WebGIS tools for enhanced environmental data management and communication in Wallonia

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Context of environmental data management in European Union (UE) and Wallonia :

- **European directive INSPIRE** (2007/CE 14/03/2007) defines a standardised infrastructure for spatial information in Europe to support Community environmental policies : open access data in 34 topics
- INSPIRE transposition in **Wallonia** : **Infrasig** decree (22/12/2011) and **Geomatics Strategic Plan** (PGSW – 08/06/2014)
- **ISSeP** (the Scientific Institute for Public Service) **acquires**, **analyses** and **valorises environmental geodata in Wallonia** :
  - **Monitoring environmental matrices** using field observations with sampling scheme, static and mobile devices as well as remote sensing techniques
  - **Cartography, environmental modelling** and **risks assessment**
  - Development of innovative **tools for data visualisation, editing and diffusion** in line with **regional legislation**
- **WebGIS interfaces** provide geodata in a formal and digital communication channel between stakeholders. These interfaces have been developed in **various contexts**: from internal research developments using open source software to geoservices publication on the Walloon geoportal : WalOnMap.

ISSeP in brief

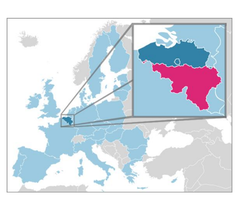
Environmental metrology

Risk assessment

Research and technological development

ISSeP is a **Public Interest Organism** (OIP) created in **1990. The institute** carry out scientific and technical activities in **environmental fields**. ISSeP is also recognised as a **reference laboratory in Wallonia**

ISSeP is a major **producer of environmental data in Wallonia**. Quality monitoring and research projects are performed in the respective matrices: **air, water, soils and wastes. Risks assessments, expertise and guide of good practices respond to the needs of the administration**. The institute's expertise includes **mapping**, **analysing** and **sharing** geodata



WebGIS APPLICATIONS : THREE APPROACHES DEVELOPED

1. Geoservices

Objective

- **Implementing environmental geodata acquired at ISSeP as geoservices <u>available to all</u> on the Walloon geoportal** : *air* and *water monitoring* layers examples

Approach

- **Use ready to use API protocol** (based on commercial GIS software ArcGIS @ESRI) to create geoservices
- Integrate these geoservices into the framework developed by the Walloon region (**geocatalog**, **Metawal** and geoportal **WalOnMap**)

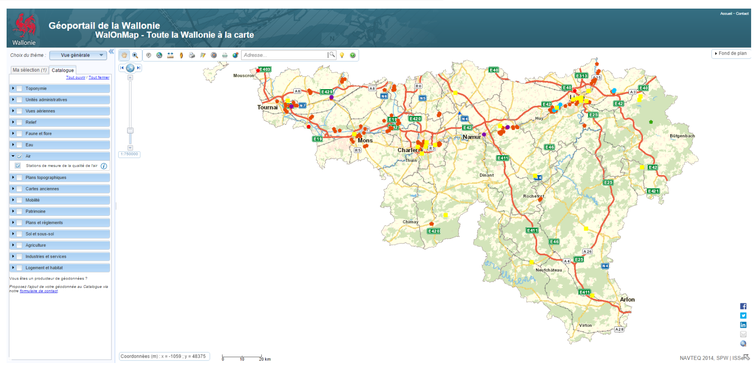
Advantages

- Same framework, format, visualisation for all data: harmonise data coherence and visibility
- Centralise all geographic resources inside one geoportal (geodata, maps, applications, geoservices …)
- Clearly indicate existing geodata with complete metadata to avoid creating such data twice (economy of scale)
- Valorisation of data integrated (high n° of users/days), political strengths
- Visualising interface already developed and customisable: layers, catalogue, tools
- Help coming from regional authorities (SPW) : coordination and technical support
- Continuously improving API
- Quality insurance (Metawal)
- Geoservices producer remains the authentic source: full control of data production and distribution

Weaknesses

- Dependence on commercial software and server licenses = costs
- Fixed framework = no customisation
- Updating of the data

<u>Air quality stations layer on WalOnMap :</u>



WalOnMap: <u>http://geoportail.wallonie.be</u>

2. WebGIS Prototypes

Objective

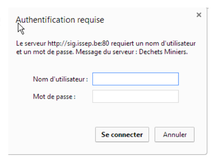
- Discuss **WebGIS prototypes developments with <u>end-users</u> to visualise intermediate results, demonstrate the feasibility and/or define product functionalities (to be developed by the responsible service afterwards)** : WebGIS developed for *sediments management*, *risks assessment related to old mining waste deposits* and *health and environmental risks assessment (SIGENSA)*

Approach

- WebGIS prototype using the API protocol JavaScript (@ESRI) **with restricted access to specific end-users**
- **Creation of new service : edition by the user of the point layer**
- **Ad-hoc functions:** advanced search, automatic snapping, updating, publi-posting between stakeholders, different roles and access
- Link to an **alphanumerical form** with questions related to management

Advantages

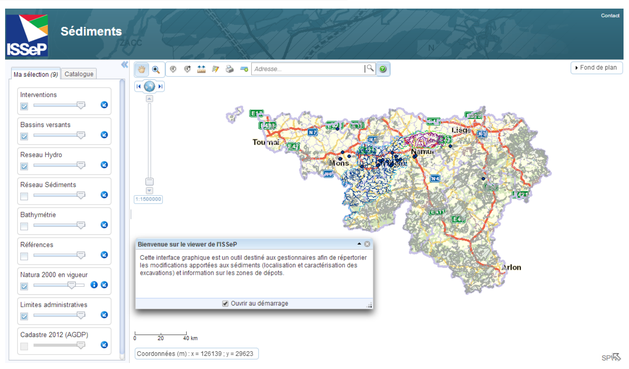
- Restricted access through specific user-name and password
- Control of access demands and roles in the interface
- Protection of sensible data
- Automatic interaction between stakeholders
- Keep track of product evolutions/versions
- Security within a group -> membership feeling
- Ease of implementation through commercial support
- Common template with WalOnMap
- Links to existing geoservices or widgets of WalOnMap (up to date and authenticity, mutualisation of costs, metadata, support)



Weaknesses

- Dependence on commercial software and server licenses = costs
- Time consuming (adapt each time the code / data to be shown)

<u>Sediments management in Wallonia :</u>



For more information : <u>http://www.issep.be/qualite-des-sediments/</u>

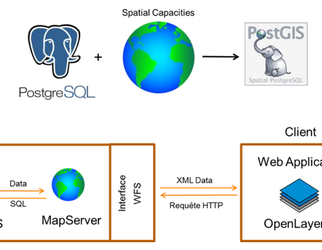
3. Open Source WebGIS

Objective

- **Derive and share high quantity of information <u>internally</u>** : example with air quality monitoring using mobile device (*ExTraCar [Exposition, Trafic et Carbone noir] project*)

Approach

- geodata on air quality (Black Carbon) acquired using mobile devices are integrated into a WebGIS using **open source software** :



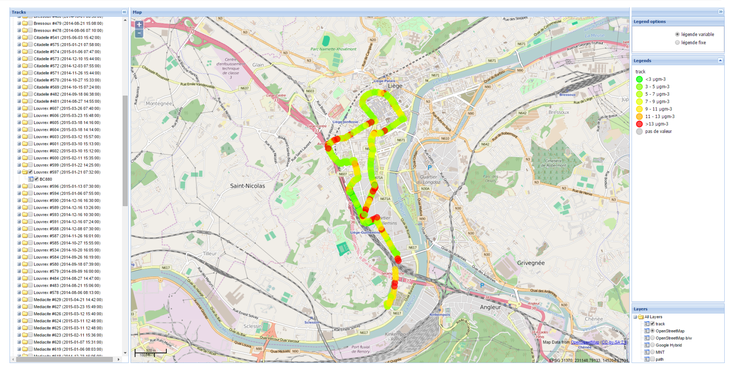
Advantages

- Free
- Can manage a lot of data
- Can be customised at infinite / flexibility
- Strong user support through Internet
- Multiplatform friendly software (Windows / Linux)

Weaknesses

- Requires skilled people to develop
- Not widely used in Walloon administration / not corresponding to the current official Walloon framework
- Lack of specific functionalities

<u>Air quality monitoring using bikes – monitoring of the city of Liège:</u>



For more information : <u>http://www.issep.be/extracar/</u>

Finality: publication of geodata on WalOnMap - from acquisition to open access visualisation

Geodata acquisition (ISSeP)

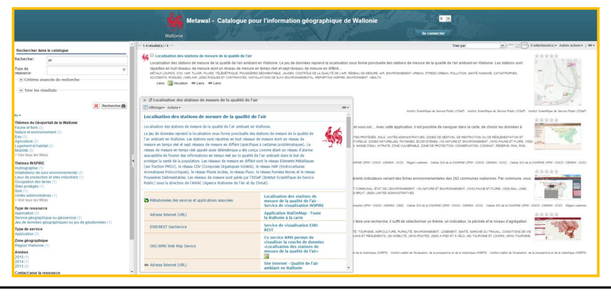
Processing (ISSeP)

Validation (ISSeP)

Final product (ISSeP)

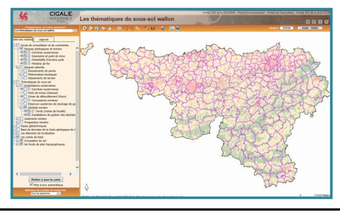
Geocatalog of Wallonia (SPW)

- Inventory and description of geographic ressources in Wallonia
- Content normalisation (Metawal)



WalOnMap (SPW)

- « Discovery » type of web application
- Visualisation and interaction of Walloon geodata (all producers included)
- Redirection through specific web application (e.g. CIGALE, Environmental status of Walloon municipalities, geological map of Wallonia, atlas of agriculture and rural policy, …)



Conclusions:

- WebGIS help **decision makers / citizens** to:
  - **visualise, understand, interact, cross** and **share** geodata information in a **single interface**.
  - **centralise** and **formalise** this information using common implementation framework.
- WebGIS are **accessible** anytime and anywhere (thanks to remote access via Internet) + accessibility can be managed depending on the objectives (from restricted to open access).
- WebGIS developments **in close collaboration with users** allows to identify their **specific needs** in terms of <u>geodata sources</u> and <u>tools functionalities</u>.

- WebGIS are then:
  1. **Efficient communication tools** : from discussion of prototypes within projects committees to geodata analysis for wider audience.
  2. **Efficient decision support tool**: individual to companies can found/cross relevant geodata answering their specific needs.
- WebGIS **issues,** such as error propagation, should be clearly mentioned to all users : information and **education** in terms of precision / scale / legal value

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