

SIERRA

An Interactive System for Ergonomic Realization of Applications

Jean Vanderdonckt

This short paper discusses some early work on the SIERRA (Système Interactif pour l'ERgonomie de Réalisation d'Applications - An Interactive System for Ergonomic Realization of Applications) tool for managing guidelines. The goal of this tool is to develop a hypermedia system managing guidelines, human-computer principles.

Description of Tool

SIERRA is a hypermedia documenting guidelines and human-computer principles that are multi-platform. It provides on-line documentation of guidelines that can be applied to multiple computing platforms. This tool also supports partially heuristic evaluation by linguistic ergonomic criteria, which is a variant of the well-known heuristic evaluation. Despite the fact that SIERRA illustrates guidelines that are platform-independent, it is only available on any Microsoft Windows station. This choice has been made to cover as wide a range of places as possible. It runs with Windows 3.1 and is implemented with Microsoft Help Compiler V.3.05 (extended version) and Microsoft Multimedia Viewer V2.0, which is an extension of the former to multimedia components (e.g. video sequences).

The audience is mainly those designers who are responsible of the human factors of a particular human-interface: user interface designer, programmer, human factors expert,... The contents of SIERRA is based on a corpus ergonomicus, which is a multi-purpose platform-independent styleguide of guidelines [1]. This styleguide mainly consists of twelve chapters (figure 1):

1. *Data input*: Position designation; Direction designation; Interaction object selection for data input; Data input properties; Forms input; Tables input; Graphics

input; Default values input; Other guidelines.

2. *Data display*: Interaction object selection for data display; Interaction object localisation; Interaction object sizing; Interaction object arrangement; Data display; Forms display; Tables display; Graphics display; Formatting; Data coding; Data display control; Data display design.

3. *Dialog design*: Dialog qualities; Context definition; Alarms.

4. *Graphics*: Graphics selection; Color display; Icons, symbols and pictograms; Hypertext; Hypermedia; Multimedia.

5. *Interaction media*: Input media; Display media; Multimedia interaction media.

6. *Interaction styles*: Interaction styles selection; Command language; Query language; Natural language; Questions/answers; Function keys; Menu selection; Form filling; Direct manipulation; Graphic interaction; Speech synthesis; Multi-windowing.

7. *User guidance*: Information status; Error management; User information; Data validation; Information protection; Information transmission management.

8. *Messages*: Guidance and information messages; Help messages; Warning messages; Error messages; Confirmation messages; Alert messages; Status messages.

9. *Help on line*: Help generalities; Help demand; Help response; Help level and options; On line documentation; Tutorial.

10. *Documentation*: General documentation; User manual.

11. *Evaluation*: Evaluation rules; Quantitative measures (physical, associative, aesthetic); Subjective measures; Diagnostics.

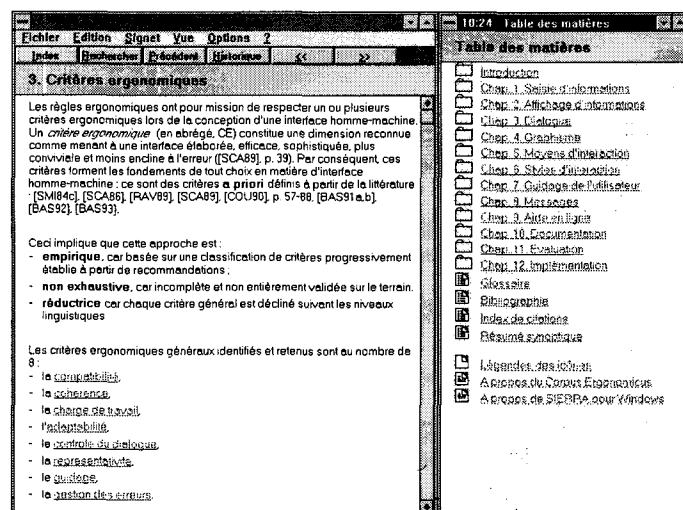
12. *Implementation*: User-interface design; Design methodologies; Design organization; Meta-ergonomics.

Each guideline is characterized by eight attributes: a numeric reference, a synthetic title, the complete statement, the related level (belonging to Nielsen's linguistic level: pragmatic, semantic, syntactic, lexical, alphabetical and physical), an impact factor ranging from 1 (mostly important) to 5 (mostly unimportant) for determining the guideline influence, positive examples (screen hardcopies where the guideline is respected), negative examples (screen hardcopies where the guideline is not respected), the exceptions, and executable demonstration programs.

Each guideline may also hold seven possible kinds of link:

1. a link to an *a priori* design criterion to be respected: consistency, compatibility, user workload, adaptability, explicit control, significance, user guidance, error management;

Figure 1: Main screen of SIERRA with table of contents



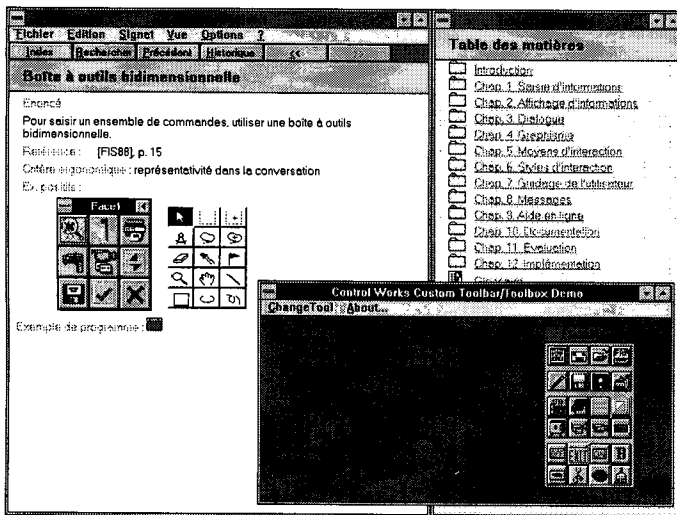


Figure 2: Guideline example with demonstration program

2. a link to an *a posteriori* evaluation criterion to be guaranteed: learning time, performance, error rate, subjective satisfaction, retention;

3. a link to the privileged interaction style where the guideline is fundamental: natural language, query language, questions/answers, menu selection, form filling, function keys, direct manipulation, multi-windowing;

4. a link to logical interactors handled by the guideline: this forms a hierarchy of abstract interaction objects which come in 5 classes: action objects (menu), static objects (label, separator), scroll objects (scroll arrow, bar), control objects (radio box, button, list box,...), dialog objects (window, dialog box, panel) and feedback objects (messages, progression indicators);

5. a link to the bibliographical references where the guideline is mentioned, defined, justified, validated;

6. a link to all others guidelines in the same topic; e.g. rules for speech synthesis, vocal interaction, speech recognition as both interaction style and media;

7. a link to all other guidelines which are either more general or more specific in a refinement process (specific guidelines are proved to be more efficient).

SIERRA's components include many different types of informations whose icons are depicted in table 1. A displayed guideline can show screen captures taken from different environments and can provide the execution of a demonstration program (fig. 2).

Acknowledgments

This work was partially supported by the FIRST research program of "Direction Générale des Technologies et de la Recherche du Ministère de la Région Wallonne", Ref. RASE/SCHL319/Conv. 1487 and by the "Informatique du Futur" project under contract N IT/IF/1. Any opinions, findings, conclusions or recommendations expressed in this paper are those of the authors, and do not necessarily reflect the view of the Belgian Government.

Author's Address

Facultés Universitaires Notre-Dame de la Paix, Institut d'Informatique, rue Grandgagnage, 21, B-5000 Namur, Belgium.
Tel: +32-81-72.50.06; Fax: +32-81-72.49.67. Email: jvanderdonck@info.fundp.ac.be

References

1. Bodart, F. and Vanderdonck, J., Expressing Guidelines into an Ergonomical StyleGuide for Highly Interactive

Table 1: List of document and folder icons in SIERRA

	Closed folder containing different documents
	Open folder showing the document contents
	Untyped document (or multi-type document)
	Document containing text
	Document containing a list of information
	Document containing a table of information
	Graphical document
	Video sequence document
	Sound document
	Macro document (pre-recorded sequence of steps)
	Program document (executable application program exemplifying the guideline)
	Environment document (document modifying the look & feel of the tool for illustrating different presentations).

Applications, in *Adjunct Proc. of INTERCHI'93* (Amsterdam, 24-29 April 1993), S. Ashlund, K. Mullet, A. Henderson, E. Hollnagel and T. White (eds.), ACM Press, New York, 1993, p. 35-36

2. Vanderdonck, J. and Bodart, F., An Object-Oriented Model for Organizing Guidelines in Human-Computer Interface Design, in *Abridged Proc. of HCI'93 International*, (Orlando, 8-13 August 1993), M.J. Smith, G. Salvendy (eds.), Elsevier Science Publishers B.V., Amsterdam, 1993, p. 260.