ELISE action
Webinar Series

Location Intelligence

Technology trends and case studies in digital government

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Ray BOGUSLAWSKY, European Commission JRC (consultant)

17/09/2020 14.00 -15.00

European Location Interoperability Solutions for e-Government

Enabling Digital Government through Geospatial and Location Intelligence
ISA² Programme & ELISE action

European Interoperability Programme

Cross-Border and Cross-Sector Interoperability Solutions

For Public Administrations, Businesses and Citizens

54 different actions tackling interoperability from different angles

ELISE action is the only action focusing on the location dimension

European Location Interoperability Solutions for e-Government

Enabling Digital Government through Geospatial and Location Intelligence
Welcome to the ELISE webinar series

ELISE Knowledge Transfer activities

Purpose:
• Engage in an agile way
• with topics of relevance to the Digital Transformation
• by harnessing the use of spatial data and technology.
• Share the results of ELISE activities.

https://europa.eu/!nP74ph
“Location Intelligence for regions and cities” event pack

ELISE webinar
03/09 at 14:00h
Preparing the ground for smart places of the future

ELISE webinar
17/09 at 14:00h
Location Intelligence Technology trends and case studies in digital government

Participatory Lab
14/10 at 11:30h
Location Intelligence4Cities and Regions

More info:
https://joinup.ec.europa.eu/node/703049
About our speakers

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Data Driven Government

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City of Helsinki

Ricardo VITORINO
Head of Research & Innovation
Ubiwhere
(Smart Cities)

The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.
What we will cover today

1. Technology landscape and trends of Location Intelligence
2. Case Study #1: Helsinki Digital Twin City Models
3. Case Study #2: City of Guimarães: Urban Platform
4. Key take-away messages and open discussion
7. Q&A
1 Technology landscape and trends of Location Intelligence
Gartner defines Location Intelligence as the process of deriving meaningful insight from geospatial data relationships – people, places or things.
Location intelligence
LI is the process of deriving meaningful insight from geospatial data relationships — people, places or things — to solve particular challenges such as demographic or environmental analysis, asset tracking, and traffic planning. (Gartner)

Digital Twin of Government
A digital twin of government is a virtual representation of government and partner assets, people and operations to provide real-time analysis capabilities, operations automation and scenario-based planning.
They will be a version of digital twins of organizations. Key features will include a single point of visualization and access to operational data related to physical assets, people and business processes, APIs for issuing commands to things and processes, and the ability to use AI for scenario planning and urban modeling. (Gartner)

Geospatial Artificial Intelligence
GeoAI, is the use of artificial intelligence methods, including machine learning and deep learning, to produce knowledge through the analysis of spatial data and imagery.
Positioning technologies are being positively affected by AI, affecting industries such as logistics and navigation systems (ex: processing millions of GPS points in (near) real-time). (Gartner)
Location intelligence, digital twins and digital platforms are key digital government technologies.

With Location Intelligence and Digital Platforms maturing, Digital Twins of government are emerging, with the additional support of predictive analytics, APIs and IoT platforms.
Gartner identified trends that will shape “Location Intelligence”

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Years to mainstream adoption</th>
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<tr>
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<td><strong>Transformational</strong></td>
<td>▪ Cloud Services for Government</td>
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<td>▪ Deep Learning Networks</td>
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<td>▪ Machine Learning</td>
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<td>▪ Digital Government Platforms</td>
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<td>▪ Edge AI</td>
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<td><strong>High</strong></td>
<td>▪ Multichannel Communications Tools</td>
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<td>▪ Geocoding Services</td>
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<td>▪ Web-Mapping Tools</td>
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<td>▪ Smart Lighting</td>
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<td>▪ Indoor Location</td>
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<td><strong>Moderate</strong></td>
<td>▪ Privacy by Design</td>
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Gothenburg, Sweden – Min Stad

• **What** Planning for Economic Development
• **How does it work** Through the use of web maps and 3D models, provide participants in the planning efforts with tools to experiment with adjusting individual variables and seeing results in near-real time
• **Trends** 3D and 4D Mapping, Geocoding Services, Web-Mapping Tools
• **Link** [https://minstad.goteborg.se/minstad/index.do](https://minstad.goteborg.se/minstad/index.do)
Walloon Government – Agricultural Subsidy Compliance Monitoring

• **What** Using satellite images simplifies and improves the administration and management of agricultural subsidies and makes the process more cost efficient.

• **How it works** Automatic and continuous monitoring of 100% of agriculture parcels and crops vs. 5% punctual compliance checks through field visits: taxpayer’s money spent better using satellite images and image processing algorithms.

• **Trends** Data sharing through open data and APIs, Video/Image Analytics, GeoAI,

• **Link** n.a.
Gendarmerie Nationale, France – Crime Prediction

• **What** Target risk areas in advance in order to optimise patrol mobilisation and the success of police intervention

• **How** A series of customised applications to help teams get to know their area and plan their patrols. The application portfolio uses Galigeo solutions, such as SAP Lumira Designer. Throughout mainland France and its overseas territories, thousands of policemen and women have free and easy access to location intelligence tools

• Against this background, the power of mapping devices can play a full role in fighting crime and anti-social behaviour more effectively.

• **Trends** Open Data and APIs, 3D/4D Mapping, Web Mapping Tools, GeoAI

• **Link** https://www.galigeo.com/en/crime-prediction/
2

Case Study #1
Helsinki Digital Twin City Models
Helsinki Digital Twin City Models

<table>
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<tr>
<th>Area</th>
<th>Policy Domain</th>
<th>Service owner</th>
<th>Organisations involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>FI</td>
<td>Urban Development</td>
<td>City of Helsinki</td>
<td>Bentley Systems, Cadfem, Terrasolid, Terra Tech, Virtual City Systems, Aalto Helsinki Tec Univ, Helsinki Univ, Technical Univ Munich, Technical Univ Stuttgart, OGC CityGML, PostgreSQL, PostGIS, 3D City DB, Cesium, Cities of Rotterdam, Singapore, Vienna</td>
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<tr>
<td>City of Helsinki</td>
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**Overview of service / innovation**

There are two next generation 3D city models of Helsinki available: a semantic City Information Model (CityGML) and a visually high-quality Reality Mesh Model. The models are available as open data (covering the whole city area 500 km2). The use of models is licensed under CC BY 4.0.

- The city information model allows users to perform a variety of analyses focusing on energy consumption, greenhouse gases or the environmental impacts of traffic, for example.
- The reality mesh model can be used in various online services or as the basis for all types of design projects, such as planning the exit routes and the locations of performance stages and sales stalls for city events.

At this point, the City of Helsinki sees it useful to maintain models of two different technologies as they cater to different use cases. These two Open City models are seen as part of the city’s digital infrastructure; the city of Helsinki shared these two models as open data 3½ years ago.
Helsinki Digital Twin City Models
AI/machine learning is applied in the semi automated production process of the city models in specific software processing e.g. laser point clouds and semantic building models. City models are multipurpose platforms catering for hundreds of use cases. Their most important features are: data quality, interoperability (according to international standards), security and openness. They provide thematic representations which support decision making. An example is the Helsinki Energy and Climate Atlas, providing a large amount of building-specific basic information, energy and repair data, as well as data on the consumption of water, district heating and electricity. Another example is the Solar potential of Helsinki, highlighting how solar energy can be implemented in the city.

The data owned and collected by the city is used for modelling and analysis. It includes:
- Point Cloud data, used for creating terrain and surface (e.g. from buildings) models
- Oblique Images, used for creating textures for the CityGML-model (terrain, buildings) and processing the mesh model
- GIS Databases and Registers maintained by City Of Helsinki – building register with basic information and renovation data, energy consumption data buildings owned by the City, the Tree register, Maps etc.
- Data models of buildings IFC/BIM and infrastructure models InfraBIM, InfraGML, InfraModel etc. The city’s goal is to collect all IFC/BIM models during the building permit process.
- New Geodata from sensors, smartphones, cars, satellites, things (IOT): these new data sources offer excellent data to supplement city models, which can in the future be “real time”. The collection of IOT/sensor data close is in progress and soon implemented.
Helsinki Digital Twin City Models
Helsinki Digital Twin City Models

Success factors
As illustrated in the previous slide, success factors stem from the benefits of a digital platform produced by combining data storages and virtual worlds. Adding processes and services – producing a digital twin – yields benefits linked to urban development modelling: efficiency, productivity, improved planning, better monitoring, transparency and management. An example is the advanced wind analysis which simulates wind patterns and new buildings. In addition, open innovation is enabled by open reliable data and web delivery services provided by the City. The models and data are reused by third parties, examples include media using open data for illustrating their narrative. Supporting ecosystems and strategic goals such as Carbon neutral Helsinki by 2035 is the most important and the constantly evolving Helsinki Energy and Climate Atlas was created to support this goal.

Challenges
- Data quality is essential and Helsinki faces many challenges related to this. During the mapping of existing data from the registers onto the models, errors are discovered and full correction takes years.
- International standards are developed but there are many issues linked to semantic interoperability between different models, and it will take years to achieve full interoperability. As environmental and urban challenges are huge and globally common, cooperation – as the city has done when developing the models - and open sharing are key factors to achieving success.
- The lack of human resources is a bottleneck; companies and cities are competing for the same expertise and education in these specific domains is not sufficient.
- The issue of maintaining the model and data quality needed to be solved. Trained city civil servants did the work as they processed building permit applications.
Heat Demand, Heat Savings and also CO₂ Emissions
Case Study #2
City of Guimarães: Urban Platform
## City of Guimarães: Urban Platform

<table>
<thead>
<tr>
<th>Area</th>
<th>Policy Domain</th>
<th>Service owner</th>
<th>Organisations involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT – City of Guimaraes</td>
<td>Urban development</td>
<td>Ubiwhere</td>
<td>The municipality, citizens and other data providers</td>
</tr>
</tbody>
</table>

### Overview of service / innovation

The Urban Platform provides cities with a holistic view of their urban environment which enables the management of the city and provides insight, informing local policy decisions. The platform allows the monitoring of various indicators (reducing environmental emissions, improving the energy and mobility efficiency, etc) by displaying information of several domains in real-time in a customisable dashboard.

The Urban Platform assists the cities in meeting defined targets, such as the Sustainable Development Goals (SDG), defined by the United Nations for 2030, by taking into account the Sustainable Cities and Communities Indicators from ISO 37120 (Sustainable Cities and Communities - Indicators for city services and quality of life) and 37122 (Sustainable Cities and Communities - Indicators for Smart Cities), among other indicators.

With these goals in mind, the Urban Platform presents itself as an aggregating solution for the different sectors of a city (mobility, environment, tourism, energy or waste), helping to fulfill these goals while supporting the digitisation of the city. The real-time indicators provide insight through the correlation of information designed for forecasting, reporting and impact assessment.
Can you imagine your city as a single, integrated system?

https://urbanplatform.city
City of Guimarães: Urban Platform

**Location Intelligence**
- real-time information from several domains in a single map;
- general overview of short-term historical data;
- capability to take decisions in real-time;
- demographic and contextual information about buildings & areas;
- 2D / 3D perspectives at will;
- data from GIS tools, open data portals and satellites;
- grouping & filtering per administrative divisions.

**Data Sources**
- Real-time mobility data about traffic, parking, incidents, weather conditions and energy consumption;
- Touristic information about events and points of interest and soon on-foot traffic;
- Geospatial 3D information about buildings from the proprietary Geographic Information System (GIS);
- Information and geographic boundaries of the administrative regions (e.g. parishes, districts);
- Information and geographic representations of watercourses;
- OpenStreetMap data to support analysis (e.g. most congested roads) and geocoding features (translation of address to coordinates).
City of Guimarães: Urban Platform
City of Guimarães: Urban Platform

Success factors

- Using open standards for communication and data exchange - such as FIWARE’s NGSI standard;
- UI/UX for non-technical or data-savvy users;
- Modular software architecture for flexible integration.

Challenges

- Focus on the city priorities amongst all the data needed;
- Data harmonisation on top of open standards;
- Complementing data from global sources with local digitalization activities;
- Ensuring scalability and responsiveness while performing geospatial data correlation and analysis.
## City of Guimarães: Urban Platform

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
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<tbody>
<tr>
<td>Total city population</td>
<td>158,124.00</td>
</tr>
<tr>
<td>City land area</td>
<td>240.95 km²</td>
</tr>
<tr>
<td>Population density</td>
<td>656.00 people/km²</td>
</tr>
<tr>
<td>Percentage of country's population</td>
<td>0.15%</td>
</tr>
<tr>
<td>Percent of population that are youth aged 18-24</td>
<td>12.60%</td>
</tr>
<tr>
<td>Percent of population that are seniors aged 65+</td>
<td>13.60%</td>
</tr>
<tr>
<td>Annual population change</td>
<td>-0.91%</td>
</tr>
<tr>
<td>Percent of population that are children aged 0-14</td>
<td>15.28%</td>
</tr>
<tr>
<td>Percent of population that are adults aged 25-64</td>
<td>58.11%</td>
</tr>
<tr>
<td>Male to female ratio (number of males per 100 females)</td>
<td>94.35</td>
</tr>
<tr>
<td>Country GDP per capita (EUR)</td>
<td>23,396.80</td>
</tr>
<tr>
<td>Average annual rent (€/year)</td>
<td>1,514.80</td>
</tr>
<tr>
<td>Average annual temperature (°C)</td>
<td>14.00</td>
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</tbody>
</table>
Suiting the future of sustainable cities.
Key take-away messages and open discussion
Key messages and conclusions

Location intelligence is maturing and supporting innovation on quality of life in regions and cities, but the challenges are high.

Location intelligence needs healthy data ecosystems to deliver high value. The main challenges relate to data quality, availability and interoperability.

Location information can contribute to interoperability in Digital Twins and urban platforms, but even a semantic city model is not enough to ensure interoperability across the platform.

There is a role to play by standardisation bodies and EU interoperability initiatives to support these healthy data ecosystems which include location intelligence.
Next events. Register today!

• Participatory Lab during EWRC, 14/10 at 11:30 – EU Login + https://europa.eu/regions-and-cities/programme/sessions/1514_en

• Monitoring and understanding emerging geospatial technologies, 24/09 at 14:00 - https://joinup.ec.europa.eu/node/703022

• Location-enabled public services, 22/10 at 14:00 - registration available soon
Stay tuned

Join the \textit{ELISE} community in \texttt{JoinUp}

@\texttt{eu\_location}

eulocation@ec.europa.eu

\texttt{ELISE\ playlist}
Thank you

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