Spatial Monitor Flanders : more than just sharing spatial indicators

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The Spatial Monitor Flanders (*Ruimtemonitor Vlaanderen)* is a digital GIS tool package to support policy making in the field of spatial planning in Flanders. The Spatial Monitor integrates indicators of spatial transformations in subdomains of spatial planning and provides a direct and user-friendly access to the indicators and their calculation tools. These indicators are developed by different research groups within the scientific Support Centre 'Space and Housing" (2008-2011) in close collaboration with the Flemish Department of Town and Country Planning, Housing Policy and Immovable Heritage (RWO). The integration requires consistency in data, spatial analyses, modelling tools, visualization and meta-information. The initial user group of the Spatial Monitor consists of civil servants of the Flemish spatial planning department, as well as the researchers within the Support Centre. At this time, also the Research Centre of the Flemish Government and the provincial spatial planning departments are integrated in the user group. Although the user group is limited, it consists of key players in the dialogue between government and public community in the field of spatial planning.

This project aims to initiate and to promote an interactive user community where indicators are developed, applied, updated, discussed and shared.

The Spatial Monitor applies a variety of GIS software and exists in two different forms, each with a different functional character.

As a first part, there is the web portal www.ruimtemonitor.be where maps and data from all the different spatial indicators on Flemish territory can be consulted. Basic functions like zooming and panning are provided and an extensive description of each indicator is given. The web portal runs on a combination of Open Source GIS software and a developed set of java scripts and libraries to glue everything together. The four main components are PostgreSQL with spatial extension PostGIS (GIS database), GeoNetwork (metadataserver and Web Catalog Service (CSW)), Open Layers (map viewer for web browsers) and GeoServer (Web Map Service).

The strength of the Open Source architecture of GeoServer is that Web Map Service (WMS) is integrated with Web Feature Service (WFS). Thus, online geospatial data can be shared and its layout can be edited by authorized users. This allows us to open the Spatial Monitor for online editing in future applications. However, enabling this function requires a very strict and clear set of conventions between the users in order to avoid mistakes when overwriting data. By assigning different levels of authorization to different user profiles, one can share certain data with some users and at the same time shield it from others. In addition, Geoserver is currently developing a Web Processing Service (WPS) module that will provide users the possibility to perform online spatial operations. This extension can be a valuable future functionality when integrated in the Spatial Monitor.

The web portal is easy to use, requires no advanced GIS knowledge or GIS software and can be made available to a large user group. Feedback from the user community highlighted the need for clear and understandable indicator metadata for people with no background in GIS, in addition to technical descriptions of GIS operations.

Second, a desktop version of the Spatial Monitor is developed in C#.NET as an extension within ArcGIS 9.3. In the desktop environment, data cannot only be consulted, but also edited or applied for analyses, and new data can be added. In addition, calculations can be automated and archived as tools with the ArcGIS Modelbuilder. This is an important feature in support of continuity of indicators: it facilitates the update process for RWO or any new researchers. Moreover, in such a model, multiple criteria can be parameterised, so that the model can act as a decision support system. Given the extended functional character and software requirements, the desktop version is meant for experienced GIS users.

It was a challenge to tune Open Source GIS with commercial GIS software (ArcGIS) as the two versions were progressively constructed. By holding on to a well-defined workflow, data, documentation, calculations and visualization in both versions are synchronized. Metadata for indicators is stored in a PostgreSQL database which is used by both web portal and desktop version. However, the geographical data consists in two versions. First, data is created and stored as shapefiles and layer files in ArcGIS for the desktop version. Next , the shapefiles are converted into PostgreSQL records by an Open Source conversion tool (shp2pgsql). At the same time, the layer files are replaced by SDL (*Styled Layer Description*) files which are created in UDIG. This latter step is still done manually and should be automated. Ideally, this chain of conversion processes and entry processes for the web portal will be integrated into one global algorithm.

Aside from the documentation, a forum is used for sharing and archiving discussions among and across researchers and civil servants. This leads to a flexible and self learning system: the more users, the more new spatial transformations, indicators, possible calculations and data sources can be identified and developed.

Finally, the target is set to integrate the Spatial Monitor within the Flemish governmental SDI. As such, core data can be extracted from existing databases, while indicators can be stored on local databases where administrators can verify, harmonize and update indicator data.

In this project, four distinct achievements were realized.

First, spatial indicators and their calculation methods are stored, documented and harmonized. Second, the two versions provide for two different types of use, thus decreasing the threshold for new users. Third, the challenge to synchronize data within an Open Source environment to data within a commercial environment is successfully tackled. Fourth, the Spatial Monitor provides the means for an interactive user community where spatial data and indicators are always in progress.

Thus, a versatile, interactive and easy to use GIS instrument is implemented to support policy making.