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Managing and Updating Geographical Data: Issues Along the Hierarchical Chain?

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Abstract

This article describes the needs and challenges (technical, juridical and governance) related to exchanging, managing and updating a large scale geographic reference dataset. The focus is placed on a specific case, namely the large scale reference frame of Flanders, the GRB. Furthermore, new challenges and needs for the future are considered.

1. Introduction

Nowadays most countries have a detailed digital geographic dataset covering their territory (Carpenter & Snell 2013). To manage this dataset, it is integrated in the country's hierarchical administrative structure, with specific rules regarding who can use, manage and update the information. This is embedded in framework, which is often referred to as a Spatial Data Infrastructure (SDI) (e.g. Cromptvoets et al. 2004). These SDIs have proven to be especially challenging when considering the interplay between the different governments and other actors within a country, each with their own authorities and responsibilities (Jacoby et al. 2002; Warnest 2005). Nevertheless, the development of (national) SDIs is not new, but a shift has been noticed in its main goal from data to data use (Williamson et al. 2006).

1.1 GRB – the Large Scale Reference Frame in Flanders

In Flanders, the dataset which serves as the large scale reference frame is called GRB (*Grootschalig Referentiebestand*). Its specifications are imposed by the Flemish Government (objects to be included, metadata, finances, use, management, maintenance, etc.) (Ministerie van de Vlaamse Gemeenschap 2004; AGIV 2014), and is managed by *Informatie Vlaanderen* (IV), a governmental institution. Recently, access to this detailed dataset has been opened up to a wider public, including architects, notaries, surveyors, intercommunal, federal government, etc. (Informatie Vlaanderen 2015). Since January 1st 2015, the GRB became obligatory as a reference frame for its users to facilitate the exchange of large scale geographical data. This means that the users of the reference frame will superimpose their own (thematic) data layers on top of this reference frame.

1.2 Top Level Updates vs Low Level Mismatches

When dealing with geographic information that covers a territory, keeping it up-to-date across all related instances can be problematic (Jing et al. 2014). The Flemish Government is responsible for maintaining the dataset of the GRB. Updates can be divided into two groups: (1) a change in the real situation (splitting or merging a parcel, change in road infrastructure, adding a building, etc.); (2) quality improvements (e.g. more accurate measurements,

correction of errors) with no change in the real situation. The latter is not linked to any official documentation (e.g. from a notary); potentially creating inconsistencies between the reference data and the 'local' layers. These mismatches are dependent on how these data layers are linked and are, at the moment, corrected manually, demanding a lot of effort and time from the GRB users. These incoherent geographical data bases introduce a level of uncertainty towards citizens who request information from the local government.

2. Creating a 'smart' framework for data exchange?

2.1 Technical challenges

The technical challenges are related to three dimensions; finding appropriate data structures, matching processes and migration processes. As a first step, existing structures and processes for data exchange need to be reviewed (Shi & Walford 2012). In this context, the use of ontologies and semantic geodata is crucial (Pauwels et al. 2009). This is already being implemented in the context of INSPIRE, ISA, core vocabularies, etc. (e.g. Masser 2007; de Vries et al. 2011) Furthermore, the implementation of 'linked data' structures (e.g. using a Resource Description Framework) seems to hold promises in updating data in this complex framework (Geiger & von Lucke 2012; Kuhn et al. 2014). Because the data is used by different types of actors, who superimpose their own (local) datasets, interoperability is of utmost importance (Bishr 1998; Stoimenov & Đorđević-Kajan 2002)

2.2 Juridical challenges

Because of the type of data – large scale governmental data, including parcels, buildings and their (legal) characteristics – juridical challenges should be considered in this framework (Onsrud 2004; Janssen & Crompvoets 2012). Two key elements are at play here: *responsibility* (Zevenbergen et al. 2016) and *liability* (Cho 2012). In this context the following questions arises: How precise and accurate should the provided data be to avoid legal issues? Who is responsible and liable when this information is wrong or inaccurate?

2.3 Governance challenges

Besides the technical and juridical challenges, an efficient workflow throughout the hierarchical chain is a key factor, aligning the framework and the decision making process. This is closely linked with the technical (distributions of the changes throughout the framework) and legal implications (Who is responsible?). Collaboration, motivation, and trust are the key elements to create an operational framework (Harvey 2003; Craig 2005; Warnest 2005). Nevertheless, the needs of the end users should not be neglected in this process.

3. Conclusion

In Flanders, the GRB is used as the large scale reference frame by governmental and other institutions, which is managed by the Flemish Government. Corrections in this dataset can create a conflict with existing datasets created by other (governmental) institutions, resulting in an uncertain data source. Nevertheless, significant challenges – technical, juridical and governance – need to be tackled to be able to provide reliable geographic information to the end user.

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