

International Journal of Spatial Data Infrastructures Research, 2018, Vol.13, 202-222  
Special Section: INSPIRE (Note from the Field)

## New Directions in Digital Government Using INSPIRE\*

### Report from the Workshop at the INSPIRE Conference 2017

Maria Teresa Borzacchiello, Ray Boguslawski, Francesco Pignatelli<sup>1</sup>

EC Joint Research Centre, Digital Economy Unit,

[Maria-Teresa.BORZACCHIELLO@ec.europa.eu](mailto:Maria-Teresa.BORZACCHIELLO@ec.europa.eu),  
[Raymond.BOGUSLAWSKI@ext.ec.europa.eu](mailto:Raymond.BOGUSLAWSKI@ext.ec.europa.eu),  
[Francesco.PIGNATELLI@ec.europa.eu](mailto:Francesco.PIGNATELLI@ec.europa.eu)

### Abstract

Digital government in Europe is evolving rapidly, thanks to both advances in technology and the tendency for governments to establish more participative relationships with businesses and citizens. There is a drive to promote economic growth in digital businesses through the better use of data, and location data play a very important role in this. INSPIRE has created a basis for the harmonisation of location information across Europe, and is able to support some of the more important developments in digital government. Some Member States have developed integrated strategies and have provided lessons from which others may learn. Technological advances have created an immense range of opportunities through developments such as the internet of things, cloud computing and big data; however, they have also introduced challenges in terms of privacy, trust and the need for new digital skills. A workshop entitled “New Directions in Digital Government using INSPIRE” at the INSPIRE Conference 2017 aimed to explore these new directions by sharing experiences and ideas. This formed part of the ISA<sup>2</sup> work programme, undertaken by the European Location Interoperability Solutions for e-Government (ELISE) project, which involves the development of frameworks and solutions to exploit the potential of location information in digital public services across Europe.

**Keywords:** Workshop, guidelines, location interoperability

---

\*This work is licensed under the Creative Commons Attribution Non-Commercial Works 3.0 License. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/3.0/> or send a letter to Creative Commons, 543 Howard Street, 5<sup>th</sup> Floor, San Francisco, California, 94105, USA. DOI: 10.2902/1725-0463.2018.13.art14

<sup>1</sup> This paper represents input from all the facilitators of the workshop, who are mentioned in the relevant sections.

## **1. CONTEXT**

### **1.1. The ISA<sup>2</sup> Programme and INSPIRE**

The context of the workshop presented in this paper is the European Commission (EC) Programme for Interoperability Solutions and Common Frameworks for European Public Administrations, Businesses and Citizens (hereafter the ISA<sup>2</sup> Programme; European Commission, 2017a). The ISA<sup>2</sup> programme supports long-standing efforts to create a European Union that is free from electronic barriers at national borders. ISA<sup>2</sup> facilitates cross-border and cross-sector interaction between European public administrations, businesses and citizens, enabling the delivery of electronic public services through the use of interoperability frameworks and solutions.

Directive 2007/2/EC established the Infrastructure for Spatial Information in the European Community (INSPIRE) project, one of the largest data harmonisation efforts ever undertaken in Europe. The main focus of INSPIRE is on the sharing and re-use of spatial data and services in support of European environmental policies and policies that affect the environment.

However, INSPIRE extends beyond the environmental domain and builds on the national spatial data infrastructures (SDIs) of the EU Member States, creating a distributed infrastructure with technical neutrality, as specified in the related legal acts and technical guidelines, which in turn are supported by common components and a range of software tools.

The implementation of INSPIRE requires further efforts to address the interoperability of the data and systems across the infrastructure, since the guidance focuses on end products rather than the steps needed to achieve this interoperability.

### **1.2. European Location Interoperability Solutions for e-Government**

The Digital Economy Unit of the EC Joint Research Centre (JRC) is acting in cooperation with other services of the European Commission to co-ordinate ELISE Action 4.1 of the ISA<sup>2</sup> programme.

The ELISE Action is a package of legal/policy, organisational, semantic and technical interoperability solutions to facilitate efficient and effective electronic cross-border or cross-sector interaction among European public administrations, and between these administrations and citizens and businesses within the domain of location information and services, in order to support the goals of the digital single market (DSM), better regulation (BR) and public sector

modernisation (PSM). Its focus is aligned with that of ISA<sup>2</sup>, and involves European public administrations, businesses and citizens and the need to ensure that best-practice interoperable solutions are deployed across the European Union (EU).

ELISE extends and builds on the work of the European Union Location Framework (EULF) and A Reusable INSPIRE Reference Platform (ARE3NA) Actions in the previous ISA programme, which partially addressed the challenges and opportunities in location-related interoperability, in terms of frameworks, application pilots and re-usable tools.

The INSPIRE Conference in Strasbourg-Kehl (European Commission, 2017b) was a unique opportunity to present the initial work of the project to stakeholders from the public and private sectors who are active in the geospatial domain, and to understand their perspectives on a number of related topics.

The workshop was attended by almost 60 people, who were primarily drawn from the public sector and involved in the geospatial community. There were brief presentations followed by interactive sessions and feedback. The interactive sessions were prepared in advance by the facilitators, with specific questions related to each topic. The audience was split into groups to discuss particular questions and share their views, and these were facilitated by different members of the ELISE team. The workshop was divided into two parts, the first dealing with strategic directions and the second discussing the need to develop new and innovative solutions. The discussions held amongst the participants are described in Sections 2 and 3 below.

## **2. PART 1: STRATEGIC DIRECTIONS**

The strategic directions discussed during the first part of the workshop were related to digital government trends, data-sharing opportunities and barriers, the possibility for businesses to grow and innovate using public sector location data, and suggestions for what the European Commission could do through the ELISE programme and other activities in supporting the European data economy.

### **2.1. TOPIC 1: Digital government trends and the role of location information<sup>2</sup>**

The first topic was introduced via a presentation entitled *Top trends in digital government*, which included new directions in location-enabled digital government, the new relationships involved, the role of technology and the

---

<sup>2</sup> Facilitated by Ken van Gansen and David Allesie, Gartner Belgium

increased reliance on “location intelligence”. The discussion was facilitated by specific questions, as follows:

**Q1: Is your government on a journey from e-government to digital government?**

**Q2: Has the digital age contributed to a shift in the ‘public task’, and are there any variations across sectors?**

**Q3: What technology trends play a key role in your digital transformation?**

**Q4: What shifts do you envisage in the next five years in the use of location information, and in which sectors?**

The difference between e-government and digital government was clarified to the audience; e-government refers to a shift of public services from paper to online formats, while digital government involves a step change in the processes and sometimes the business model involved in providing digital public services.

Two contrasting trends were distinguished in the brainstorm: an acceleration towards digital government, and a longer, slower shift towards digital government.

1. Firstly, there is some evidence of a well-supported and driven approach towards digital government. One example came from France, where ministries are encouraging a push towards a government that makes more effective use of digital technologies (Dillet, 2018; Blachère, 2017). As part of this trend, the need for change was clearly felt and translated into initiatives that are part of a digital government agenda. Citizens can increasingly be described as digital ‘natives’, and are best served not only by e-services, but by platforms through which they have some degree of control. Although change is a necessity for some governments, there is also an increasing demand from citizens for privacy. Another driver is economic growth, and the digital government paradigm is deemed to enable this growth. Examples of countries that are advanced in this area are Denmark (Danish Agency for Digitisation, 2016), Estonia (Enterprise Estonia, 2018), and the Czech Republic (Czech Ministry of Industry and Trade, 2014); these nations have a clear digital strategy.
2. On the other hand, a number of participants highlighted that there is still a long way to go before governments have fully embraced the shift towards digital government. Digital immaturity in the public sector is seen as a key inhibitor, as is resistance to change, which is typical across all organisations. This goes hand-in-hand with a lack of the skills and knowledge necessary to

realise this shift. From a technical point of view, legacy systems and the fragmentation of IT infrastructure in public organisations also inhibit this change. Citizens are also increasingly likely to demand privacy from their e-services, another potential inhibitor for digital transformation.

One interesting statement raised was that “government has no future outside of digital government”. This means that public administrations have an urgent need to capture value from digital transformation, and if they fail to do so may have difficulty in continuing to provide their services efficiently and with the required level of quality.

A shift in the ‘public task’ is exemplified in the fact that increasing numbers of citizens are challenging the data provided by government. For example, in the Netherlands, citizens have begun to measure air pollution themselves (Making sense, 2016). Governments then use and include these data in their own databases and return them back to the citizens. This is a sign that they recognise that data measured by citizens can sometimes lead to improved accuracy, and that their public task may lie not in data collection but in data distribution.

The audience identified a number of technology trends playing a key role in digital government transformation, including artificial intelligence, blockchain technology, machine-generated data input/validation rather than human input/validation, web services and web feature services (WFS), open-source developments and digitalisation in the broadest sense. Not all of these trends were perceived to have the same significance; for example, blockchain technology was perceived to consist of more hype than value by some participants. However, it was also recognised that these technology trends form only one dimension of digitalisation, and the ways in which governments and citizens are able to use these technologies were seen to be much more important.

There was also a lively discussion related to the opportunity to handle spatial data separately from other kinds of data. According to the participants, spatial data will not in future be a separate type of information, but will become invisible and simply another dimension of data, highlighting the value of location information within public services. A number of participants argued that this shift is already taking place.

## **2.2. TOPIC 2: Location data sharing opportunities and barriers<sup>3</sup>**

The second topic was introduced by a presentation entitled *Economic opportunities and barriers in the sharing and re-use of geospatial information*.

---

<sup>3</sup> Facilitated by Debora Di Giacomo and Barbora Kudzmanaitė (Wavestone, Luxembourg)

Concrete examples included location-data-sharing ecosystems, factors that have made them successful, and challenges to be overcome.

Reflections in the group were triggered by the following set of questions:

**Q1: What are the main opportunities that could be unlocked by a more extensive application of the INSPIRE directive for the delivery of geospatial-data-based products and services?**

**Q2: What could be done to tackle some of the identified barriers to the wider applications of these geospatial data?**

**Q3: Within the framework of INSPIRE, what factors continue to limit potential users' access to and reuse of the geospatial information held by public or private organisations?**

**Q4: What are the most important actions that policy makers at European and Member State level could take to improve the use of geospatial data?**

With respect to the main opportunities, the audience identified the following:

- Open geospatial data can help to bring end users closer to data scientists in terms of creating and unlocking new opportunities.
- Small and medium enterprises (SMEs) could benefit from more open geospatial data being made available, as this would enable new business opportunities, higher revenue streams and cost savings;
- Significant value can be created from easier access to and reuse of geospatial data on the web;
- Interoperability between different data sets can help to encourage even more data reuse and innovation.

Barriers identified in the presentation included the availability of data, a lack of geospatial skills and knowledge, the complexity of INSPIRE standards and a lack of awareness in the public sector about users' needs. The audience was asked to identify further limiting factors within the framework of INSPIRE; they mentioned the generality of the INSPIRE specifications, the fact that INSPIRE is not the only standard in the market, difficulties in terms of data searchability and combining spatial data with other data types, and finally resistance to change amongst

public administrations, who are not always comfortable with the idea of their data being reused.

The audience discussed possible ways to address these barriers, and this generated the following proposals:

- Stricter and better-defined standards within INSPIRE may be needed;
- A change in mind set needs to take place to increase the openness of data and clearly highlight the benefits of this;
- Service-level agreements could be put in place to foster greater data reuse by the private sector;
- Public administrations could try to take into account the perspective of the user, making datasets more easily searchable and allowing users to rank or rate datasets.

At the European level, the audience identified two actions that the European Commission should take to improve the use of geospatial data: coordination of and support for Member States, to help them understand and navigate all the directives and regulations linked to geospatial data; and the standardisation of data reporting practices.

### **2.3. TOPIC 3: Building a business using public sector location data<sup>4</sup>**

The third topic was introduced by two presentations from the public sector: *Making the most of open data*, by Ulla Kronborg Mazzoli (Agency for Data Supply and Efficiency, DK) and *Powered by INSPIRE.NL*, by Rob van de Velde (Geonovum, NL); and one from the private sector: *Energy data analytics*, by Gerard Mor Martinez (Beedata, ES).

The discussion was facilitated using the following questions:

**Q1: The value of public open data is increased when it is used in private sector products or services. Do these products and services need high-quality data, and if so, is this need met in practice?**

**Q2: INSPIRE involves data from the public sector: do the right conditions exist to allow access to and reuse of this data for commercial purposes?**

---

<sup>4</sup> Facilitated by Giacomo Martirano (external consultant EC JRC) and Gerard Mor (Beedata, Spain)

**Q3: Are data protection policies a help or a hindrance when using public open data?**

Apart from the facilitators, the audience was composed mainly of public sector stakeholders, and the findings therefore emphasise their views rather than a business perspective.

Data harmonisation was perceived by participants as an important condition for data (re)usability, and the lack of harmonisation between different data policies (at MS level) generally represents a high barrier.

The level of data quality needed depends strongly on users' requirements, which may vary significantly between uses/applications. Users need to know very precisely what they can gain from the available data, and "high-quality data" therefore requires "high-quality metadata".

The use of data for commercial purposes generally implies specific conditions on access and use, which need to be addressed (and possible related issues solved) on a case-by-case basis. It was suggested that the public sector could start conversations with SMEs on the topic and help data producers to provide more harmonised data for reuse by others in a straightforward way. For example, Dutch SMEs prefer PDOK (<https://www.pdok.nl/>) to INSPIRE data, since these are easier to use.

The application of data protection to users' data cannot be avoided. More transparency about the use of the data should be available, for example asking end customers to allow the sharing of their data.

**2.4. TOPIC 4: European Commission support for data sharing and reuse through ELISE**

The fourth topic was introduced by Francesco Pignatelli (DG JRC), who spoke about ELISE, the ISA<sup>2</sup> geospatial action to promote effective use of location information in digital government across sectors and at European level. The main discussion points were triggered by the following questions:

**Q1: What is the role of location information within the roadmap for the digital transformation of government in your country?**

**Q2: What barriers have you encountered and what opportunities are you exploiting in which pan-European collaboration may be relevant?**



**Q3: What could ISA2 bring to SMEs working with location information, and how could INSPIRE help them in supporting the European data economy?**

The audience showed some confusion regarding the difference between e-government and digital government, and the two terms should therefore be clarified and explained better to the wider public. Most of the participants welcomed new developments, including feedback from citizens.

With respect to geospatial data, they pointed out that such data are increasingly embedded in existing governmental services, but that these form a silo since particular standards, specifications and so on mean that they are separated. The audience agreed that geospatial data should be considered in the same way as other kinds of data, and this view was confirmed during discussions in other groups (see Section 2.2).

The concept of digital transformation was also discussed; the creation of an ecosystem and an understanding of the added value of transformation along the whole value chain were considered to be important.

The importance of EU cooperation was highlighted, and in particular by representatives of new or candidate EU countries who may be able to learn from more mature countries. Moreover, the skill and educational level of users are critical, especially when usage of the data is low. Shared guidelines can also offer a possibility for sharing experiences.

The role of European programmes such as ISA<sup>2</sup> in supporting SMEs was discussed. According to the participants (mostly drawn from the public sector), the private sector plays an extremely important role: government provides the infrastructure and makes the data available, and the private sector should then act as an intermediary to provide services with added value and stimulate competition. However, it is also important for the public sector to collaborate with the private sector, in order to understand whether there is in fact value in such an intermediary role.

In some cases, the role of the private sector arises due to inefficiencies in the public sector; for example, private companies can help in validating the quality of open data, and offering support for the provision of metadata and discovery services, which form the first step in the use of the available data.

### **3. PART 2: DEVELOPING SOLUTIONS**

During the first two years of the ELISE project, a number of solutions were analysed, developed and tested. The topics discussed during the second part of

the workshop therefore included the sharing of spatial data on the web, perspectives on digital platforms and application programming interfaces (APIs), user requirements for a EU gazetteer,<sup>5</sup> and the role of INSPIRE in public/private data exchange.

### **3.1. TOPIC 1: Sharing spatial data on the web<sup>6</sup>**

This topic was introduced through presentations on the sharing of spatial data on the web (building on SDIs to make spatial data available to a wider audience) by making the data browsable by humans, crawlable by search engines, accessible to developers via APIs and by supporting user feedback. The presentations were given by Clemens Portele (Interactive Instruments) and Paul Van Genuchten (GeoCat).

Questions discussed included the following:

**Q1: What is the target audience: specialists, who act as intermediaries to the market, or non-specialists, for the widest possible direct use?**

**Q2: Will applying best practices in data sharing make it easier to use INSPIRE in digital government? What are the most important gaps that should be addressed?**

**Q3: What will work best, in practice, in terms of user feedback on the data?**

The target audience for activities involving the sharing of spatial data on the web was identified as non-specialists in spatial data, mainly developers and content creators. However, it is not always easy to use spatial data correctly without spatial expertise.

In terms of the gaps that need to be addressed, the audience identified that good APIs are essential, and that although the use of the technological state of the art expected by developers is important, it is not only technology that is valuable. There are aspects related to the fact that governmental datasets are mainly designed to support government processes, and open data rules promote the publication of the raw data in original form, although raw data are not always easy to use.

---

<sup>5</sup> A gazetteer is a register of features of a country, region, continent etc. containing information on their geographical position [ISO19112]

<sup>6</sup> Facilitated by Francesco Pignatelli and Maria Teresa Borzacchiello, EC JRC. Van Genechten (GeoCat, The Netherlands)

The audience also had concerns relating to the type of indexing mechanism, reflecting that although indexing by search engines is important, geoportals may also remain relevant. They also felt that it was important to make HTML generated from data useful to humans. In many cases, the data per se are not very useful, and need to be presented in context (using maps, links, etc.).

In terms of user feedback on metadata, no one in the discussion group was at the stage of publishing feedback, although people in general were becoming more aware of the value of feedback. There was a view that feedback from developers was more useful than that from end users. Within the geospatial domain, participants acknowledged that mechanisms for the acceptance of feedback were not yet at the same level as for other use cases (reviews of hotels, movies, recipes etc.).

### **3.2. TOPIC 2: Digital platforms and APIs<sup>7</sup>**

The second topic was introduced via a presentation on digital platforms and APIs, which covered the growing importance of location-enabled digital platforms, how these are governed and operate, the role of APIs in the context of these platforms, and the implications for INSPIRE.

A digital platform is a business-driven framework that allows a community of partners, providers and consumers to share, extend or enhance digital processes and capabilities for the benefit of all the stakeholders involved, through a common digital technology platform. Examples in the public sector include e-Estonia X-Road<sup>8</sup>, Geopunt<sup>9</sup> and Lets Do It<sup>10</sup>. There are also many well-known private sector examples, such as Uber, Amazon and Spotify. APIs are used to simplify connections between components within IT systems or between IT systems. They are very often used to manage data requests and transmissions, which may of course include INSPIRE data.

The discussion was conducted based on the questions below.

**Q1: Is your government developing new digital public services using the platform paradigm?**

**Q2: In which use cases is your country using Application Programming Interfaces for location information? What benefits and issues have you identified?**

---

<sup>7</sup> Facilitated by Ken Van Gansen (Gartner Belgium) and Simon Vrekar (external consultant JRC)

<sup>8</sup> <https://e-estonia.com/>

<sup>9</sup> <https://www.geopunt.be/>

<sup>10</sup> <https://www.letsdoitworld.org/>

A general observation was that participants were somewhat confused regarding the term 'platform'; they often mixed up the technical term 'platform', the simplistic business model involved in an 'online platform' and the broader concept of a 'digital platform'.

The most common drivers for public sector digital platforms were identified as INSPIRE, e-government, the military, transparency, collaboration between communities, and single access points for the data. Various barriers were also mentioned, including a lack of precise standards or too many of them (and standards that were too broad), legislation/regulation, privacy, unclear roles for public/private sectors and competition.

The benefits of APIs highlighted included standardisation, ease of use, promotion of data sharing, supporting the 'once only' principle, and 'breaking the barriers' to data access. Two specific issues were mentioned: implementation difficulties and/or complexity, and the fear of losing control of the data by making it available outside the 'silo'. APIs were also seen as requiring specific GIS/technical knowledge, and an easy method for accessing the functionality provided by APIs should therefore be provided.

### **3.3. TOPIC 3: The role of an EU gazetteer<sup>11</sup>**

This topic was introduced by a presentation entitled *Searching for information linked to location – an EU gazetteer approach to complement national solutions*. A 'gazetteer' is a dictionary of place names that is used to unambiguously define a geographical location.

The following questions were prepared following a feasibility study performed under EULF and ELISE (Fernandez de Soria et al, 2016) on the opportunity for a pan-European gazetteer service. These questions aimed to contribute to the definition of requirements for such a service.

**Q1: Would an EU gazetteer be useful? Are the applications listed relevant to you? Can you identify another application that is missing?**

**Q2: What capabilities should an EU gazetteer service provide? How should MS data sources be integrated?**

**Q3: In what ways does INSPIRE present new opportunities for an EU gazetteer?**

---

<sup>11</sup> Facilitated by Ray Boguslawski and Lorena Hernandez, External Consultants EC JRC

As a first step in understanding the possible user demand for a pan-European gazetteer, participants were asked to rate the degree of relevance of a list of cross-border applications and to indicate which of these applications have highest priority (Table 1). These cross-border applications were drawn from the feasibility study mentioned above.

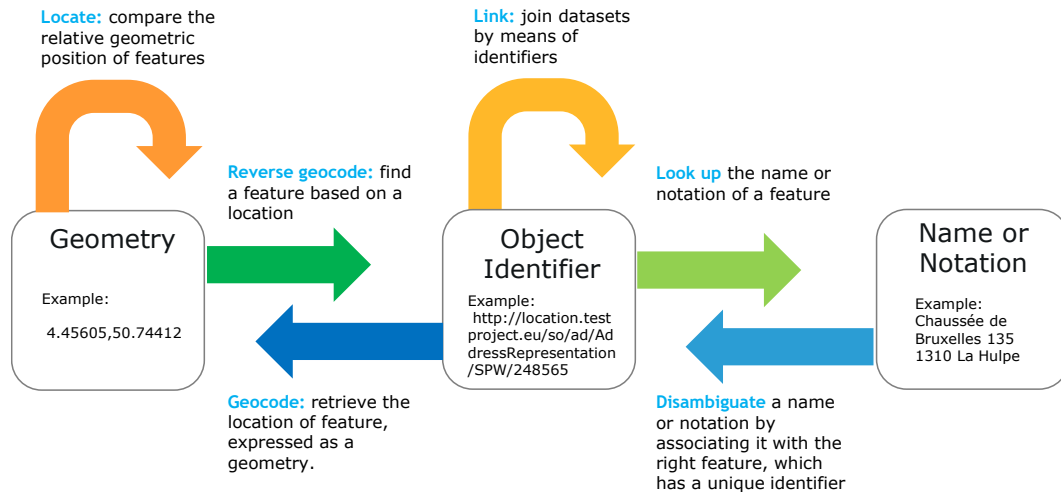
The application for which a pan-European gazetteer was considered to be most relevant was “**Situational awareness during emergency response**”, with votes from 11 out of 12 participants. This was followed by the more generic applications “**Search across existing federated data portals**” and “**Statistical analysis**”. It was perceived that none of the business-specific applications (3-6) would be possible without generic applications being in place (1,2). When identifying priorities, participants again highlighted the application “**Situational awareness during emergency response**”, followed by “**Law enforcement and analysis of crimes**” as a system for supporting the fight against terrorism and other criminal activity.

Table 1: Relevance of cross-border applications for workshop participants

Name of the application	Low relevance	Medium relevance	High relevance	Don't know	First priority
Federated search across data portals	3	3	6	0	1
Statistical analysis	1	2	5	2	1
Collaborative territorial planning	1	8	3	0	0
Law enforcement and analysis of crimes	6	2	4	0	2
Validation of (foreign) addresses	2	8	0	2	0
Situational awareness during emergency response	1	0	11	0	6

The participants agreed that the capabilities or functionalities in Figure 1 should be provided by a gazetteer service.

Figure 1: Typical gazetteer capabilities (Fernandez de Soria et al, 2016)



They indicated that it would be advisable to understand what “failed” in former initiatives involving building an EU gazetteer, and recommended relying on machine-readable interfaces if a federated approach was applied.

Typical gazetteer data include geographic names, administrative units and addresses (Fernandez de Soria et al, 2016); these are all priority INSPIRE themes. It was mentioned that address datasets from INSPIRE could be especially valuable for an EU gazetteer, since they provide harmonised representations of addresses, which are traditionally very different from one country to another.

### 3.4. TOPIC 4: Public/private sector data exchange and the role of INSPIRE<sup>12</sup>

This topic was introduced using two case studies from the public sector, [API Carto for the winegrower](#) by Marc Leobet (FR), and the private sector, [Road safety data exchange in Europe](#) by Maxime Flament (ERTICO).

The main items were discussed using the following questions.

**Q1: How can the private sector leverage the wealth of public spatial data available through the INSPIRE framework to create business opportunities?**

---

<sup>12</sup> Facilitated by Maxime Flament (ERTICO, Belgium) and Maria Teresa Borzacchiello (EC JRC)

**Q2: What conditions would enable the private sector to exchange their data with the public sector for the benefit of society, without losing their competitive advantage?**

**Q3: In your member state, are there examples of successful cooperation between public and private sector involving mutual data exchange?**

As for the other sessions, this was also attended primarily by public sector stakeholders. According to the participants, INSPIRE aims to promote the accessibility of data but can also provide business opportunities. Since INSPIRE is complex to use, there is a need for private sector intermediaries to create applications that can simplify and bring INSPIRE to the level of the users.

However, it was not clear to the audience whether the private sector had an interest in being an intermediary in the exploitation of INSPIRE data. The participants felt that INSPIRE was a trusted source, leveraging the fact that it was authoritative, and had validity and a high level of quality. However, public administrations are afraid of the term “trusted” and are cautious in offering guarantees of quality.

There should be mutual benefits when exchanging data between the public and private sectors, and mechanisms that facilitate these exchanges. However, the return of public sector datasets enhanced by the private sector is not automatic; sharing data can be very difficult and there should be clear licensing conditions.

The following examples of successful cooperation between the public and private sectors in Member States were provided by the audience:

- In Sweden and Norway, a mechanism to enable the exchange of accurate and up-to-date road safety data between public road authorities and private navigation system providers was put in place. The process was trialled as part of the EULF Transportation Pilot, and is being implemented in 14 other countries with the help of funding from Connecting Europe Facility (CEF) (Borzacchiello et al., 2016);
- In Denmark, public sector data (e.g. addresses) have been released to OpenStreetmap, resulting in significant quality improvements. OSM data can be used for commercial purposes, provided attribution is given (McMurren et al., 2016);
- In the Azores (PT), address data collected by the government were shared with the post office. When the postal service became a private

company, the government still shared the address data, as this provided mutual benefits;

- In Belgium, the route network and information on registered private properties are shared with the fire service to keep their maps updated (Astrid 2018);
- In France, public administrations do not have to pay for data from the national mapping agency (IGN, Institut Geographique National), and data are open to the private sector if this is for public purposes (IGN, 2018).

The audience agreed that there is a need to find and share more success stories like these.

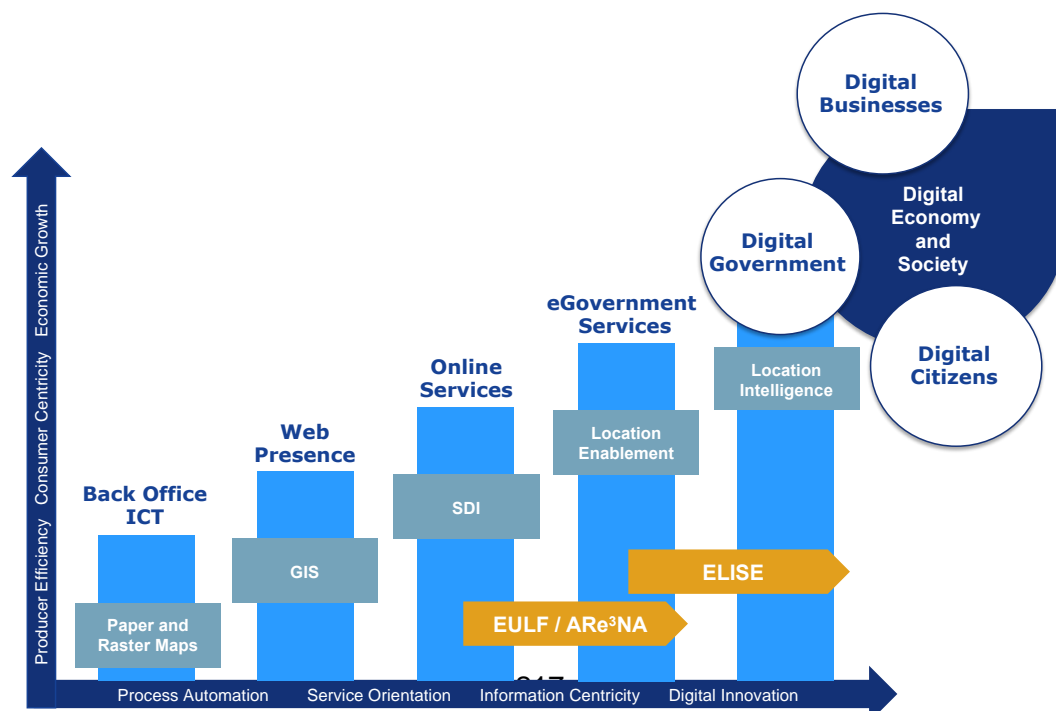
#### 4. CONCLUSIONS AND REFLECTIONS

The workshop touched on a variety of topics reflecting the breadth and complexity of the new challenges for digital government and the implications for INSPIRE. Conclusions and reflections are drawn from these two perspectives.

##### 4.1. Digital government

Figure 2 depicts the parallel evolution in the use of ICT and location information for government processes and services that was introduced and used as a basis for discussion in the workshop.

Figure 2: Evolution of government ICT and use of location information (Boguslaswski et al, 2017)





The evolution of both government ICT and the use of location data and information has to a significant extent been influenced by the growth of the internet. The early use of consumer-facing ICT in government was in web content and basic online services, and this often replaced existing manual processes with very similar electronic processes. These developments did not fully exploit the potential of ICT for government. Ways of serving the customer and using information continued to evolve, with the increased use of ICT for transactional and more dynamic services. This evolution culminated in the growing adoption of a digital government paradigm that embodies digital innovation through new business models and the use of technology and data (e.g. using digital platforms and APIs), giving customers (i.e. citizens and businesses) the type of 'digital experience' they encounter in their daily lives, and promoting economic growth.

Location information plays a key role in the drive towards information centrality and digital innovation. SDIs have contributed to government policies on opening up their data to users outside of government, and location data is used in many customer-facing and back office applications, and is increasingly used for comprehensive analytics (location intelligence) and in highly dynamic situations (e.g. road traffic management, smart cities and disaster management). Factors such as collaborations between the public and private sectors in these developments, the drive towards multi-national applications and a digital single market, and the increasing adoption of a once-only approach for consumers of government digital services have placed further demands on government data strategies for increased harmonisation and use of standards.

The direction of development highlighted above was recognised by participants in the workshop, although there are differing levels of maturity amongst Member States. The benefits of better services, increased participation, savings in terms of cost and time, and support for innovation and growth are paralleled by a number of barriers that need to be overcome before these opportunities can be realised. These include a lack of the skills and knowledge necessary to realise this shift, the cost of moving from legacy systems, the fragmentation of existing ICT and data standards, data licensing restrictions, and the expectations of citizens for data privacy (which have been further strengthened under the new General Data Protection Regulation). Action by the European Commission through initiatives like ISA2 and ELISE can support Member States in this transition.

## 4.2. Implications for INSPIRE

With the importance of location information in digital government and the increased need for harmonised data specifications and use of standards, not only nationally but across the EU, INSPIRE has an important role to play. INSPIRE has formed the basis for many public sector SDIs and location strategies in Europe, and although INSPIRE addresses environmental policy, its core themes of reference data are applicable across all areas of government policy. INSPIRE has also made a major contribution to European data policy in terms of promoting access to public data, simplifying licensing, promoting open data, supporting the drive towards harmonised data, and in some Member States contributing to core reference data initiatives, applying the 'once-only' principle and resulting in public sector savings and private sector opportunities that have contributed to economic growth.

However, INSPIRE was conceived in the early stages of the evolution towards digital government. Early efforts were focused on transposition of legislation, understanding the implementation rules, and organising publication of data through INSPIRE web-based network services. The INSPIRE specifications for each data theme represented generic requirements based on use cases for environmental policy identified by experts across Europe. Thus, although INSPIRE was to a certain extent customer-centric, the real test lay in the development of applications using INSPIRE data. The challenge for INSPIRE lies not only in supporting the initial applications that were envisaged but also in supporting applications in other policy areas, more dynamic applications using 'big data' that have emerged (since initial considerations centred mainly around static data), and the new business models of digital government, some of which integrate public sector and private sector organisations (the private sector is, of course, not bound by INSPIRE).

The INSPIRE community has recognised the need to ensure that INSPIRE data are usable in these new situations. There are some good examples of the use of INSPIRE data in other sectors (e.g. transport, energy) and the increasing integration of INSPIRE in digital government strategies. Most participants in the workshop have a role to play in this evolution; however, they recognise the challenges involved in making INSPIRE data as easy as possible to find and use, integrating both INSPIRE and non-INSPIRE data into applications, making INSPIRE applicable to the private sector, ensuring the privacy of INSPIRE data (e.g. cadastral parcels), and ensuring that awareness and skills are at the required levels. These all relate to making INSPIRE more user-centric and keeping pace with increasing user expectations. More fundamental challenges also exist, perhaps in terms of defining the role of INSPIRE in a world in which geospatial data is no longer a silo for specialists, increasing numbers of data types are linked to location data, numerous multi-national and national

applications need to be supported, and technology enables new advances, for example in artificial intelligence, machine-created data validation and the digitisation of services.

Figure 3. Workshop Moments



## REFERENCES

- Astrid (2018). *Astrid Communication for Security*, at <https://www.astrid.be/en/about-astrid> [accessed 17 June 2018].
- Blachère, T. (2017). Révolution numérique : ce qui attend la France si elle copie l'Estonie, at <http://www.leparisien.fr/politique/revolution-numerique-ce-qui-attend-la-france-si-elle-copie-l-estonie-05-07-2017-7111923.php> [accessed 17 June 2018].
- Boguslawski, R. van Gansen, K., Valayer, C., Borzacchiello, M.T., Pignatelli, F. (2017). *European Union Location Framework Blueprint*, EUR 28931 EN, ISBN 978-92-79-77060-9, doi:10.2760/975822.
- Borzacchiello, M.T., Boguslawski, R., Pignatelli, F. (2016). *Improving accuracy in road safety data exchange for navigation systems – EULF Transportation Pilot*, EUR 28301 EN, doi:10.2791/227108.
- Czech Ministry of Industry and Trade (2014). Digital Czech Republic v. 2.0 - The Way to the Digital Economy, at <https://www.mpo.cz/dokument149132.html> [accessed 17 June 2018].
- Danish Agency for Digitisation (2016). A stronger and more secure digital Denmark, at [https://en.digst.dk/media/14143/ds\\_singlepage\\_uk\\_web.pdf](https://en.digst.dk/media/14143/ds_singlepage_uk_web.pdf) [accessed 17 June 2018].
- Dillet, R. (2018). France's digital minister Mounir Mahjoubi on upcoming digital policies, at <https://techcrunch.com/2018/01/30/frances-digital-minister-mounir-mahjoubi-on-upcoming-digital-policies/> [accessed 17 June 2018].
- Enterprise Estonia (2018). e-Estonia website, at <https://e-estonia.com> [accessed 17 June 2018].
- European Commission (2017a). Enabling Digital Government through Geospatial and Location Intelligence, at [https://ec.europa.eu/isa2/actions/improving-cross-border-exchange-location-information\\_en](https://ec.europa.eu/isa2/actions/improving-cross-border-exchange-location-information_en) [accessed 17 June 2018].
- European Commission (2017b). INSPIRE a digital Europe: Thinking out of the box – Workshop proceedings, at <http://inspire.ec.europa.eu/conference2017/workshops> [accessed 17 June 2018].
- Fernandez De Soria, A. Gielis, I., Bargiotti, L., Goedertier, S. (2016) *ELISE Common Data Services: EU Gazetteer scoping*, JRC External study reports.

Institut National de l'Information Géographique et Forèstièrè (IGN), (2018). *L'IGN et l'Open Data*, at <http://www.ign.fr/institut/activites/lign-lopen-data> [accessed 17 June 2018].

Making Sense (2016). Urban Airq: Citizens Measuring Air Quality Themselves, at <http://making-sense.eu/urban-airq-citizens-measuring-air-quality-themselves/> [accessed 17 June 2018].

McMurren, J., Verhulst, S., Young, A. (2016). Denmark's Open Address dataset – Consolidating and freeing up open data, at <http://odimpact.org/case-denmarks-open-address-data-set.html> [accessed 17 June 2018].