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# GEOBS: TOWARDS AN OBSERVATORY PROTOTYPE OF THE CONTENTS OF THE 65 FRENCH SDIs

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## Introduction

Spatial Data Infrastructures (SDI) feature nowadays as an essential driver of institutional data diffusion (Crompvoets et al., 2004). Due to the dual impact of systems interoperability and changes in the legal framework, institutional spatial data are more and more accessible through the widespread deployment of SDI.

In this context, the French research program “*GEOBS: Spatial Data Infrastructure in the informational governance for environment*” (2015-2018) led by the French National Centre for Scientific Research (CNRS) considers SDI as a real object of study for a better understanding of the flows of environmental information. For this purpose, we are developing a prototype observatory based on content and uses indicators of French SDIs. These indicators propose some (spatial, temporal, thematic, organisational) markers to analyse currently accessible spatial data assets as well as related territorial and informational restructuring.

SDIs that we consider as sociotechnical systems, allow to identify some issues related to production and management of environmental knowledge. This contribution aims to present the *GEOBS* project and its methodological frame for analysing how the contents of SDIs are currently evolving. Future developments of these methods are expected to enable more accurate interpretations of the political role of these new and original public institutions specialised in information management.

## Context: the 65 French SDIs

In France, the transposition of Directive 2007/2/CE INSPIRE has led to the implementation of a National SDI in the form of a geoportal/geocatalogue<sup>1</sup>. It is complemented by regional infrastructures like PIGMA<sup>2</sup> in Aquitaine, which are essential links in the production and dissemination of public information, and also by thematic SDIs (for example, focused on water with ONEMA (*Office National d'eau et des milieux aquatiques* – National Office for water and aquatic environments)) and territorial SDIs (for example, the Pyrenees with APEM (*Assemblée Pyrénéenne de l'économie montagnarde* – Pyrenean assembly of mountain economies)). In 2014, AFIGEO (*Association française pour l'information géographique* – French association of geographical information) listed 65 operational SDIs. Far from reflecting a simple interlocking of the many administrative layers in France (State > region > department

<sup>1</sup> <http://www.geoportail.gouv.fr/> and <http://www.geocatalogue.fr/>

<sup>2</sup> <http://www.pigma.org> (*Plateforme d'information géographique mutualisée en Aquitaine* - platform for geographic information in Aquitaine)

> inter-municipality), a glance at the situation of the future Aquitaine – Limousin – Poitou-Charentes<sup>3</sup> region enables to assess the complexity of the informational restructuring that is currently occurring (figure 1). This complexity is further accentuated by the emergence of open data portals that mainly disseminate geographical data.

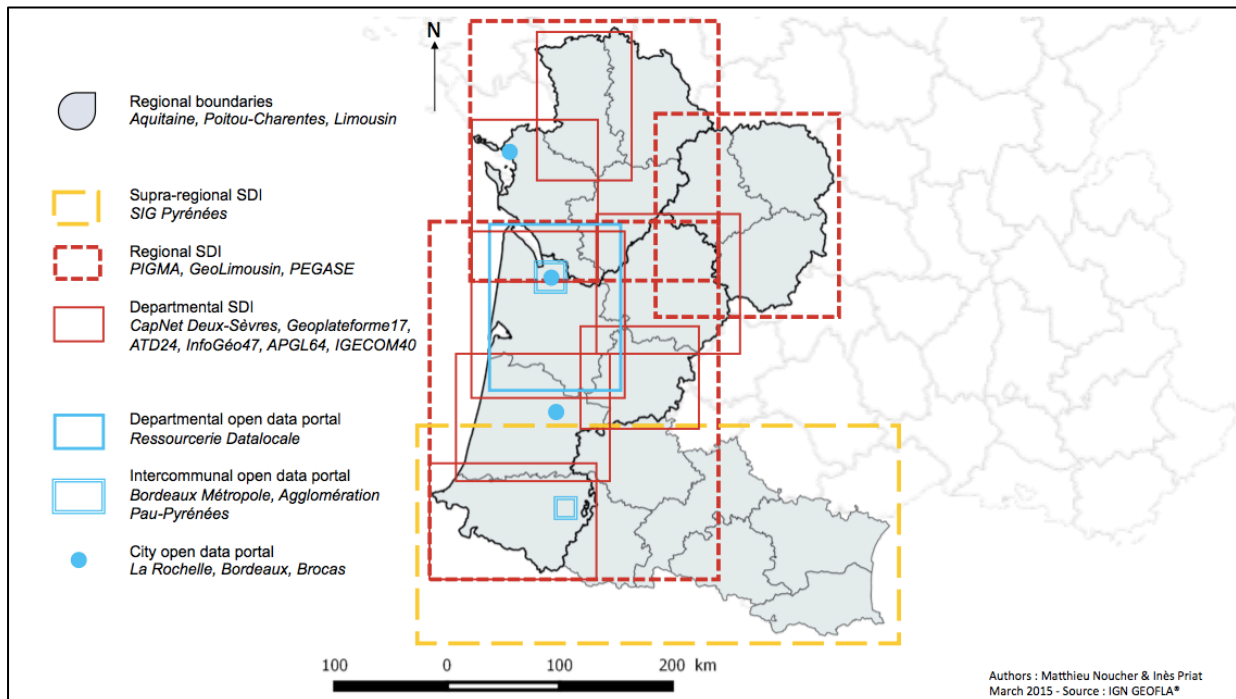


Figure 1. Distribution of institutional platforms (SDIs and open data portals) that disseminate geographical information in Aquitaine – Limousin – Poitou-Charentes.

### Postulate: SDIs as a sociotechnical system of "mapping" the world

By concentrating on analysing the contribution of SDIs to environmental knowledge and expertise, the study is based on a complementary approach to current assessment methods (Cromptvoets et al., 2008). Considered as tools, SDIs are subjected to technical analyses in areas such as systems interoperability or data standardisation (Mohammadi et al., 2008). Organisational issues are essentially addressed to assess the reproducibility of governance systems from one country to another (Georgiadou et al., 2006). SDIs are mostly based on quantitative criteria for purposes of comparison. The analysis of changes in data volumes and their similarities makes it possible to compare national SDIs and to follow them over time. But no analysis of data asset content is being done: the European Commission sees reporting (2009/442/CE) as a *benchmarking*<sup>4</sup> practice aimed at creating a common cognitive framework designed to make data comparable, without any consideration of content or relevance.

Taking a different stance from these reporting practices, our study aims to explore SDIs as sociotechnical systems that shape the "mapping" process of the environment (Noucher, 2013). This point of view offers an alternative entry point. The term "sociotechnical system" was provided by sociologists of innovation and translation to describe the social dimension of a technical object, considering that "in the way they are configured they define a certain partition between the physical and social world, assigning roles to certain kinds of players – human and non-human – excluding others, allowing certain types of relationships between the different players so that they participate fully in the building of a culture (...) while simultaneously compelling them to become mediators in all the relationships that we maintain with the real" (Akrich, 1993). Considering SDIs as sociotechnical systems therefore encourages the development of different analysis criteria than traditional technical or

<sup>3</sup> As part of current territorial reform, the 22 metropolitan regions in France are being merged to become, by 1st January 2017, 13 regions whose boundaries have just been determined (government bill « NOTRe : *Nouvelle Organisation Territoriale de la République* (New Territorial Organisation of the French Republic), adopted by the National Assembly on first reading on 10<sup>th</sup> March 2015).

<sup>4</sup> *Benchmarking* is a marketing technique for comparing company performance. A *benchmark* is a numbered performance indicator in a given field taken from observing the results of the most successful company in the field. The indicator may be used to define the objectives of a company wishing to compete with the successful company.

economic indicators. Following Mormont and Hubert (2008), we refer here to systems rather than instruments of public policy. The notion of instruments suggests an interpretation based on resources and encourages an evaluation in terms of tensions between objectives and results. It therefore tends to fall back on an evaluative approach. For its part our study aims to reveal the dynamics that the new systems induce in terms of environmental policies and the reconfigurations that they bring about. These dynamics are not just the objective-result kind, but the kind that change the relationships between components of a system.

### **Objective: towards an observatory prototype of French Spatial Data Infrastructures**

The objective of the study is to analyse the content of 65 french SDIs to understand the way institutional geographical data is currently characterised and delivered. Our assumption is that SDIs should not be considered simply as information search support (i.e. a simple search engine) but as an actual object of study, in order to understand how territorial information governance works today (Mol, 2009). This therefore requires an overview of available and published institutional resources.

To achieve these objectives, the study aims to develop an observatory prototype of geographical information flows through the 65 French SDIs (according to the AFIGEO census of June 2014). Based on the clarification of several content and use indicators, the observatory prototype will eventually propose a Web application, providing dynamic geovisualisations of indicators aimed at showing the current state of French institutional geographical data assets.

### **Approach: data corpus and processing protocol**

A processing protocol for automatic extraction of metadata and their restructuring in a database is currently being developed in order to enable spatio-temporal analysis of SDIs (Noucher et Gautreau, 2014). XML metadata files are extracted using Python scripts. A very strong disparity in catalogue volume is immediately apparent. For example, the national geocatalogue has 48,809 metadata records, PIGMA SDI has over 3,100 metadata on the Aquitaine region and the IGEOCOM40 SDI has 41 metadata records on its territory (the Landes). However, beyond this snapshot taken at a given point in time, the main interest of the GEOBS observatory prototype is in monitoring changes in metadata distribution. Figure 2 therefore shows changes in the distribution of SDI metadata by volume on the regional level between March 2013 and March 2015.

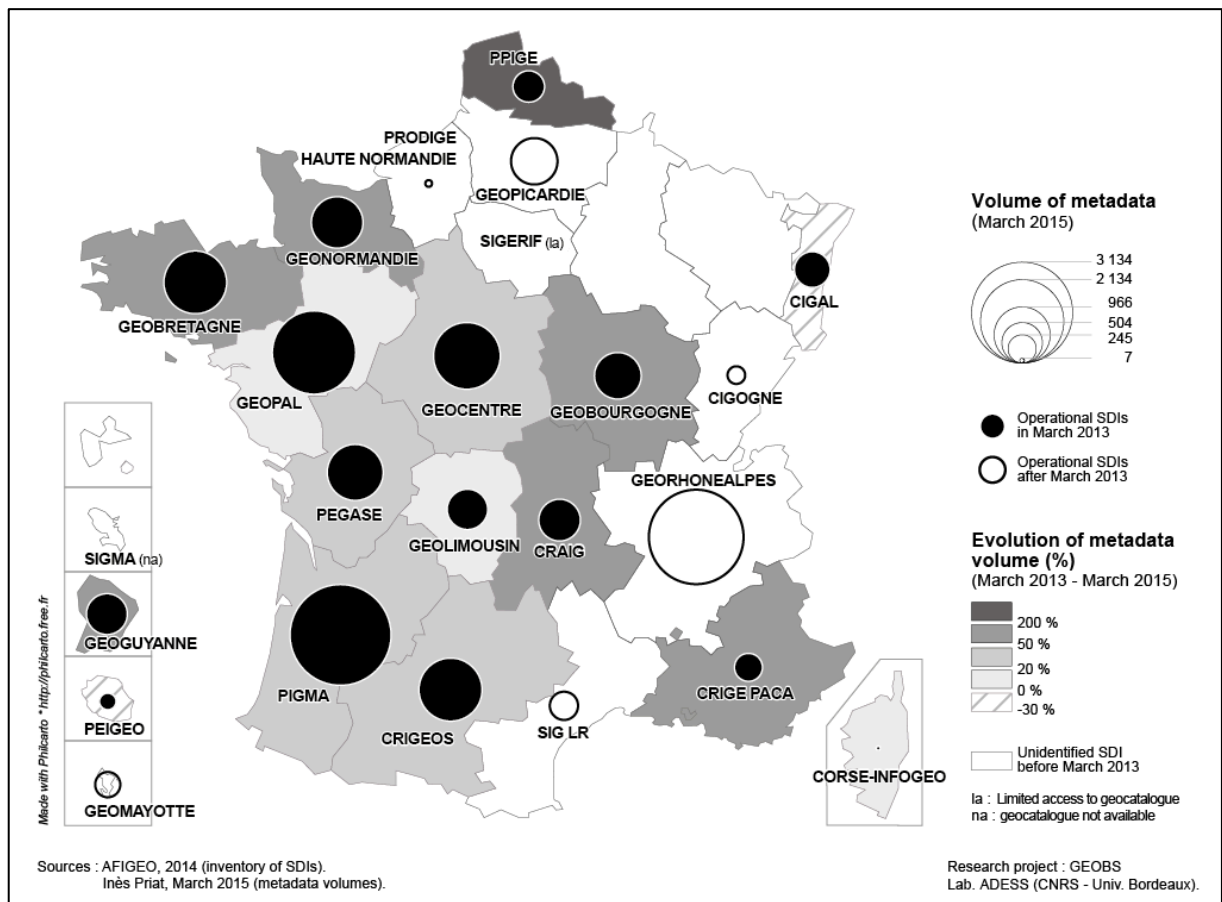


Figure 2. Distribution of metadata in French regional geocatalogues.

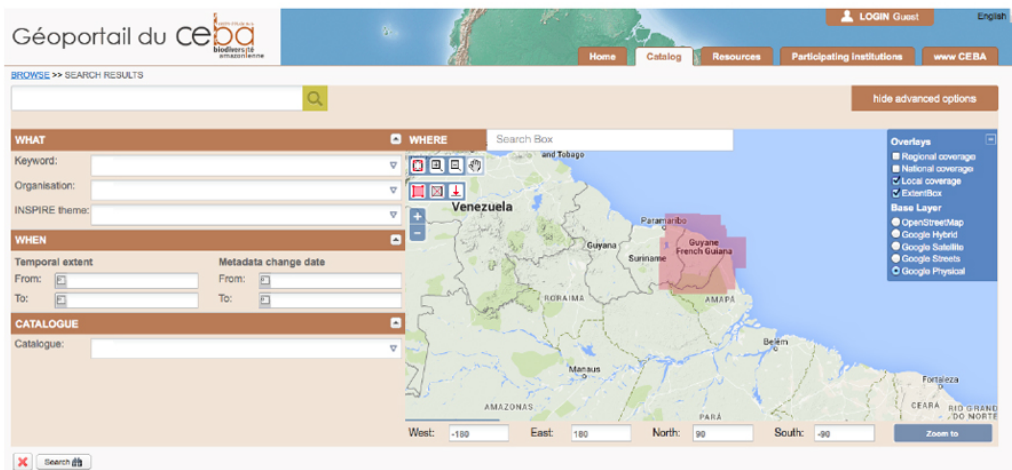
However, caution should be exercised when drawing conclusions from such discrepancies. On the one hand, these are recent systems and are still largely in the scalability phase. On the other hand, metadata volume is very different from open-access data volume. It also depends on both data distribution and data scale.

Metadata analysis cannot therefore be limited to a count of records in an effort to try and understand territorial information practices. The content of metadata fields is more accurate for this purpose. For example, analysis of the geographical extent of the data is done by extracting 4 coordinates from the bounding rectangles<sup>5</sup>. This extraction is based on the retrieval in CSV format of the XML tags that correspond to the bounding (<EX\_GeographicBoundingBox>) in order to subsequently generate data in GeoJSON format. PostGIS/QGIS processing then enables a geographical data density map to be produced. As a result, the spatial dynamics in the composition of local and national institutional geographical data assets can be highlighted. By using XQuery on XML tags, we also examine metadata content to address in particular the temporal (when?), thematic (what?), organisational (who?) and geographical (where?) coverage of the data. Figure 3 shows some snapshots of the current state of

<sup>5</sup> The same dataset can have several bounding boxes if cover is intermittent.

# geographical data assets in the scientific SDI of French Guyana.

What ? CEBA SDI in french Guyana



Where ? Data bounding box

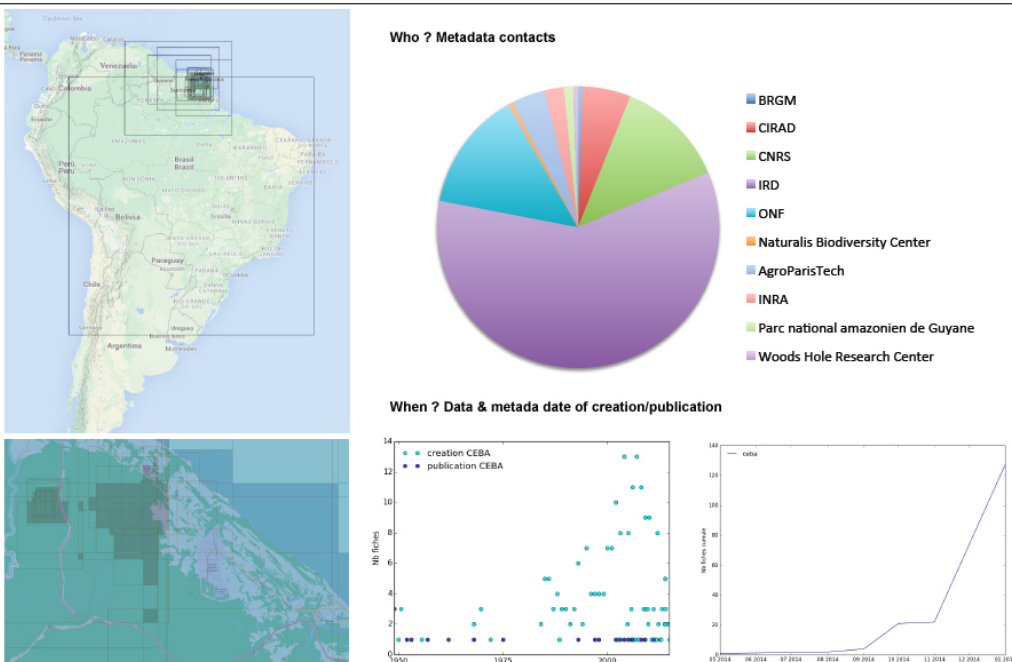


Figure 3. Temporal, organisational and geographical coverage of metadata in the scientific SDI of French Guyana.

## Preliminary conclusion:

Preliminary results show some limitations in comparing SDIs with one another in providing differentiated interpretations of the standards. Even though all SDIs refer to the INSPIRE directive and the ISO19115 standard (metadata), geocatalogues are still being rationalised and standardised, and a comparative analysis raises interesting methodological issues. For example, the completion rate of metadata field “role of contact” reveals relatively imprecise input from one SDI to another (figure 4). Each indicator will therefore have an index of confidence to *measure* its representativeness and therefore relevance of the analyses.

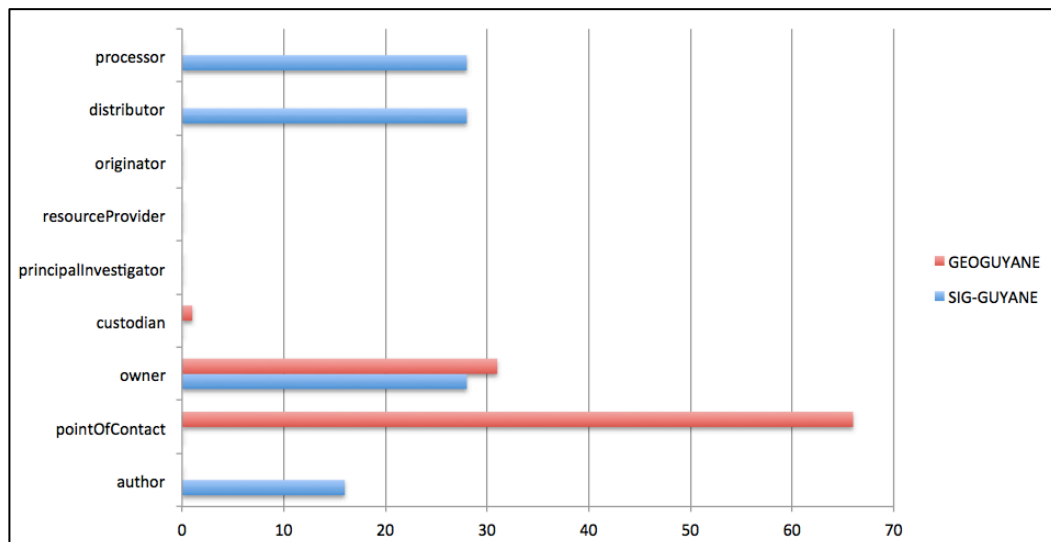


Figure 4. Comparison of completion of the roles of contacts between two regional SDIs in French Guyana.

In our study, the examination of geocatalogues is the first step, aimed at formalising the elements to be compared and assumptions about the flows of geographical information. These assumptions will then be tested by SDI developers (interviews with administrators) and users (web survey). Geovisualisations from the analysis of geocatalogue content are therefore an intermediate research result, an element to be used to consult stakeholders in order to move towards a more detailed understanding of geographical information flows.

The observatory prototype that is being put in place should, in the long term, make visible institutional geographical data assets that have thus far been fragmented. By integrating a use-based approach (Georis-Creuseveau, 2014 ; Georis-Creuseveau et al., 2015) it also aims to contextualise the flows of geographical information. In so doing, the study will bring some answers concerning the new stakes of environmental governance

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### **Brief Biodata of authors**

Matthieu Noucher is a Research fellow at the French National Centre for Scientific Research (CNRS) since 2011 and is member of the institute ADESS (University of Bordeaux). He did his PhD at Ecole Polytechnique Fédérale de Lausanne (2005-2009). His research focuses on the informational governance for environment by the analysis of spatial data infrastructure, volunteered geographic information and participatory mapping. Theoretical anchor: critical GIScience studies, critical data studies.

The focus of the professional career of Jade Georis-Creuseveau has been on the implementations of SDIs at an international level for the purpose of Coastal and Inland Natural Resource management. These achievements have led her to complete a PhD at the European Institute of Marine Studies (2011-2014). Currently, Jade is a Research fellow at the French National Centre for Scientific Research (CNRS) since 2015 and is member of the institute ADESS (University of Bordeaux). Her research focuses on Spatial Data Infrastructure and Volunteered Geographic Information within the framework of the coastal and marine management and conservation.

Françoise Gourmelon is a senior researcher at the French National Center for Scientific Research (CNRS). She is a member of the LETG laboratory, part of the European Institute of Marine Studies. She has been using GIS in ICZM studies since 1989. She has been working with coastal and marine applications such as landuse changes in protected islets in temperate and tropical coastal zones or maritime spatial planning. Her current focuses are on the contribution of geographic information to informational governance for coastal environment.