



Chapter XV

Web-Based Collaborative Spatial Decision Support Systems: A Technological Perspective

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Abstract

The rapidly expanding range of Web technology has made it possible to collaboratively make decisions over the Web. This chapter examines some of these Web technologies important to the development of collaborative spatial decision support systems, and identifies their technology impediments and strengths. The outcomes provide a basis for discussing how the existing collaborative spatial decision support systems may be redesigned to take advantage of new Web technologies, and how new collaborative spatial decision support systems may be designed and developed in this Web-based paradigm. Some discussions on selected design and development issues that are important to the development of collaborative spatial decision support systems including system design, user's impact, and performance are presented.

Introduction

The Internet and the World Wide Web hold many possibilities for new forms of communications. The expanding range of Web technology has made it possible for people to make decisions over the Internet using spatial decision support systems (SDSS), geographical information systems (GIS), or planning support systems (PSS) in a group environment. Mostly in their prototype research stage, many of such systems focus on facilitating group communications by simply sharing and presenting information. Among this information, geospatial information (maps and location related data) plays an indispensable role. Urban planning and spatial decision-making are highly interactive, group-oriented processes where the spatial aspect of a problem plays a decisive role. Collaborative spatial decision support systems (CSDSS) are therefore required to support interactive exploration, analysis, modeling, and presentation of geospatial data within group settings.

In order to support collaborative planning and spatial decision making, CSDSS tools need to be integrated not only with groupware tools, but also with decision-making theories, methods, techniques, models (decision, planning, or domain models), and processes. CSDSS in general and Web-based CSDSS in particular are still in their infancy. Limited research effort reported in the area has identified several challenges relating to (1) limited or no support of analysis and evaluation of output from decision support tools (Uran & Janssen, 2003); (2) unequal access to data and technologies (Yigitcanlar & Okabe, 2002); (3) poor integration between GIS tools and decision, planning, and domain models (Li, 2002b); and (4) lack of group presence and collaboration mechanisms.

Recent advances in Web-based groupware technology and other Web technologies promise to provide new or improved methods, tools, and platforms for developing Web-based CSDSS. In order to fully embrace the new, innovative Web technologies for such systems, it is necessary to establish a solid understanding of these technologies and how they can be integrated with a variety of decision-making theories, methods, techniques, and models to improve decision-making processes.

This chapter presents a review of Web technologies that are suitable for developing and implementing Web-based CSDSS, followed by how these technologies have been or will be utilized in selected CSDSS developments. Arguments are made on whether or not these technologies provide a healthy environment for integrating decision theories, methods, and models. Through discussion, this chapter also tries to answer several important questions: What are the technological and procedural limitations that limit how useful Web-based representations of geospatial data are to decision makers? How can we integrate decision theories, methods, and models into Web-based collaborative environments? Based on what frameworks? What prediction can be made on the impact

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