Reimagine INSPIRE by Leveraging Open Data and Web GIS



The Infrastructure for Spatial Information in Europe (INSPIRE) Directive has made good progress toward implementation by all member states. On the occasion of the INSPIRE Conference 2017 and in keeping with the theme INSPIRE a Digital Europe: Thinking Out of the Box, it seems fitting to comment on the current state of the directive compared to global geospatial technology trends.

INSPIRE represents the most complex spatial data infrastructure project ever attempted, with the goal of aligning the 28 member states of the European Union (EU). It may prove helpful to reflect on what works; what has changed; and what needs to change by the established end date of 2021, given the shifting technology landscape.

The initiative has:

- Helped open what was largely a closed data environment by tackling data licensing.
- Created detailed structural guidelines for a set of 34 spatial data themes needed for environmental applications to improve our understanding of our planet.
- Set guidelines for making authoritative data web accessible and interoperable.

To date, much of the emphasis of the project has been focused on adoption of and compliance with the directive, which dictates the steps and means for sharing environmental spatial information across Europe to assist policy-making across boundaries. With increasing environmental pressures, perhaps it's time to review the emerging technology delivery patterns that turn data access into data-driven solutions that can enable rapid response to threats.

Moving Targets

Setting out to frame and tackle a complex spatial data infrastructure over a 14-year time period in a constantly changing technology environment has posed challenges.

At the time of the directive's adoption in 2007, who among us could have predicted that:

- Connected sensors would proliferate, ushering in an era of real-time mapping?
- Smartphones with increasing computing capacity and ubiquitous apps would become the major means of citizen engagement?
- · Browsers and mobile apps would become the interface for most geospatial interactions?
- GIS platforms would migrate online, using the infinite computing capacity of the cloud and a software-as-a-service delivery model?
- Open data would become a global phenomenon for governments of all scales, ushering in new interactions with greater transparency and accountability?
- Drones would proliferate and greatly change surveying and aerial imaging workflows and outcomes?
- Machine intelligence would be adopted as a means to automatically classify imagery for quicker and more accurate geospatial base maps and spatial analysis inquiries?

These major technology changes have all contributed to accelerated volumes of data at higher accuracy. This has made it much easier and more cost-effective for users to undertake geospatial projects, without the need to be concerned about where and how the data is delivered or the underlying infrastructure is configured.

These trends have forced authoritative data stewards to rethink how they make their data available to support the everyday decisions of their governments and citizens. As a collective force for data stewards, INSPIRE should not ignore the impacts.

Open Data Disruption

The INSPIRE Directive pioneered top-down, specification-driven spatial data infrastructure approaches, and since its establishment,

bottom-up and citizen-focused open data initiatives have really taken off. There is a growing expectation that data is readily available, usable and reliable. Most of the spatial datasets covered by the INSPIRE Directive have already been made available as open data.

The global open data movement has helped governments make inroads into solving problems with a data-driven approach. Open data provides a new kind of glue to bring governments and citizens together. It facilitates interaction, provides the means to rally around shared objectives, and helps everyone stay connected and informed as improvements take place.

The emerging concept of a hub supplements the open data patterns and addresses this trend—offering open data tools, mapping apps, and analytics that wrap around policy initiatives to tackle pressing issues. The approach gives communities the tools to combine data, visualisation, analytics, and collaboration technology alongside well-defined goals to create data-driven results.

The Copernicus satellite imaging constellation program sets a precedent for open data in the European Union. Copernicus data and services are made available and accessible to any citizen and organisation around the world for free, on a full and open-access basis. This decoupling of the data from its exploitation creates an environment that complements commercial operations and allows users to choose what they want to do with the data—aligning their tools and workflows with their task at hand.

The INSPIRE Directive faces many constraints in turning data into actionable information and could benefit from an open data approach. INSPIRE sets the bar with thorough technical guidance, but for many stakeholders, the bar is too high and prohibits many interested users from finding and using data as expected. A simpler, user-oriented INSPIRE implementation pattern with more flexibility on compliance would foster greater participation and sustainable implementation plans.

Improving Accessibility

At Esri, we see INSPIRE as a national and regional system of systems network with an enormous potential. However, the rigid framework has inhibited innovation and made it difficult to adapt to a constantly evolving technology landscape.

The predominant geospatial platform today is a distributed GIS that makes data accessible from anywhere, on any device. This pattern has evolved over the years from the desktop to the enterprise, with discoverability of data across teams and organisations. It's becoming increasingly easier to securely share data, maps and apps with a wide variety of stakeholders.

We call this new distributed pattern Web GIS, which we implemented in ArcGIS. We have realised returns of a far greater number of users and interactions by embracing this informal, loosely connected, and organic way of collaborating. It has expanded the number of engaged GIS users far beyond the prior, more formalised distributed patterns. For example, the software-as-a-service offering ArcGIS Online now has more than four million subscribers contributing new apps and maps every day, and it's serving billions of maps per day to consumers using their preferred devices, with more than 40 million open data downloads. Building on this pattern, Esri recently introduced a capability into the ArcGIS platform: ArcGIS Hub, which provides two-way engagement to connect government and citizens.

The Web GIS pattern contains:

- A system of systems architecture.
- Application programming interfaces (APIs) for flexible data and analytics interactions.
- Apps to deliver functionality for different purposes.
- The ability to deliver GIS content and functionality via mobile devices, the web or the desktop.

Web GIS facilitates brings together heterogeneous data that is dynamically extracted in layers and maps. Distributed data management and dynamic integration connects everyone, from the citizen and the fieldworker to government agencies and operations centres.

Getting to Interaction

The connected system of systems approach, which has been a goal of the geospatial industry for some time, has arrived. It allows dynamic replication and integration of information from all parts of governments and organisations. It also marks the evolution of the database from a single database to multiple databases with multiple data models.

The European Spatial Data Infrastructure has set in motion this system of systems approach across the 28 member states. The INSPIRE Directive's vision for an agile and crosscutting information exchange of environmental spatial information has provided a compelling goal. The next steps involve the creation of pathways for meaningful action with this data, centering on improving the quality of life for all.

Web GIS has the capability to rapidly respond to user needs and adapt to changes in technology by allowing easy access to data and services. This pattern did not exist when INSPIRE was designed; however, it aligns with the spirit of INSPIRE to break down information silos.

INSPIRE can stay as it is, with a road map oriented to measure completeness, or it can evolve and become part of a more transparent open data approach with wide use in society. Our software users have guided us to view this change as inevitable, and we support them with changes to our products. EU citizens would benefit if the INSPIRE community of data providers and technical consultants took advantage of open data and Web GIS patterns.

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https://www.gim-international.com/content/article/reimagine-inspire-by-leveraging-open-data-and-web-gis