



A stakeholder-based assessment framework applied to evaluate development scenarios for the spatial data infrastructure for Flanders



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ABSTRACT

Spatial Data Infrastructure (SDI) is the integration of a number of components to create a platform which enables a wide variety of stakeholders to access, share and use spatial data in an efficient and effective way. The way this platform should be set up and governed is a difficult decision, in which all these stakeholders have different views and objectives. In this paper, the Multi Actor Multi Criteria Analysis (MAMCA), developed by Macharis (2000, 2005), is discussed as a methodology for evaluating different development alternatives for SDI. The application of the methodology for the case in Flanders (Belgium) clearly shows its clear and visual interpretation strengths. This enables a thorough discussion of the possible implementation paths with their strengths and weaknesses by the stakeholders. The results show that the future of the SDI in Flanders could lie within the integration of the market in the SDI.

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1. Introduction

Spatial data and the concept of Spatial Data Infrastructures (SDI) have gained importance during the last years. From a public policy point of view, spatial data offer many governmental possibilities to produce and use public information with different types of end users. The introduction of Geographic Information Systems (GIS) has made a significant contribution in terms of managing spatial data (Rajabifard, Feeney, Williamson, & Masser, 2003). But over the years, the need to exchange and share spatial data between different organizations has emerged (Crompvoets, Bregt, Rajabifard, & Williamson, 2004). This resulted in different initiatives that could be classified under the concept of a spatial data infrastructure. An SDI can be defined as the integration of a number of components to create a platform which enables a wide variety of stakeholders to access, share and use spatial data in an efficient and effective way (European Commission, 2007; Giff & Coleman, 2002; Kok & Van Loenen, 2005). There are many other ways to define an SDI (Chan, 2001; Grus, Crompvoets, & Bregt, 2007), but most definitions refer somehow to the SDI-components (e.g. data, technology, policies, standards and people (Crompvoets et al., 2004; Giff & Coleman, 2002; Rajabifard, Feeney, & Williamson, 2002)) and/or its purpose (European Commission,

2007; Vandenbroucke, Crompvoets, Vancauwenberghe, Dessers, & Van Orshoven, 2009).

In this paper, the Multi-Actor Multi-Criteria Analysis (MAMCA), developed by Macharis (2000, 2005) is discussed as a methodology to evaluate different development alternatives for SDI. The proposed methodological framework is applied for the SDI in Flanders (Belgium). Future scenarios with a time horizon of 2020, when the INSPIRE Directive (European Commission, 2007) should be fully implemented for each EU Member State, and the actions that should be taken in terms of the further development of the SDI are defined and assessed. These scenarios shape the context in which the SDI could develop in the future, taking into account the characteristics of the current set up of the SDI in Flanders and the demands of the stakeholders. The MAMCA methodology allows to elicitate the preferences of the (local) stakeholders and bases the evaluation of possible future scenarios on their objectives. The outcome is thus specific for the case in Flanders, but the methodology could be used in different settings or countries/regions.

Over the last years, there have been substantial investments in the development of SDIs. These investments, most of which are public funds, need to be justified towards the public. In other words, the SDI initiatives need to be assessed in order to obtain the necessary information on their impact and implications so that measures can be taken to improve the SDI in general (Crompvoets, Rajabifard, Van Loenen, & Delgado Fernández, 2008; Giff & Crompvoets, 2008).

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The assessment of SDIs appears to be complicated due to their dynamic, multi-faceted and constantly evolving nature, and the vaguely defined objectives (Crompvoets et al., 2008; De Man, 2006; Georgiadou, Rodríguez Pabón, & Lance, 2006; Grus et al., 2007; Nedović-Budić, Crompvoets, & Georgiadou, 2011). Many researchers have tried to assess SDIs (e.g. Crompvoets, 2006; Delgado Fernández, Lance, Buck, & Onsrud, 2005; Kok & Van Loenen, 2005; Masser, 1999; Onsrud, 1998; Vandenbroucke, Janssen, & Van Orshoven, 2008), but these attempts, however useful and valuable, either concentrate on one aspect of SDI, sector or stakeholder, are bounded by one region, or are still conceptual in nature.

When assessing SDIs, one has to take into account the fact that SDI development integrates issues from multiple disciplines, such as law, economics, geomatics and public administration science. SDIs were mainly introduced as a technical concept, but as SDI research evolved, so did the idea that it needs to be investigated by using a multiple as well as trans-disciplinary approach which acknowledges multiple realities (De Man, 2008).

In addition, stakeholders could have different motives or purposes to assess SDIs. According to Chelimsky (1997), there are three main purposes. The first purpose, accountability, looks at the cause and effects of a certain initiative as to where the second purpose, development, looks at the organisational implications. The third purpose includes knowledge evaluation. Furthermore, stakeholders might have different views on the objectives and benefits of SDIs, depending on their position and stake (De Man, 2006; Grus et al., 2007), which also need to be included.

One of the most important characteristics of the MAMCA is its ability to implement the preferences (criteria) of multiple stakeholders in an evaluating framework, enabling clear assessments per stakeholder. In complex decision making problems such as SDI, the input from different stakeholders with regard to their preferences and objectives is crucial for a successful further development. Through the objectives, the stakeholder specific criteria can be defined, which are then weighed by the stakeholders in order to determine their importance. Other relevant characteristics of MAMCA for further SDI development are its capability to take the multidisciplinary issues into account, and to deal with the level of complexity. On the basis of these methodological strengths, the MAMCA methodology was chosen to assess the future SDI development in Flanders.

The paper is constructed in the following way. In Section 2, the MAMCA methodology is briefly presented. Section 3 presents its application for the SDI development in Flanders. The paper ends with conclusions and a summary of the main application findings (Section 4).

2. Introducing a new assessment framework: the Multi-Actor Multi-Criteria Analysis (MAMCA)

The Multi-Actor Multi-Criteria Analysis (MAMCA) is an extension of the existing multi-criteria analysis (MCA) (Fandel & Spronk, 1985; Guitoni & Martel, 1998; Laarabi, Chevallier, & Martel, 1996). The MAMCA methodology allows researchers to evaluate different alternatives (policy measures, scenarios, technologies, etc.) with regards to the objectives of the different stakeholders that are involved in the decision making process. This methodology is unique in its field as it explicitly includes the stakeholders and uncovers their points of view. The methodology was developed by Macharis (2000, 2005, 2007) and has been used in many projects, mainly for transport related decision making problems (for an overview, see Macharis, De Witte, & Ampe, 2009).

The MAMCA consists of two phases (Macharis, 2005; Macharis et al., 2009). The first phase is mainly analytical and includes the

gathering of all the necessary information. The second phase is the synthetic or exploitation phase and consists of the actual analysis. These two phases are divided into respectively four and three steps (Macharis et al., 2009), as can be seen in Fig. 1. The first step comprises of the problem definition and the determination of the possible alternatives for further development. In the second step, all relevant stakeholders are highlighted, together with their objectives. These objectives are then translated into criteria (step 3), which need to be weighed. In the fourth step, one or more measurable indicators are linked to each criterion. They allow evaluating each alternative with regards to a given criterion and are either quantitative or qualitative, depending on the criterion. The fifth step aggregates all the information from the previous steps into an evaluation matrix. The actual results are given in step six and are generated through multi-criteria analysis. This permits the analysis of the advantages and disadvantages of every alternative. The seventh and final step is the actual implementation of the results and is mainly directed towards the policy maker. More background information on the application of the MAMCA as a methodology in the context of SDIs can be found in Geudens, Macharis, Plastria, and Crompvoets (2009).

3. The case of spatial data infrastructure in Flanders

In this research, the investigated area is Flanders, the Dutch-speaking part of Belgium (Fig. 2). The objective is to determine the optimal strategy for the future development of SDI in the Flanders region.

The SDI in Flanders is mainly determined by the regulatory cooperation framework SDI-Flanders (Crompvoets et al., 2010). This cooperation framework is the successor of the GIS-Flanders which was founded in 1995 with the objective to optimize the production, use and exchange of spatial data. The participants of the GIS Flanders were responsible for the mutual acquisition, production, use and distribution of spatial data and for the introduction of training programs. These participants were the departments and organizations of the Flemish Government, the Flemish provinces and the Flemish municipalities. Moreover, all other public Flemish organizations are currently integrated into the SDI as a consequence of the adoption of the SDI Decree 2009 (AGIV. Organization: legal framework., 2011; Vlaamse Regering, 2011).

All organizations need spatial data and use them for different business processes, such as spatial planning, traffic accident registration or flood mapping. In other words, there is a significant number of organizations that produces, uses and shares spatial data. The main difficulty with the current SDI is the coordination and facilitation of the exchange of spatial data between these organizations (Vanden Broucke, Crompvoets, & Vancauwenbergh, 2011). Internal and external initiatives were introduced in order to improve the access, use and sharing of spatial data. It is therefore important to streamline these initiatives and to look for synergies. This will help to improve the performance of the SDI and will allow organizations to manage spatial data in an efficient and effective way.

Up to now, the SDI in Flanders has been mainly regulated by a hierarchical framework which stipulates the extent in which spatial data is produced and shared by different organizations. The INSPIRE Directive, which entails the development of a European spatial data infrastructure, was transposed into a Flemish decree in order to bind the different organizations in the SDI. The SDI Decree was adopted by the Flemish Government on February 20, 2009 (AGIV, 2011) and serves the commonly shared SDI-interest by organizing the SDI in such a way that it is efficient and effective in producing, exchanging, using and sharing spatial data. This decree also formed the legal basis for the shift of the cooperation framework GIS-Flanders into SDI-Flanders and is the starting-point for further development of the SDI in Flanders.

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