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Chapter II

Usability Dimensions in Collaborative GIS

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Abstract

Collaborative GIS requires careful consideration of the Human-Computer Interaction (HCI) and Usability aspects, given the variety of users that are expected to use these systems, and the need to ensure that users will find the system effective, efficient, and enjoyable. The chapter explains the link between collaborative GIS and usability engineering/HCI studies. The integration of usability considerations into collaborative GIS is demonstrated in two case studies of Web-based GIS implementation. In the first, the process of digitising an area on Web-based GIS is improved to enhance the user's experience, and to allow interaction over narrowband Internet connections. In the second, server-side rendering of 3D scenes allows users who are not equipped with powerful computers to request sophisticated visualisation without the need to download complex software. The chapter concludes by emphasising the need to understand the users' context and conditions within any collaborative GIS project.

Introduction

The design and implementation of successful collaborative GIS (C-GIS) is a multidimensional challenge. As Armstrong (1994) identified, the crux of this challenge lies in the semistructured nature of the problems that C-GIS is intended to solve. In such situations, only parts of each problem can be defined using formal methods of analysis that are easy to implement with a GIS. However, most of the problem components do not succumb easily to formalism, and an agreed solution can only be reached through discussion and interpretation by the stakeholders. Worse still, in many cases these are "wicked problems" (Rittel & Webber, 1984) where the stakeholders do not agree on the definition of the problem, and the problem itself mutates during the problem-solving process, as a result of the effort itself.

These inherent challenges are well recognised in the literature on the applications of GIS for group problem solving. This literature is inextricably linked to the wider research on Computer Supported Cooperative Work (CSCW) and groupware, which originated in the field of computer science circa 1984 (Grudin, 1994). For many researchers of CSCW and C-GIS, the complexity of group problem solving makes the research and development of such systems more interesting.

One might expect that, on the basis of almost two decades of research, a developer of C-GIS today would have a relatively easy task in assembling an effective system: the extensive literature and much practical experience should have provided clear instructions. After all, many of the tools that were introduced in CSCW research are now available as standard within everyday software, to the extent that the latest version of the ubiquitous Microsoft Office is now promoted as a system that enables group collaboration: "…Office 2003 Editions have improved in four areas: information management and control, business processes, *communication and collaboration*, and personal productivity" (Microsoft, 2004, emphasis added).

However, while the latest versions of commercial GIS packages offer some support for group collaboration, and reliable systems for sharing spatial databases and geo-processing amongst groups are being deployed successfully, these GIS packages do not include groupware capabilities. Therefore, there remains a need for research on end-users' interaction with C-GIS, and for development of easy and effective methods, techniques, and tools to allow the implementation of C-GIS applications. The gap between GIS and other software systems can be attributed to the complexities of geographical information sharing. Only in the mid-1990s did GIS technology reach a level of maturity that allowed the development of information sharing within organisations, in what is termed "enterprise GIS." Enterprise GIS products focus mainly on the storage

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