, excepting the two outliers, is very clearly concentrated in an index maturity range of ±0.13 points from the average, thus demonstrating a relatively homogeneous overall level of maturity across the countries.

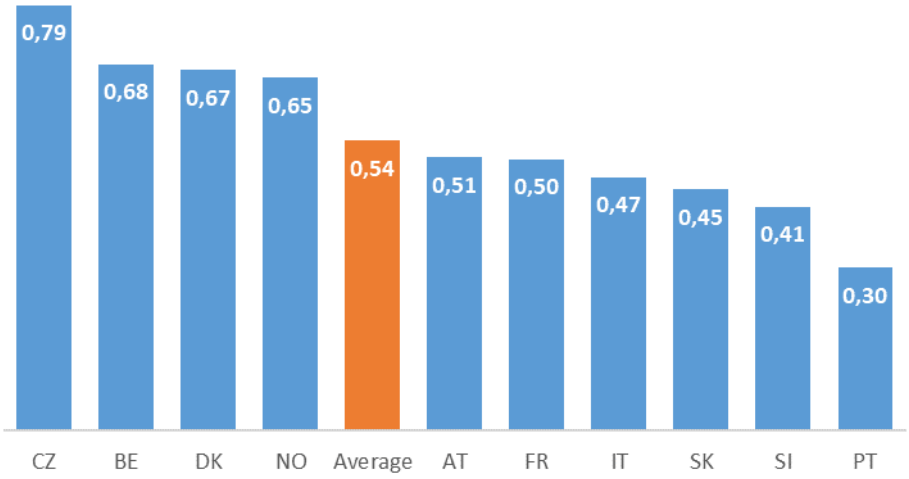

Figure 2 - LIFO index by country

The following paragraphs present the results within each focus area, across all participating countries in the LIFO 2019 data collection.

3.2. Policy and Strategy Alignment

Under this focus area, the recommendations target a consistent policy and legislative approach where location information plays a significant role.

Vision	
There is an aligned and coordinated policy and strategic approach across Europe for the use of location information that enables more efficient and effective integration of cross-sector and cross-border location-based applications, reducing costs and increasing social and economic benefit. Public sector location policies promote accessibility and interoperability. There are simple and consistent approaches to licensing, progressive open data policies that balance the needs of data users and suppliers, and authentic registers in which 'location' has a prominent role.	
Recommendation 1	Connect location information and digital government strategies in all legal and policy instruments.
Recommendation 2	Make location information policy integral to, and aligned with, wider data policy at all levels of government.
Recommendation 3	Comply with data protection principles as defined by European and national law when processing location data.
Recommendation 4	Make effective use of location-based analysis for evidence-based policy making.
Recommendation 5	Use a standards-based approach in the procurement of location data and related services in line with broader ICT standards-based procurement.

Table 1 - Focus area "Policy and Strategy Alignment" - vision and recommendations

As mentioned above, this is the focus area with the second highest overall score across all the participating countries, acknowledging the attention paid to the strategic dimension of location interoperability within each country. The current European state of play for this focus area can be summarised as follows:

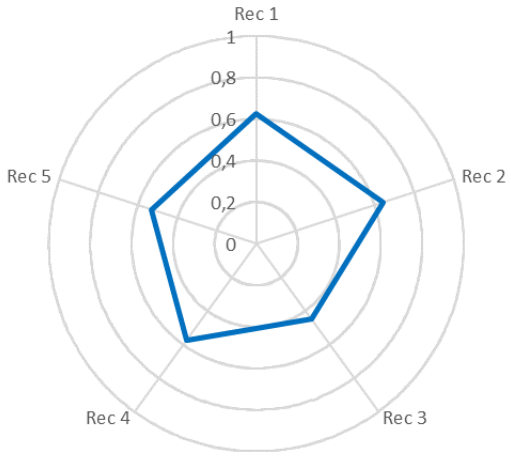

Figure 3 - Policy and Strategy Alignment - indexes by recommendation

- location aspects are relatively well addressed in existing policy and strategic frameworks; specific location information strategies exist in several countries and are aligned with e--government strategies, although not fully, at least in certain legal and policy instruments;
- in several countries, most location data is available free of charge under an open licence without restrictions, and a common licensing framework is also often adopted, which facilitates the consolidation of location data coming from different sources. However, there is usually no systematic national scheme of core location datasets. Overall, countries are in line with this recommendation by adopting a simple approach to licensing and progressive open data policies;
- in the majority of surveyed countries, several of the organisations that control and process public sector location data are fully prepared for the GDPR; this is due to widespread awareness of potential location data privacy issues and that specific processes have been established to comply with the rights of data subjects;
- location-based analysis is used for evidence-based policy making in some relevant policy areas;
- the documents used for the procurement of location data and services often refer to INSPIRE or other relevant standards, but only in some cases also make specific references to the applicable parts of the Directive and/or the applicable national standards.

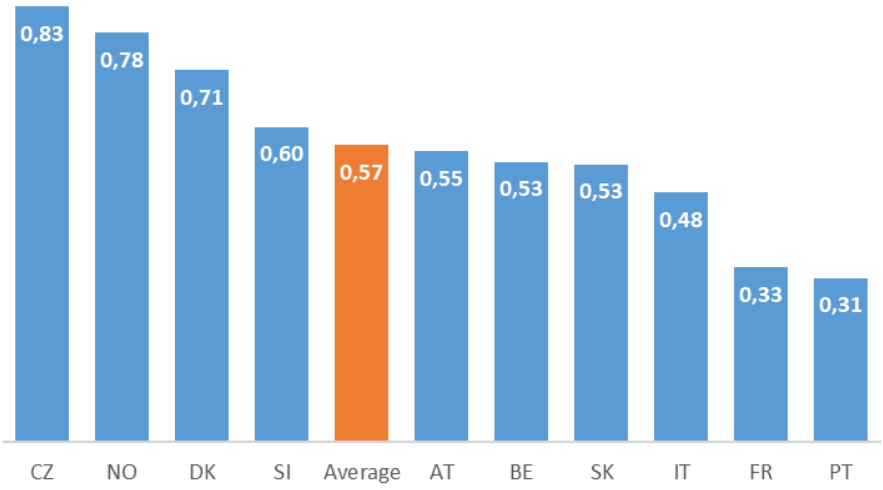

Figure 4 - Policy and Strategy Alignment focus area index by country

Looking in more detail at each recommendation, as mentioned in the Overview, the status for Recommendation 2 is positive across the majority of countries as most location data is available free of charge under an open licence, without restrictions. Additionally, a common licensing framework is often adopted, rather than different licensing agreements, thus facilitating data interoperability. In particular, Czech Republic and Denmark both display a high degree of progress towards the target state for this recommendation, due to the incorporation of core location reference datasets into a national scheme. Slovenia is also well placed, in this regards, due to the wide range of location core reference datasets available for general use.

A Register of Territorial Identification, Addresses and Real Estate (RÚIAN) in Czech Republic

In operation since 2012, RÚIAN is the most extended project in the frame of the Czech civil service basic registries system. The main benefit of the system of basic registers is the creation of a set of reference data, which are binding for the performance of Public Administrations' agendas.

https://www.cuzk.cz/ruian.aspx

Similar levels of alignment can also be highlighted for Recommendations 1 and 4. For Recommendation 1, Belgium, Czech Republic and Norway have a location strategy that is aligned with the digital government strategy in many key areas, while Denmark is the only case among the surveyed countries where the location strategy and digital government strategy are fully aligned. Furthermore, Czech Republic, Italy, Norway and Slovakia have implemented cross-sector legislation mandating the use of authoritative location datasets and services in digital government.

Belgium – Flexpub

Flexpub is a strategy for the implementation of flexible and innovative geographical public e-services. Through a baseline measurement of the existing federal administrations' practices in terms of geographical e-services and an analysis of the deriving stakeholders' requirements, the strategy aims to identify future needs and define the way in which federal administrations can develop, manage and stimulate the use of these services.

https://cirb.brussels/fr/images/doc-actualites/doc-urbis-user-club-14-06-18/flexpub-the-development-of-flexible-and-innovative-location-based-e-services

Use of location-based analysis for evidence-based policymaking (Recommendation 4) is developing well across countries, albeit in varying degrees and directions, to support the development of relevant policies and to monitor their outcomes in relevant policy topics. Location-based analysis is for example the foundation of environmental policy, territorial planning and – quite obviously – land surveying activities in most of the surveyed countries.`

Regarding Recommendation 3, only four countries; Austria, Czech Republic, Denmark and Norway, indicate that public organisations are fully aware and prepared for GDPR in relation to location data. The value of this recommendation index, at 0.45 as average of all participating countries, does indicate there is still progress to be made for a systematic approach to the application of GDPR in the geospatial domain.

As for public sector procurement of location information and/or services (Recommendation 5), most surveyed countries include in their procurement documents and regulation, a general reference either to INSPIRE, or other standards, yet there are typically no specific details or references to the applicable parts of the directive or those other standards. Only Norway applies a more extensive approach, by referring to a standard-based architecture document describing where and how the procured location data and services should fit.

3.3. Digital Government Integration

This focus area considers how location is used as a key enabler in G2B, G2C and G2G digital government processes and systems, detailed in Table 2 below.

Vision Location is well integrated in digital government processing supporting G2G, G2B and G2C interactions, through location related services across government. Users do not have to supply the same mandatory information multiple times. There is visibility of common coordinating and support structures, expert groups and technologies, a strong user voice in the design, evaluation and improvement of location-based services, and good evidence of take-up of services.	
Recommendation 6	Identify where digital government services and processes can be modernised and simplified through the application of location-enabled services and implement improvement actions.
Recommendation 7	Use INSPIRE and SDI models, data and services for delivering cross-sector and cross-border digital public services to citizens, businesses, government and other parties.
Recommendation 8	Adopt an open and collaborative methodology to design and improve location-enabled digital public services.
Recommendation 9	Adopt an integrated location-based approach in the collection and analysis of statistics on different topics and at different levels of government.

Table 2 - Focus Area "Digital Government Integration" - vision and recommendations

In this focus area, the information collected through LIFO highlights an extensive use of location data and solutions, but more for straightforward rather than innovative digital public service implementations. The current state for this focus area shows that:

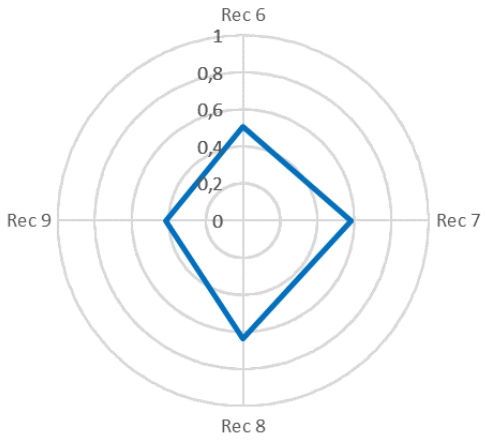

Figure 5 - Digital Government Integration - indexes by recommendation

- The majority of surveyed countries indicate that they exploit the potential of location information, even if only few countries use location data to develop innovative models of digital public services;
- INSPIRE is considered as a reference framework for the harmonisation of location data and services in a cross-border perspective, while this is rarely the case for the delivery of cross-sector public services within each country;
- the public sector SDI is used by the private sector and other organisations for the delivery of innovative applications and services but the practice is applied on a large scale in only a minority of countries;
- open and collaborative methodologies are not used extensively for the design and improvement of location-enabled digital public services; however, a more collaborative approach is adopted for the delivery of services, with quite an active involvement of the private sector;
- various actions are undertaken to fully exploit the integration of location and statistical information in producing location-based statistics.

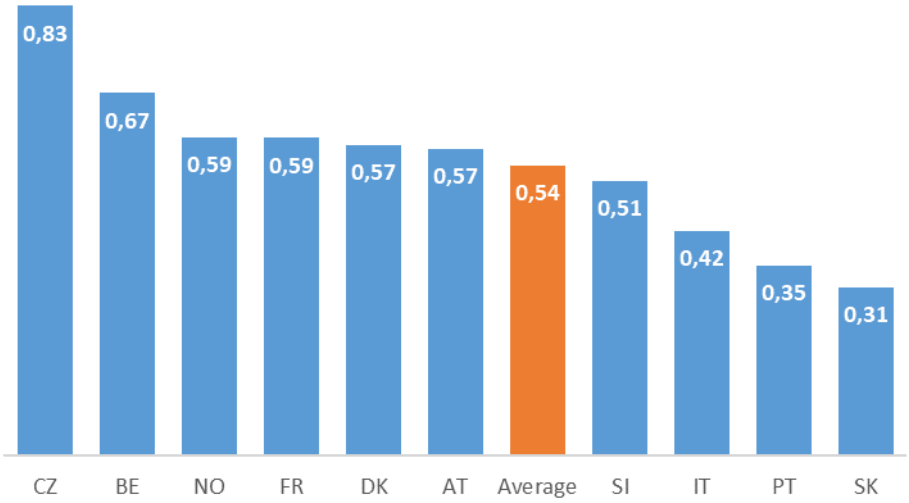

Figure 6 - Digital government integration focus area index by country

Under Recommendation 6, opportunities for modernisation and simplification through location-enabled services are implemented, though not always optimally. Among the surveyed countries, Czech Republic, Denmark and France reach a high degree of alignment with the target state, as they report introducing new business models involving, co--delivery with the private sector or use digital platforms to engage multiple parties.

There are a number of cases where location information is used in an innovative way, for example, to integrate processes or create innovative location-based analytics (e.g. using AAI algorithms).Relevant examples of public services using location information to a comprehensive degree were also found (e.g. the Citizen Map from Portugal).

Portugal – Citizen Map

Citizen Map is a website with information about all points of assistance in Public Administration, namely hospitals, police stations, tax offices, registration offices, Citizen Shops and Spaces. It provides information such as: the location, working hours, documentation required, costs and legal deadlines for services in approximately 7000 georeferenced assistance points.

https://www.ama.gov.pt/web/english/citizen-map

TokajGIS - a joint Slovakia and Hungary initiative

TokajGIS is a GIS database with a common structure and nomenclature for the Tokaj wine region, using INSPIRE for harmonisation, displaying the social, economic and landscape characteristics of the wine region.

https://gis.uni-eszterhazy.hu/

With reference to Recommendation 7, public sector SDIs are used by the private sector and non-profit organisations for delivery of applications, products and services in almost all participating countries. The Czech Republic, Denmark and Norway, in particular, indicate extensive application of SDIs in new and innovative use cases. In this context, INSPIRE is used rather for the deployment of cross-border digital public services rather than for intra-national services, e.g. for Austria, Portugal, Slovakia and Slovenia. An example of this is TokajGIS.

The progress towards the target state of this focus area is positively affected by the alignment with Recommendation 8 concerning the involvement of external parties in public service delivery. This is achieved in several ways:

- contracting services to the private sector or NGOs under public sector accountability,
- scaling back the role of public bodies under public / private partnership models,
- making data openly available for external parties to develop their own products and services,
- encouraging 'civic hacking' to develop new ideas, technologies or methodologies.

Less advanced is the use of a collaborative approach in the design and improvement of services.

In the two aspects of this recommendation, Belgium and the Czech Republic and, to a lesser extent, Austria and Denmark perform the best, with France and Slovakia also being aligned with this recommendation.

Slovenia - Interactive Tool for the Presentation of Geospatial Data (STAGE)

STAGE is an interactive tool for presenting and disseminating geospatial data. It provides users with interactive viewing of statistical content in the form of thematic maps at 10 spatial scales. Based on spatial queries, spatial units can be combined and statistics can be customised. All data is freely available in geospatial format or in a thematic map and can be used in further spatial statistical analyses.

http://gis.stat.si/

The surveyed countries register the lowest degree of progress towards the target state in the implementation of Recommendation 9, with only Czech Republic, Belgium and Norway implementing more than half of the listed actions on integration of location and statistical information in the production of location-based statistics. These actions often consist of the use of a common geospatial reference framework for statistics, the collection of location-referenced census data, and the contribution to European projects aiming at establishing a data and production infrastructure for location-based statistics (e.g. GEOSTAT). There are cases of more advanced synergic use of geospatial and statistical data in Austria or Slovenia, where the latter has implemented the STAGE interactive geospatial statistical tool.

3.4. Standardisation and Reuse

Practices in this focus area concern the adoption of recognised geospatial and location-based standards and technologies, enabling interoperability and reuse.

Vision	
Core data has been defined and a funding model has been agreed for its ongoing maintenance and availability. Consistent use of geospatial and location-based standards and technologies, enabling interoperability and reuse, and integration with broader ICT standards and technologies, including the standards and solutions promoted by the ISA2 programme. Use of these standards in all areas related to the publication and use of location information in digital public services, including metadata, discovery, view, exchange, visualisation etc.	
Recommendation 10	Adopt a common architecture to develop digital government solutions, facilitating the integration of geospatial requirements.
Recommendation 11	Reuse existing authentic data, data services and relevant technical solutions where possible.
Recommendation 12	Apply relevant standards to develop a comprehensive approach for spatial data modelling, sharing, and exchange to facilitate integration in digital public services.
Recommendation 13	Manage location data quality by linking it to policy and organisational objectives, assigning accountability to business and operational users and applying a “fit for purpose” approach.

Table 3 - Focus area Standardisation and Reuse - vision and recommendations

The current state in the focus area “Standardisation and Reuse”, in comparison to the elements of the target state defined in the Vision, shows that:

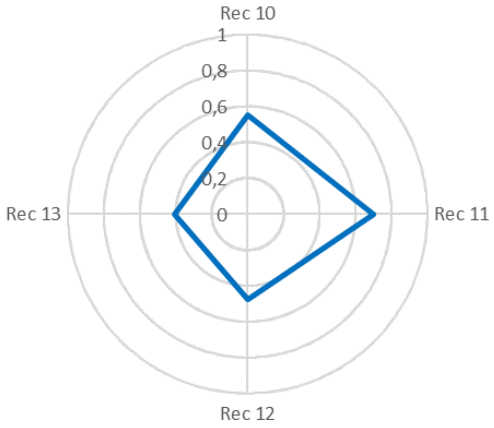

Figure 7 - Standardisation and Reuse - indexes by recommendation

- most of the participating countries promote the reuse of existing authentic data, data services and relevant technical solutions. Furthermore, most countries adopt a common location architecture approach fitting within a broader national ICT architectural framework or an ISA^2 EIF / EIRA based framework;
- conversely, with some exceptions, most countries adopt only a limited number of actions to manage and improve location data quality, and the level of alignment of spatial data modelling and sharing with European standards is quite low.

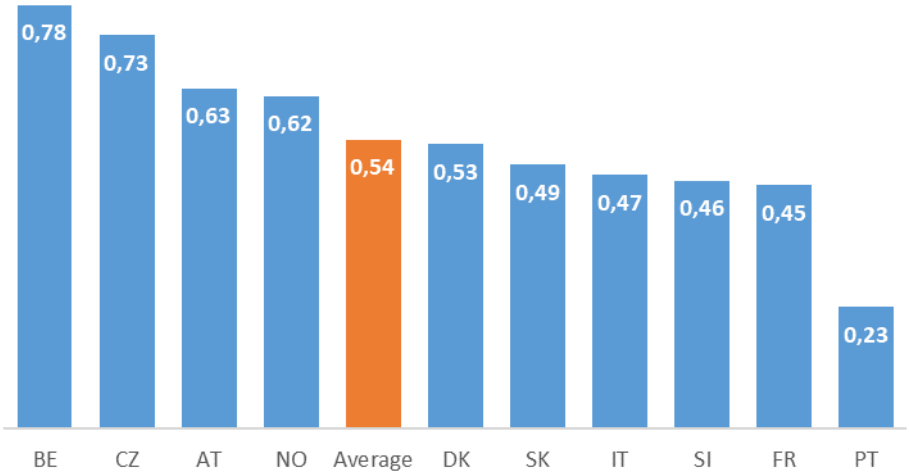

Figure 8 - Standardisation and Reuse focus area index by country

Austria - Integration of location information policy into wider data policy through the Registers

Under its e-government policy, Austria has set up several registers within the Digital Austria Platform. The digital infrastructure includes 21 electronic registers of the Austrian federal Administration, including those related to location information, in many cases linked together. These registers include the address register, the building and housing register, property database (GDB) - digital cadastral map (DKM), property database - land register (GB), and central Motor Vehicle Register (KZR).

https://www.digitales.oesterreich.gv.at/register

The highest degree of progress towards the target state provided in the EULF vvision concerns the reuse of existing authentic data, data services and relevant technical solutions (Recommendation 11). Belgium, Czech Republic, Austria and Slovakia register the highest scores under this recommendation.

Results for Recommendation 10 also indicate a good level of alignment with the target state. All countries monitor new technological developments applicable to the geospatial domain and incorporate them in their respective architectures, although more often with an ad-hoc rather than systematic approach. Architectures are based mostly on national policies and frameworks, at various degrees of implementation, with Belgium, Czech Republic and Norway adopting an EIF / EIRA-based framework. Certain high value public sector location datasets have APIs available in most countries, with Denmark standing out for its complete coverage of all those datasets.

The maturity in managing location data quality (Recommendation 13) is still subject to significant margins for improvement. Most countries adopt a limited set of measures for this purpose, focusing in particular on linking data quality standards with data standards and on considering different dimensions of data quality, such as timeliness, accuracy, completeness, integrity, consistency, compliance to specifications / standards / legislation. Only Czech Republic, Belgium and Norway implement a significant number of actions to assure quality of location data and effective location data quality governance.

Finally, alignment with Recommendation 12 is particularly low. Apart from Belgium, Italy and Slovenia, the percentage of spatial data sets conformant with Regulation (EU) No 1089-2010 on interoperability of spatial data sets and services, is quite low. Better results have been

reached so far on the conformity of network services with Regulation (EC) No 976-2009, where six countries have from 40% to 100% of the services conformant with the regulation. Positively, the GeoDCAT-AP specification is used to connect geospatial data and general data in 80% of the participating countries.

3.5. Return on Investment

This focus area describes how to ensure that funding of activities involving location information gives value for money, and to take action to stimulate innovation and growth.

Vision	
There is a strategic approach to national and European funding, procurement, and delivery of location information and location-based services to minimise costs and maximise benefits for government, businesses and citizens, recognising best practices, and building on INSPIRE and standardisation tools. The funding and sourcing model for collection and distribution of core location data considers user needs from different sectors and the strategic importance of continued supply of data at a suitable quality. Procurement recognises INSPIRE and other standardisation tools in a meaningful way. There are compelling impact assessments and business cases, a rigorous approach to targeting and tracking benefits, and good evidence that benefits are being achieved.	
Recommendation 14	Apply a consistent and systematic approach to monitoring the performance of their location information activities.
Recommendation 15	Communicate the benefits of integrating and using location information in digital public services.
Recommendation 16	Facilitate the use of Public Administrations' location data by non-governmental players to stimulate innovation in products and services and enable job creation and growth.

Table 4 - Focus area Return on Investment - vision and recommendations

"Return on Investment" is the focus area with the highest index result. This possibly reflects the relevance given to maximisation of investment returns in any location driven initiative, and the effectiveness in achieving that aim. Overall results of this focus area indicate:

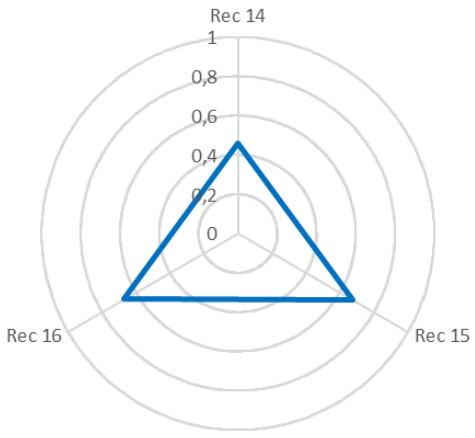

Figure 9 - Return on Investment - indexes by recommendation

- the measures adopted to make the process of searching, finding, and accessing location data and web services as easy as possible for non-governmental parties are particularly effective;
- more than half of the countries are developing, or have implemented, a systematic approach to communicate the availability and benefits of location data and location-enabled digital public services, to raise awareness and understanding;
- more than half of the countries adopt a strategic approach to funding public sector location reference data to make access cost-effective;

- moreover, many countries have implemented or planned an array of actions to actively support private, non-profit and academic players in the development of new products and e--services.

Across participating countries, there is no consistent and systematic approach to monitoring the performance of location information activities and driving through impact-based improvements. A few countries monitor a broad number of factors regarding efficiency and effectiveness and target improvements in these terms but in most cases the factors considered are quite limited.

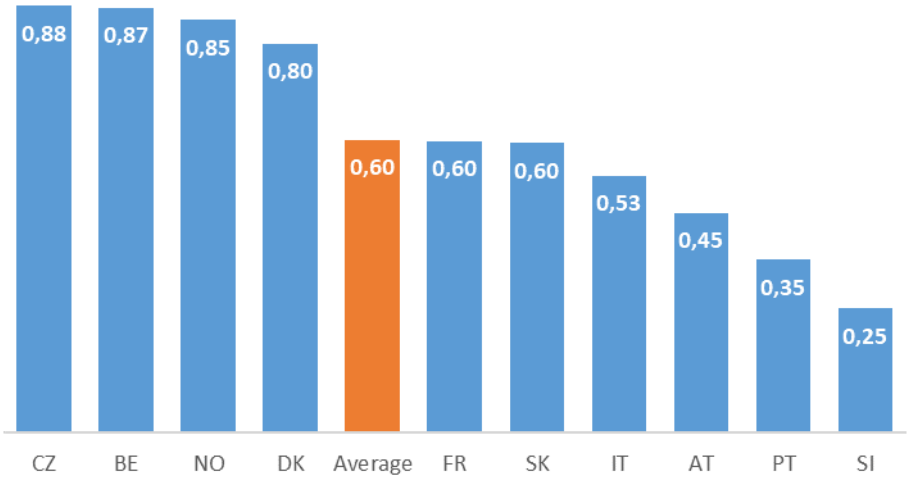

Figure 10 - Return on Investment focus area index by country

The overall good alignment with Recommendation 16 is due to several factors. Firstly, most countries have adopted policies supporting the reuse of public sector location information by the private sector. Secondly, the countries have implemented a variety of measures to make searching, finding and accessing location data and web services as easy as possible for the needs of different users. Finally, private, non-profit and academic actors are supported in the development of new products and e-services in various ways (e.g. promoting open data policies; hackathons, collections of best practices on the use of INSPIRE/SDI data and services; training in skills necessary to better exploit the SDI).

Danish Portal on Use Cases of Geographical Information

Brugstedet.dk is a common communication platform for the Danish geo-data domain, focusing on the use of geographical information (GI). It was established in 2012 and serves as a communication and marketing platform, providing access to ideas, solutions and examples.

http://brugstedet.dk/

France – IGN directorate for communication of geospatial activities and benefits

IGN has established a directorate in charge of communication activities, reporting to the Director General of the organisation. It uses different channels to promote the use of location data and benefits to users: IGN news magazine, newsletters, website, digital communication (on social networks), webinars (n500-700 attendees).

http://www.ign.fr/

Regarding Recommendation 15, a number of countries have implemented or are planning to implement a systematic approach to communicating the availability and benefits of location data and location-enabled digital

public services, in order to raise awareness and understanding. Belgium. Czech Republic, Denmark, France and Norway have extensively adopted practices in place.

The lowest maturity in this focus area concerns monitoring the performance of location information activities and the implementation of impact-based improvements (Recommendation 14). Results indicate that assessments are made over a limited set of parameters (e.g. the reduction in administrative burden and the simplification of administrative processes), while more advanced assessment criteria (e.g. reusability, adaptability, risks, availability, user satisfaction, user centricity, etc.) are applied only in very few countries. Additionally, the monitoring information is not generally used to guide funding and investment of initiatives, nor to assess maturity and benchmark performance of initiatives with other Member States.

3.6. Governance, Partnerships and Capabilities

This focus area deals with effective decision-making, collaboration, knowledge and skills related to the provision and use of location information in the context of digital government.

Vision	
There is high level support for a strategic approach to the funding and availability of location information at Member State and EU level, based on INSPIRE and other tools to achieve interoperability. Effective governance, partnerships, work programmes, responsibilities and capabilities to progress such an approach have been established, considering the needs and expectations of stakeholders at the Member State and EU level. Governments recognise the importance of 'location' understanding and skills and invest in awareness raising, training and resourcing. Service design takes account of user capabilities. Specialists form communities to share knowledge and develop new ideas related to location information. As a result, there is a sufficient level of understanding and skills to develop, deploy and use effective location-based services.	
Recommendation 17	Introduce an integrated governance of location information processes at all levels of government, bringing together different governmental and non-governmental players around a common goal.
Recommendation 18	Partner effectively, to ensure the successful development and exploitation of location data infrastructures.
Recommendation 19	Invest in communications and skills programmes, to ensure sufficient awareness and capabilities to drive through improvements, in the use of location information in digital public services and support growth opportunities.

Table 5 - Focus area Governance, Partnerships and Capabilities - vision and recommendations

As mentioned in the Overview, this is the focus area with the lowest alignment with the target state described in the EULF Blueprint. The current state for this focus area shows that:

- There are examples of well-organised governance of location information in the context of digital government. However, in general, the governance of location information processes at all levels of government does not effectively involve all relevant stakeholders;
- There are limited examples of formal agreements between public authorities, both within the country and cross-border, for financing, building, and operating location data services or digital public services using location data. Examples of public-private partnerships in this domain are also scarce;

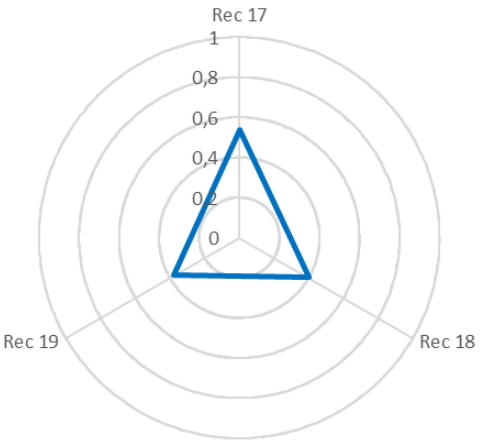

Figure 11 - Governance, Partnerships and Capabilities - indexes by recommendation

- While in several countries the range of initiatives taken to build awareness on geospatial matters is relatively extensive, a few countries are positioned significantly below the average. An important factor is that in the majority of countries there no strategic approach to building the skills necessary to drive through improvements in the use of location information in digital public services and to support growth opportunities.

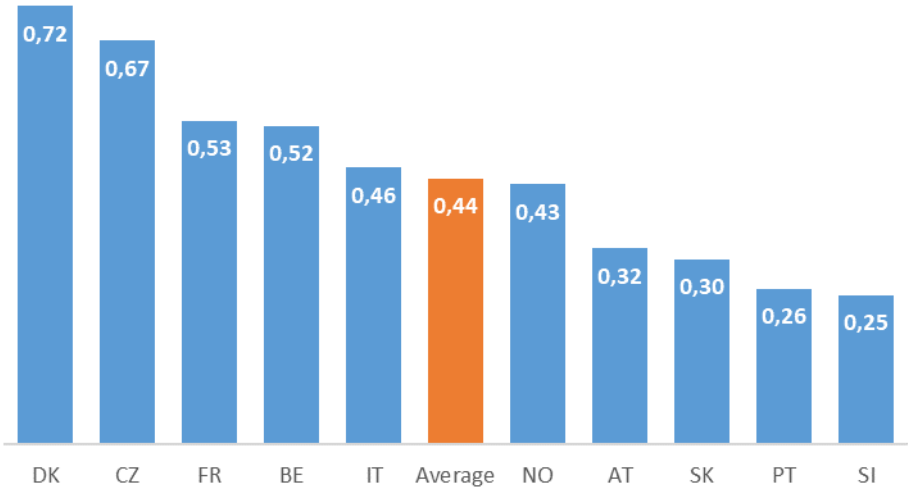

Figure 12 - Governance, Partnerships and Capabilities focus area index by country

Although the overall scores are overall not particularly high for Recommendation 17, there are some strong examples of integrated governance of location information, particularly in terms of coordination at national level of the bodies overseeing location information / SDI, and digital government.

Denmark – integrated governance framework

Denmark operates an effective integrated governance of location information in the context of its digital and data strategies, which applies to all levels of government, includes cooperation across the Nordic region, and brings together different governmental and non-governmental actors. Key elements are:

- The Basic Data General Board
- The Coordination Committee for Infrastructure for Digital Spatial Information
- Common Public Digital Strategy committees
- The Nordic Council of Ministers and formal regional cooperation on digitalisation and INSPIRE implementation

https://norden.lmi.is/

Particular standout examples of governance are in Belgium. Czech Republic, Denmark, France and Norway. Overall though, improvements can be made in the involvement of different communities, administrative levels and sectors in decision-making on the role of location information in digital government through a well-established governance framework.

Recommendation 18 findings indicate that most of the participating countries have not implemented formal partnership agreements for the management and exploitation of SDIs. As an exception, Austria, Denmark and Norway have established formal agreements between public authorities for financing, building and operating location data services or digital public services using location data, across many services. Regarding cross-border agreements for location data services or location-enabled digital public services, examples exist in several countries, namely Austria, Czech Republic, France, Italy and Norway.

Norway digital

Norway digital is a collaboration between organisations that are responsible for providing established information and / or who are major users of such information. The Partners in the collaboration are municipalities, counties and national agencies that are suppliers and users of geographical data and online services. There are common technical and administrative obligations based on the Geodata Act and common agreed requirements.

https://www.geonorge.no/Geodataarbeid/Norge-digitalt/

Italy – Geographic Information professional profiles

The technical standard defines the profiles of professionals operating in the geographic information sector, both in public and private organisations.

The technical standard (the first and only one in Europe so far) is built on top of the competencies defined within the European e-Competence Framework (deployed in Italy with the norm UNI EN 16234-1) and complementing for the geospatial domain the list of typical roles identified in that framework and performed by ICT Professionals in any organisation.

http://store.uni.com/catalogo/index.php/uni-11621-5-2018.html

Recommendation 19 has the lowest index result of all recommendations. This acknowledges the fact that geospatial training or awareness raising is in most cases not part of a recognised or accredited competency framework, but rather addresses only specific needs. Additionally, the catalogue of geospatial training and awareness raising solutions is, on average, relatively limited. There are however a few selected best practices: for example, Italy has established a geospatial competence framework as part of a broader ICT framework. This is embodied in a specific technical norm on GI professional profiles, unique in Europe, extending the standard on ICT profiles defined in the European e-Competence Framework 3.0 (EN 16234-1). On the other side, several countries have set up quite an extensive catalogue of initiatives to raise awareness on geospatial matters, but some other countries have adopted only few initiatives, thus bringing down the average score on this indicator.

Annex 1: LIFO 2019 Scoring methodology

The LIFO scoring methodology is based on a hierarchy of indicators and indexes.

(Action) Indicators: A certain number of actions[4] have been selected in the EULF Blueprint as being representative of the scope of each of the recommendations to which they belong. For each of these actions, an indicator has been designed to measure how monitored countries are progressing towards the "vision" outlined in the EULF Blueprint. Each indicator is calculated on a specific scale, which best reflects the nature of the action (e.g. if it can be measured over a continuous or a discrete scale, if it is a binary phenomenon i.e. yes/no or similar, etc.). Indicators are then normalised over a scale 0-1, as follows:

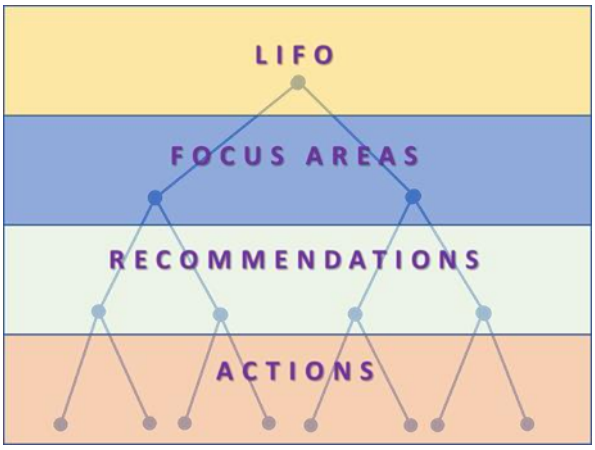

Figure 13 - Herarchy of indicators and indexes

Score attributed to the answer / Maximum Applicable Value

where the Maximum Applicable Value is the upper end of the scale that the non-normalised Value of the indicator can reach.

Note: Optional questions in the LIFO survey capture supplementary information relevant to corresponding mandatory questions about the actions. The mandatory questions (i.e. those marked '*' in the survey) are scored whereas the optional questions are not scored.

(Multi-level) Indexes: Indexes aggregate the Action Indicators at the levels of Recommendations, Focus Areas and LIFO overall, in order to represent the performance of each country at the respective levels. The relationships between (Action) Indicators, Recommendation Indexes, Focus Area Indexes and the overall LIFO Index are described in the table below.

Level	No.	Scoring method
LIFO	1	Average of the 5 Focus area indexes
Focus area	5	Average of scores for all recommendations associated with a focus area
Recommendation	19	Average of normalised scores for all indicators associated with a recommendation[5]
Action	61	Scores calculated using different scoring methods, converted to standard normalised scores in range 0-1.

***Table 6** – Relationships between indicators and indexes*

Action indicators, Recommendation indexes and Focus Area indexes are thus equally weighted in the calculation of their respective upper level indexes.

Note: Some questions have a "don't know" response as an option. Respondents are encouraged to provide answers wherever possible. Where a "don't know" response is given,

[4] Described in the "How" section of each Recommendation
[5] In the event of a failure to respond or an "I don't know" answer, the indicator in question scores zero and it is excluded from the computation of the average score for the above levels.

the question has a null score. This is shown as zero in the indicator charts and the question is ignored in calculating the index scores.

Annex 2: Glossary

Term	Meaning	Link
European Location Interoperability Solutions for e-Government (ELISE)	The action in the ISA^2 programme responsible for maintaining the EULF Blueprint and coordinating the LIFO.	https://joinup.ec.europa.eu/collection/elise-european-location-interoperability-solutions-e-government/about https://ec.europa.eu/isa2/home_en
European Union Location Framework (EULF)	An EU-wide, cross-sector interoperability framework for the exchange and sharing of location data and services. It consists of a package of recommendations, guidance, methodologies, case studies, training, pilots and collaborative action required by public administrations and stakeholder communities to facilitate the free flow of location data and ensure its effective use in e-government services.	https://joinup.ec.europa.eu/collection/european-union-location-framework-eulf/about
EULF Blueprint	Guidance framework for a wide audience to implement the EULF vision. The EULF Blueprint is updated periodically to embrace new developments in digital government.	https://joinup.ec.europa.eu/collection/european-union-location-framework-eulf/eulf-blueprint
EULF Vision	Vision and framework for 'location-enabled government', based on applying good practice in a number of 'focus areas'. It identifies the objectives, transition strategy and high-level actions needed in each focus area.	https://joinup.ec.europa.eu/sites/default/files/inline-files/RegNo_JRC94727_lb-na-27125-en-n%20.pdf
Focus area	Best practice domain relevant to the effective use of location information in policy and digital public services. The focus areas identified in the EULF Vision and adapted in the EULF Blueprint are: Policy and Strategy Alignment, Digital Government Integration, Standardisation and Reuse, Return on Investment, Governance, Partnerships and Capabilities.	
Indicator	Quantitative measurement of the performance / practice of an organisation or entity. In the context of the LIFO, the	

Term	Meaning	Link
	indicators evaluate the degree of alignment of the practices implemented by Member States to the EULF Blueprint recommendations. LIFO includes "primary indicators", which are specifically created for the Observatory and are measured through direct questions to LIFO contact points, and "secondary indicators", taken from external sources, following principles of relevance for the scope of LIFO.	
INSPIRE implementing countries	Group of countries that have engaged to implement the INSPIRE directive or parts thereof. It includes: EU Member States, EFTA Members and a group of non-member states.	https://inspire.ec.europa.eu/INSPIRE-in-your-Country
Recommendation	EULF location interoperability best practices in the EULF Blueprint focus areas. Each of the 19 EULF Blueprint recommendations, contains a description of the rationale for following the recommendation and the expected benefits (why?), a checklist of associated actions (how?), potential problem areas to address in implementing the recommendation (challenges), a variety of best practices across Europe where this has been done successfully, links to relevant parts of the EIF, and further reading related to the recommendation.	

Annex 3: LIFO 2019 results summary

Indexes	AT	BE	CZ	DK	FR	IT	NO	PT	SI	SK	Avg
Rec 1	0.38	0.63	0.75	0.75	0.50	0.75	0.88	0.25	0.50	0.75	0.63
Rec 2	0.56	0.71	0.85	0.88	0.58	0.54	0.52	0.48	0.83	0.48	0.64
Rec 3	0.75	0.50	0.75	0.75	0.00	0.25	0.75	0.00	0.50	0.25	0.45
Rec 4	0.75	0.50	1.00	0.50	0.25	0.50	0.75	0.50	0.50	0.50	0.58
Rec 5	0.33	0.33	0.67	0.67	0.33	0.33	1.00	0.33	0.67	0.67	0.53
Policy and Strategy Alignment	0.55	0.53	0.83	0.71	0.33	0.48	0.78	0.31	0.60	0.53	0.57
Rec 6	0.50	0.58	0.88	0.83	0.75	0.33	0.42	0.17	0.5	0.13	0.51
Rec 7	0.67	0.65	0.71	0.56	0.57	0.48	0.82	0.46	0.65	0.40	0.58
Rec 8	0.70	0.85	0.85	0.7	0.63	0.55	0.52	0.48	0.48	0,62	0.64
Rec 9	0.40	0.60	0.90	0.20	0.40	0.30	0.60	0.30	0.40	0.10	0.42
Digital Government Integration	0.57	0.67	0.83	0.57	0.59	0.42	0.59	0.35	0.51	0.31	0.54
Rec 10	0.53	0.78	0.78	0.67	0.60	0.23	0.85	0.30	0.45	0.32	0.55
Rec 11	0.85	0.95	0.88	0.78	0.63	0.70	0.70	0.25	0.58	0.85	0.70
Rec 12	0.73	0.65	0.38	0.25	0.39	0.72	0.34	0.23	0.58	0.50	0.48
Rec 13	0.41	0.76	0.88	0.42	0.19	0.22	0.58	0.12	0.24	0.29	0.41
Standardisation and Reuse	0.63	0.78	0.73	0.53	0.45	0.47	0.62	0.23	0.46	0.49	0.54
Rec 14	0.68	0.75	0.91	0.50	0.39	0.25	0.57	0.11	0.32	0.45	0.46
Rec 15	0.00	1.00	1.00	1.00	1.00	0.75	1.00	0.50	0.00	0.50	0.68
Rec 16	0.67	0.80	0.73	0.90	0.41	0.59	0.98	0.46	0.44	0.84	0.67
Return on Investment	0.45	0.87	0.88	0.80	0.60	0.53	0.85	0.35	0.25	0.60	0.60
Rec 17	0.25	0.88	1.00	1.00	0.63	0.25	0.25	0.38	0.25	0.50	0.54
Rec 18	0.50	0.33	0.50	0.75	0.50	0.50	0.67	0.17	0.17	0.17	0.40
Rec 19	0.22	0.37	0.50	0.42	0.47	0.62	0.37	0.23	0.32	0.25	0.38
Governance, Partnerships and Capabilities	0.32	0.52	0.67	0.72	0.53	0.46	0.43	0.26	0.25	0.30	0.44
LIFO	**0.51**	**0.68**	**0.79**	**0.67**	**0.50**	**0.47**	**0.65**	**0.30**	**0.41**	**0.45**	**0.54**