Safety-Critical Interaction: Usability in Incidents and Accidents.

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ABSTRACT
Recent years have seen an increasing use of sophisticated interaction techniques in the field of command and control systems. The use of such techniques has been required in order to increase the bandwidth between the users and the systems and thus to help them deal efficiently to increasingly complex systems. These techniques come from research and innovation done in the field of HCI but very little has been done to improve their reliability and their tolerance to human error. It can be difficult to know how to assess the risks that such systems can create for the successful operation of safety-critical systems. One consequence of this is that interaction issues are almost entirely missing from international development standards in safety-critical systems, such as IEC615098 or DO 178B. This SIG will provide a forum for academics and industrials to exchange research problem as well as best practice in the field of safety critical interactive systems.

Author Keywords
Safety critical systems, human error, reliability, usability.

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ACM Classification Keywords
Interactive systems (I.5.5) Interfaces (B.4.3) Human safety (K.4.1), Reliability (D.2.4), User interfaces (D.2.2).

INTRODUCTION
CHI and other conferences recognize the importance of addressing the problems raised by non-classical User Interfaces. For instance, for several years in a row, CHI conferences have featuring a dedicated track on "Beyond the Desktop". However, there has been no work reported on user interfaces for command and control interactive systems. On the other hand conferences on formal methods or software engineering address the issues raised by the design of such systems. Unfortunately, these meetings can have limited interest for user interface designers. Conferences on human factors or cognitive engineering mainly focus on the human-in-the-loop side of these systems with very little interest in the interaction per se.

Attendees will discuss challenges of designing UIs for safety critical error-tolerant systems in which human error analysis and assessment, formal description techniques, incidents and accidents reporting and analysis must be systematically addressed to deal seriously with user interfaces for safety critical systems Issues to be discussed include the following:

- What are the specificities of UIs of safety critical error-tolerant? What research exists?

- What is usability in a safety critical context and how to evaluate it,
- How to analyze and prevent human error through system specification and implementation. Possible classifications of human errors improving their understanding;
- How to guarantee the safety and reliability of the possible interactions in a safety critical context;
- How to design for robust co-operation among the users in technologically mediated work.

RELATED EVENTS

At CHI 98 we organized a workshop on "Designing User Interfaces for Safety Critical Systems" [1]. Even though the workshop was successful, almost no work in this area has been presented at CHI since then. As this field is more active in Europe than it is in the USA, we would take the opportunity of CHI in Europe to trigger participation from European research labs and European industries within the CHI conference.

AUDIENCE

One of the goals of this SIG is to identify and gather people interested in the field of human computer interaction for safety critical systems. We foresee the following types of users:

- Practitioners who work in the design, construction and certification of safety critical interactive systems,
- Academics working or interested by state of the art and research activities in the field of safety critical interactive systems.

The audience would be approximately 50-150 professionals and academics interested in how to overcome the limits of conventional UI paradigms, design methods and processes in order to deal with safety, reliability and usability on an equal base.

SIG ORGANISATION

The activity plan for the SIG is as follows:

- Introduction of the SIG goals and participants (10 minutes);
- Presentation by the organizers of issues in the various fields related to the topic of the SIG (5 minutes per topic) namely human error assessment, incidents and accidents analysis and reporting, reliability for interactive systems and model-based approaches (20 minutes)
- Interactive discussion with participants on the research topics discussed, selection of those that seem more important, and comments on the solutions proposed (30 minutes).
- Discussions on future plans and in particular how to increase CHI community interests in such topics and how to provide industrials with more usable and applicable research results. (30 minutes)

REFERENCES

1. P. Palanque, F. Paternò, R. Fields. Designing User Interfaces for Safety Critical Systems. Report from CHI 98 workshop, ACM SIGCHI Bulletin, October 1998, vol. 30 n°4.
2. C.W. Johnson and C.M. Holloway. A Survey of Causation in Mishap Logics. Reliability Engineering and Systems Safety journal, vol. 80,n° 3, pp. 271-291, 2003
3. R. Fields, F. Paternò, C. Santoro, S. Tahmassebi, Comparing Design Options for Allocating Communication Media in Cooperative Safety-Critical Contexts: a Method and a Case Study. ACM Transactions on Computer-Human Interaction, Vol.6, N.4, pp.370-398, ACM Press, December 1999.
4. S. Pocock, M.D. Harrison, P.C. Wright and P. Johnson. THEA: A technique for human error assessment early in design. In Hirose, M., editor, Human-Computer Interaction INTERACT'01 IFIP TC.13 International Conference on human computer interaction, pages 247-254. IOS Press 2001.
5. D. Navarre, P. Palanque, R. Bastide. A Tool-Supported Design Framework for Safety Critical Interactive Systems in Interacting with computers, Elsevier, Vol. 15/3, pp 309-328.