Chapter 9
Linked Data:
Connecting Spatial Data Infrastructures and Volunteered Geographic Information

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ABSTRACT

A Spatial Data Infrastructure (SDI) is an information infrastructure for enhancing geospatial data sharing and access. At the moment, the service-oriented second generation of SDI is transitioning to a third generation, which is characterized by user-centric approaches. This new movement closes the gap between classical SDI and user contributed content, also known as Volunteered Geographic Information (VGI). Public use and acquisition of information provides additional challenges within and beyond the geospatial domain. Linked Data has been suggested recently as a possible overall solution. This notion refers to a best practice for exposing, sharing, and connecting resources in the (Semantic) Web. This chapter details the Linked Data approach to SDI and suggests it as a possibility to combine SDI with VGI. Thus, a Spatial Linked Data Infrastructure could apply solutions for Linked Data to classical SDI standards. The chapter highlights different implementing strategies, gives examples, and argues for benefits, while at the same time trying to outline possible fallbacks; hopeful this contribution will enlighten a way towards a single shared information space.

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1 INTRODUCTION

A Spatial Data Infrastructure (SDI) is an information infrastructure for enhancing geospatial data sharing and access (Nebert, 2004). An SDI embraces a set of rules, standards, procedures, guidelines, policies, institutions, data, networks, technology and human resources for enabling and coordinating the management and exchange of geospatial data between stakeholders in the spatial data community (Rajabifard et al., 2006; Masser, 2007). All involved resources (geospatial data sets, metadata, users, providers, organizations, etc.) are not static, i.e., they are dynamic over time. In addition, communication and information technologies have dramatically changed since 1990s, when first SDI projects took off (Masser, 1999). SDI is a live, adaptable entity by definition that needs to accommodate periodically to emerging technologies, user relationships, socio-economic contexts and other factors that have influence on SDI developments (Rajabijard et al., 2006; Masser, 2007; Budhathoki et al., 2008).

The web itself is evolving from the idea of an open, static repository (Callahan, 1985) to an application platform (Ackland, 2009). Recent advances in web technologies, such as social networks (Boyd and Ellison, 2007), enable new ways of participation, communication and creativity on the web. It is not surprising then that the web has changed the way in which we work nowadays. Citizens, experts and non-experts alike, are increasingly participating in the process of generating up-to-date information and collaborating with others in solving-problem tasks. This highlights the matter of a transition, changing role of users, from just mere data consumers to active consumers and producers. Consequently users interact, use and access information infrastructures in a different way.

The shift in the role of users has been also reflected in the geospatial domain, known as Volunteered Geographic Information (VGI) (Goodchild, 2007). VGI highlights that users are active producers of geographic information rather than passive recipients of geographic information by formal organizations. Budhathoki et al. (2008) have suggested a new generation of SDI, which is driven by user needs. However, some recent studies on how social networks are used to sharing data in SDI reveal that users are still poorly connected to data resources of their interest (Omran and van Etten, 2007; van Oort et al., 2010). Results also indicate that the position of individuals in a given organization (hierarchy of work relationships) has influences on their potential access to and sharing spatial data, i.e., most relationships are vertical, with few horizontal user-to-user connections between peers.

There is a need to establish connections among geospatial data sets, by linking users with other providers, users with users, and data sources with users and providers. Connecting resources in such a way would let stakeholders to find out who is actually using a particular data set. If someone is, for example, looking for information about the city of Nottingham (UK), any data set (reaching from geo-tagged photos to demographic data and related maps) should be connected to related data sources and users with similar interests. Such connections would enable seamless browsing and effective information retrieval. In this vision, Linked Data has been suggested as possible solution for creating such information spaces (Bizer et al., 2009). The notion of Linked Data refers to a best practice for exposing, sharing, and connecting data sources in the web[1]. In essence, Linked Data evolved from research on the semantic web (Berners-Lee et al., 2001) and is concerned with creating links between different data sources, to enable the discovery, navigation, analysis, and knowledge inference of data across disciplinary domains. We stick to the example of Nottingham (Section 3) throughout this chapter to exemplify the potential connections among SDI, VGI and Linked Data.

Given this context, the motivation of this chapter is two-fold: