Assessing GI enhancement

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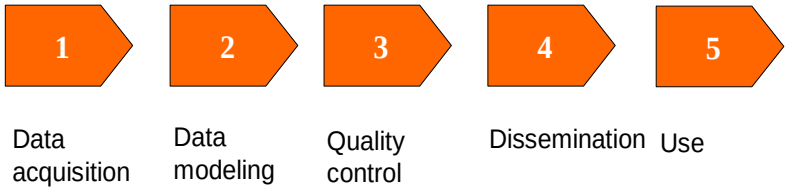
EXTENDED ABSTRACT
Assessment of geographic information is increasingly attracting the attention of researchers in the GI domain. Many approaches to assess SDI performance are included in the recently published work of Crompvoets et al. (2008). However, it lacks an assessment of the value of geographic information (GI) or geographic information infrastructure (GII also referred to as spatial data infrastructures, SDI).

Several researchers have tried the value of geographic information, or more general geographic information infrastructures through cost-benefit analysis (see Craglia and Nowak, 2006). However, Longhorn (2006) concluded there are three kinds of lies: lies, damned lies and cost-benefit analysis indicating that it is very difficult to assess the benefits of SDI. Geographic information is "highly disparate and often inextricably linked to the provision of other public goods" (Coopers Lybrand, 1996). The real value of geographic information for society is difficult to assess, and therefore the economic value is often underestimated (OXERA, 1999).

Longhorn and Blakemore (2008) introduce the promising approach of the value chain to assess the value of GI (see also Genovese et al., 2009; Van Loenen and Zevenbergen, 2006; Krek and Frank, 2000). Genovese et al. (2009) define in the context of GI a value chain as a "sequence of operations undertaken by one or more producers, to transform geographic data (datasets or analogue maps) to the final product"; Value is created step-by-step along the chain (cf. the supply chain in Cox, 1999; Beamon, 1999; Lambert, 2000; Manthou et al., 2004). Raw data acquisition, applying a data model to the raw data, performing quality control, and dissemination are some of the most essential steps (see Figure 1).

Figure 1: Example of a Geographic information enhancement supply chain



Each step enhances the data from the previous step. Each organization in the chain enhances, and makes a new (geo) data product or service that satisfies the needs of another group of users. As a result a chain of new services building on previous services may develop. Also these new services are GI enhancements.

One outcome of a value chain analysis may be the extent to which a chain delivers value added products. Applying such approach across different jurisdictions may provide insights in the performance of GIIs compared to each other. However, concepts of value and especially value adding to GI needs to be handled with great

care. Our research shows that value adding is related to the different roles government and market play in the value/supply chain. The different roles impact on the appropriation of value flows to the players in the chain. Research addressing the roles of different parties within a chain is typically not addressed, especially not in international comparative research (see, for example, Pira, 2000). Therefore, the reliability of the assessment of the value added market, such as Pira (2000), can be questioned.
Using the results of case study research in the United States, and the European Union for Transportation Network data sets, this paper demonstrates the need to link the value/supply chain to the roles different parties play in this chain as a prerequisite for delivering objective and valuable information that can be used for comparing GIIs across jurisdictions.

Keywords: Geographic information (GI), Value chain, Supply chain

1. ASSESSING GEOGRAPHIC INFORMATION ENHANCEMENT

Information economies are a powerful engine for growth, competitiveness and jobs (The Lisbon Special European Council, 2000) . It improves citizens' quality of life and the environment. New digital goods and services are vital to developing information economies (The Lisbon Special European Council, 2000; see also High Level Group chaired by Wim Kok, 2004; Commission of the European Communities, 2005; The European Parliament, 2005) . Information infrastructures are considered the backbone of information economies (Castells and Himanen, 2002). Information infrastructure may be defined as “a technical framework of computing and communications technologies, information content, services, people, all of which interact in complex and often unpredictable ways” (Borgman, 2000, p. 30). Within information infrastructures, geographic information may be considered a special type of information. This specialty has resulted in the emerging of geographic information infrastructures (GII). This domain is well-known for its technological advances such as GoogleEarth, navigation technology (e.g., TomTom), and location based services in mobile devices which have resulted in the presence of geographic information in the daily life of many. Daratech has estimated the global GI industry to total US$3.3 billion in 2005 with expected annual growth rates of over 10% (Daratech, 2006 cited by Longhorn and Blakemore, 2008; ABI research, 2006; JupiterResearch, 2007). It is one of the major digital content industries (Pira, 2000). In addition, it has been estimated that eighty percent of all government information has a geographic component (FGDC, 2007; Robinson, 2002). The European Union has dedicated a Directive to develop a geographic information infrastructure (GII) promoting exchange, sharing, access and use of geographic information and services across the various levels of public authority and across different sectors (see INSPIRE directive). Objectives are to provide users the geographic information they need (quality, type, scale, among other aspects), in a way needed by these users (price, user interface, among others), in an efficient way (Van Loenen, 2006). Value adding services are critical for the GII since they typically bring the information to the broadest range of users necessary for the GII to reach its full potential (Van Loenen, 2009; Rajabifard et al., 2003; Crompvoets et al., 2004).

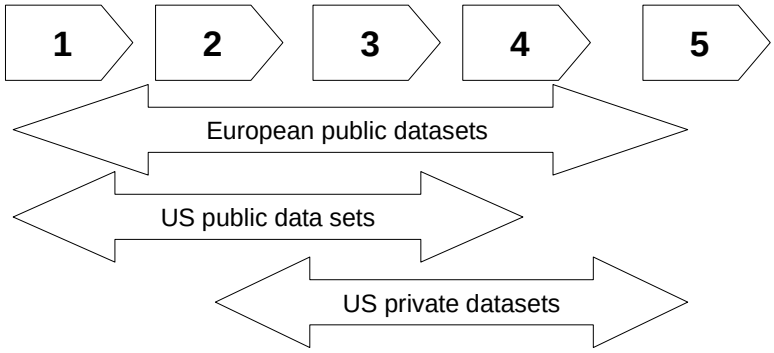
The stimulation of value added services and products based on public sector geographic information is a prominent subject on the agenda of policy makers in the geographic information domain. It has been estimated that the value adding market of geographic information in Europe is extremely small compared to North America (Pira, 2000). This was explained by the different access policies for government information. To bridge the cap, the EU enacted in December 2003 a Directive directed at promoting

value adding to public sector information (2003/98/EC) recommending open access policies for public sector information similar to US policies (PSI directive). Five years after the Directive's introduction, only a few best practices of value adding to public sector information in Europe were identified (see Micus 2008, ePSIplus, 2009; Corbin, 2008; European Commission, 2008) indicating that the objectives of the Directive have not been reached yet. A value/supply chain analysis of one critical data set for the GII may explain this.

Supply chain theory provides a clear systematic approach to provide insight in differences in geographic data and service characteristics. We detailed the enhancing process that must be employed to turn raw information into new services and products regardless of the organisation performing the enhancement. Not only the differences in specifications of data sets were respected, also the differences in variety of activities within related organisations in the public sector were.

As such, applying the supply chain theory to one important type of geographic information, Transportation network data sets (see Onsrud, 1998; FGDC, 2006; INSPIRE, 2007) in Europe and the US explains that the lack of success of the PSI Directive may be found in the ambiguous meaning of the wording value adding to geographic information (GI) (see Longhorn and Blakemore, 2008, p. 40). It is likely that what in one country is considered a value adding activity may not in another. Our research has found significant differences in the geographic information characteristics of governments in Europe and the US: European public sector GI was more accurate, more up-to-date and more comprehensive (Van Loenen and Zevenbergen, 2006). This resulted in the proposition that the private sector in the US adds value to US public sector GI to arrive at similar levels of quality and service provision as provided by the public sector in Europe (see Figure 2, Van Loenen and Zevenbergen, 2006; see also Lopez, 1998; GITA, 2005).

Figure 2: A preliminary summary of 'value adding' in the case studies



These European public sector 'value adding' activities are, however, not recognised as value adding activities, but rather considered to be part of their public task. The difference of the meaning of 'value adding' may explain the discrepancy between the 'value added' markets in the US and EU.

Therefore, to be of use for policy makers, GI value adding in jurisdictions needs to be validated empirically through a research framework addressing the term value or value adding neutrally (see also European Commission, 2008), [39]). We argue that GI enhancement meets this criterion. A neutral framework may reveal what level of GI enhancement exists in a jurisdiction and what the distinguishing roles of government and private parties in the enhancement are and to what extent value flows are

appropriated to these parties. This step is critical in the assessment of the value of geographic information in general and the value of geographic information infrastructures more specifically.

The results of the research will allow for true comparison of GI enhancement between different jurisdictions. This should result in better understanding of the level of GI enhancement in a specific jurisdiction and accordingly in effective decisions stimulating GI enhancement, geographic information infrastructures and information societies.

Revealing the distinguishing roles of government and private parties in the GI enhancement process in different jurisdictions will also contribute to the discussion on the extent to which public sector organisations should process geographic information as part of their public task.

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