

BEST-GIS

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Guidelines for Best Practice in User Interface for GIS

List of Contributors

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Section 1 “Introduction to the Guidelines”

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Foreword

These Guidelines have been developed as a result of the ESPRIT/ESSI Experience/ User Network, project N° 21580: “BEST-GIS - Best Practice in Software Engineering and methodologies for developing GIS applications”.

This network was promoted in the framework of the Association GISIG (Geographical Information Systems International Group) and within its policy to promote GIS as Information Technologies for Territorial Management, grouping together users, experts and suppliers of GIS technology.

The Guidelines are intended to help GIS users to achieve best practice in using these tools for their job and hence to achieve added value from their systems. The focus is on recommendations about how the usability of GIS applications can be improved, since this represents a noticeable barrier for users.

The Guidelines address needs and requirements of end-user organisations. The emphasis is on GIS specific user interface issues. In fact, the quality of user interfaces for GIS needs to improve, but it should be the end-users and not the developers who determine in which direction the improvement should go. This process can be facilitated by adopting the user-centred design (UCD) paradigm, commonly applied in several engineering fields but not very well-known in the GIS domain.

GIS users (beginners and experts) were interviewed about the current state of usability engineering within their organisations. The answers illustrated that most of the interviewees were not familiar with user-centred-design and responded according to the normal stereotype. Beginners wait for the GIS to arrive: thus, they respond that little time was spent for their applications on usability issues. Expert users do their own customisation, implying a sort of implicate usability analysis. In both cases it was evident that usability engineering is conducted too late in the development process to have any real effect on the resulting system.

These Guidelines were written to assist potential end-users of GIS in increasing awareness of usability issues and in better describing their requirements, and to support system developers in better understanding end-user and customer needs.

The major expected benefit for the end-users is to progressively become real actors in the GIS application development process.

We are convinced that the future generation of tools and methods to support design and software development of GIS products should include aspects of user-centred design. It is our opinion that through these Guidelines the Best Practice in GIS will be fostered.

1. Introduction to the Guidelines

Geographic Information (GI) is a complex, rapidly growing and important part of the Information Society. New Geographic Information technologies are developing rapidly. The great advantage of GI is that it has the capability of summing up and visualising graphically what vast amounts of data are trying to tell one about the relationship between various phenomena on the Earth surface (such as the relationship between climate and certain health risks). There are many applications in international, national and local government, business and research, and in various commercial sectors. Geographic Information is important because of its value for planning, land management, marketing studies, environment, renewable energy resources, emergency services, health care, political analysis and many other uses (GI2000).

Geographic Information Systems (GIS) are tools for the management of geographic information, for spatial analysis and the visualisation of this information. GIS are complex yet general purpose tools, serving many types of users, but a frequently stated problem is that this complex functionality is not accessible to end-users in administration, planning, decision making and other work domains because the technology has been developed for technical experts. Due to ergonomic deficits, today GIS user interfaces are not easy to use and require much time to learn. Because task performance with GIS imposes high workload on users, the results may not be as optimal as required.

The quality of GIS user interfaces is a key-factor for efficiency and effectiveness of GIS use, for user satisfaction, and therefore for GIS diffusion. This quality must be improved for end-users, especially since the technology is becoming more inexpensive and is therefore reaching more, normally non-expert, users within the general public.

A key issue in GIS application development is the design of user-system interaction. However, the needs and requirements of real GIS users - a prerequisite for good user interface design - are not taken into account to a satisfactory degree for the development of GIS applications.

1.1 Objectives

These "Guidelines for the Best Practice in User Interface Development for GIS" have been produced by the BEST-GIS project based on the experience of GIS end-users and experts.

The objectives are to increase user and customer awareness regarding the development and customisation of GIS applications. GIS end-users will be able to define more precisely their requirements and tasks. GIS customers will be able to understand the relevant cost and benefit factors to be taken into account for GIS procurement decisions.

GIS developers, experts involved in GIS customisation, end-users and other stakeholders in the GIS life cycle will be introduced to the user-centred design (UCD) approach and will find methods applicable to GIS user interface evaluation.

1.2 Audience

The target audience of the guidelines are GIS end-users, i.e. persons who sit at a workstation and have (or intend to have) hands-on experience with a GIS, both technology users and domain specialists. Some information will also guide GIS customers to make reasonable GIS purchase decisions.

In addition the guidelines will be useful for GIS developers and experts who customise GIS to specific user requirements.

1.3 Overview

Section 2 describes the development process of GIS applications and the status of usability engineering in this domain. The most important GIS user interface issues are described. The discussion about GIS user interfaces standards is summarised.

Section 3 is an introduction to the user-centred design approach. The emphasis is on the role of end-users and customers in user-centred design of GIS applications. An overview of appropriate methods for GIS user interface evaluation is given.

Section 4 explains how to perform user requirements and task analysis. GIS stakeholders and user groups will be described together with typical task and workflow scenarios.

Section 5 contains a check list for the selection and definition of user requirements for a specific GIS application. The list is useful as a starting point in order to derive user requirements for a GIS application. Readers are invited to adapt and extend this list for their own purposes and to future GIS technology.

The checklist in section 6 gives an overview of the most relevant GIS specific technical features.

Section 7 provides recommendations for the best use of significant GIS user interface functions described in section 6. This section is addressed in particular to those users looking for useful hints on the usability and drawbacks of GIS functions.

A checklist for testing the conformance of GIS user interfaces to the European Directive 90/270 on minimum requirements for health and safety of display screens equipment is provided in section 8

The guidelines end with recommendations on how to perform a cost / benefit analysis of GIS usage in section 9. This section emphasises consideration of the whole GIS life cycle for the analysis and lists the most relevant and important cost and benefit factors to be taken into account for the analysis.

1.4 How to read the guidelines

Section 2 introduces the reader to the problem with GIS user interfaces. This section will be useful for readers who are not at all familiar with the GIS domain.

Readers having no basic knowledge about usability engineering should read the introduction to the user-centred design approach in section 3. The overview in this section will be useful for end-users and customers as well as for developers and customisers.

Sections 4 to 8 are especially useful for end-users who are responsible for requirements specification.

Section 9 is intended for customers who want to find out more about the relation of costs caused by GIS usage and its benefits.

1.5 Benefits

Today, in public or private organisations, many architects, civil engineers, geologists, and many others, who could make use of GIS tools in their work domains, *either* do not exploit the technology *or* rely on the expertise of a GIS expert. On the other hand, the expert may be highly familiar with GIS technology but often has limited experience in different domain problems.

The short term benefits of these best practice guidelines will be:

- for end-users to improve the statement of their needs and requirements,
- for customers to improve cost / benefit calculations of GIS usage,
- for developers and customisers to better understand user needs and requirements and thus taking these into account,
- resulting in a better exploitation of GIS which are currently available on the market.

in the long term making use of these best practice guidelines should lead to:

- user-centred development of GIS user interfaces with higher quality,
- GIS user interfaces which can be applied by the end-users more efficiently (speed up work) and effectively (do the right thing) and which are accepted by the end-users,
- improvement and speed up of the GIS development process,
- reduction of customisation effort.