Evaluation of the communicability in groupware interfaces according to semiotic engineering

Hélio L. Costa Jr[1,2,4,6], **José L. P. Bueno**[2,3,7], **Ana L. V. Torkomian**[4,7], and **Édis M. Lapolli**[3,5,7]

[1] Faceca - Faculdade Cenecista de Varginha - Brazil (www.faceca.br)
[2] Unis-MG - Centro Universitário do Sul de Minas - Brazil (www.unis.edu.br)
[3] Vias - Instituto Virtual de Estudo Avançados - Brazil (www.vias.org.br)
[4] UFSCar - Universidade Federal de São Carlos - Brazil (www.ufscar.br)
[5] EGC/UFSC - Universidade Federal de Santa Catarina - Brazil (www.egc.ufsc.br)
[6] Professor, M.Sc.
[7] Professor, Dr.

This work presents a general vision of the computers and the nets, the interfaces, the IHC - Human-Computer Interaction - the Semiotic Engineering and the evaluation method of communicability and, finally, the applications of groupware. It also presents the justifications to extend the evaluation of the communicability, method that originally was developed for interfaces mono-user, adding methodology to evaluate the communicability of applications of groupware.

Keywords Semiotic engineering; Human-computer interaction; HCI

Este trabalho apresenta uma visão geral dos computadores e redes, as interfaces, a Interação Humano-Computador – a Engenharia Semiótica e o método de avaliação da comunicabilidade e, finalmente, as aplicações de *groupware*. Também apresenta as justificativas para estender a avaliação da comunicabilidade, método que foi originalmente desenvolvido para interfaces monousuário, adicionando uma metodologia para avaliar a comunicabilidade de aplicações de *groupware*.

Palavras-chave Engenharia Semiótica; Interface homem-máquina; IHC

1. Presentation

First, computers had become trivial tools in the life of common citizens, inserted in their day-by-day and in their work environment. Later, with the creation of the personal computer, the tool started also to inhabit the residences. Recently, the computer networks – the Internet and the Web – had mainly transformed the habits, the work, the leisure and the learning processes [1]. Such factors had propitiated the creation of a new class of application software, called groupware. These applications facilitate the interaction between people who want or need communicate themselves, through their computers and the networks, for leisure, work or learning.

Currently, great part of computer users still find some or much difficulty in dealing with the existing software interfaces, as much in the individual level as in the level of groupware. The Human-Computer Interaction (HCI) is a multidiscipline area that studies the problems of usability of these interfaces. The HCI can be considered under Semiotic Engineering perspective, that presents a theory to evaluate the communicability of the interfaces [2].

The original proposal of the communicability in Semiotic Engineering is restricted to mono-user systems interaction. Case studies had been carried through with multi-users systems, as groupware applica-

tions, but they had not been tested enough and exhaustively to allow the extension of the original method [3].

In view of the importance of information systems to the citizens [4] and understanding how the interface usability can be a determinant item in the digital inclusion, this article argues the validity of the extensions to the original method of communicability evaluation, so that also encloses the communicability in the groupware systems. Is possible to believe that the interfaces designers, mainly those specific for groupware interfaces, could be benefited by this work, fact that consequently would improve the communicability of the interfaces, leading more quality to the final users and allowing that they reach their objectives when interacting with computers, the networks and other users.

2. Main concepts

The interaction between man and his tools has becoming always more complex, therefore the tools themselves had also became more complex. The computer is a symbol of this complexity. Its diversity of forms, application and interaction sample this affirmation [5]. This tool, in particular, has been targeted of several critics, therefore, with its complexity, the majority of the manipulating – human users – already tried some type of frustration on not having been able to operate its interface.

2.1 Computers and networks

The creation of cheap computers, the microcomputers, in the seventies, allowed a continuous expansion of the computer science technology to most diverse areas. Transforming citizens without no specialization into users of a tool that, before that, were only used for trained engineers and specialized people in this area. It would be like if airplanes became so cheap and accessible that great part of the population would have his particular jet and would have to learn how to pilot it – ability that demands currently, years of studies and supervised training.

Still one another important factor, also occurred in the seventies, it was the creation of the necessary technology to connect the microcomputers in networks. Both technologies – the microcomputers and the networks – had popularized during the eighties and nowadays are present in industry, commerce, services; also in schools, libraries, residences and very briefly, thanks to the popularization of mobile devices, following its users wherever they were [6].

So, there is a problem to be solved: how to transform a complex tool into a simple device to use, justifying the research for development of better interfaces for these tools.

2.2 Interface problems

The interaction between user and computer happens through an interface, based on hardware and software, that evolved enormously along of time. While in years 50, 60 and 70 the interface was strongly based on hardware, years 80, 90 and nowadays, software has been the central part in the communication with the user.

Such fact justifies the concern with the development of interfaces and its respective developers – analysts and computer programmers – of information systems.

Traditionally, in a mono-user system, the communication happens between user and machine, through an interface developed by a computer programmer, or, less frequently, by interface designer; so the interface is the programmer representative and the communication happens between the programmer and the user through the interface developed for the first one.

Originally, computer programming was seen as an art thing [7]. Each program would have interfaces with features chosen from the preferences of its programmers. Given to the particularities and individual preferences of each one, it is very difficult to get an interface standardization, what it would make possible to users to communicate more easily with new devices, created by the programmers.

There are other reasons for the problems with the interfaces: the computer is still something new for many people (the majority of the population), after all, this area has only 50 and a few years and many people still will pass for their first experience with software interfaces. This implies in learning to deal with mouse, keyboard, windows, icons, pointers and clicks, before starting to deal with some specific application; the high speed of interface evolution does not allow enough time for study it and develop good theories of usability and communicability. When an experiment of long term is finished, probably the employed technology is already obsolete; due to multipurpose characteristic of computers, the same device is used for different purposes, like work, leisure, learning, etc.

2.3 HCI – Human-Computer Interaction

The study of ways to promote better interactions between users and their interfaces is objective of graphic designers, pedagogical specialists, computer scientists, psychologists, ergonomic engineers, knowledge and information architects and semiotic engineers. The HCI area, investigates the quality of this interaction and study how to improve it. Such studies have been sponsored by a small part of software and hardware industry, aiming to create products that have better usability than the competition products.

More research is needed to propitiate the creation and efficient improvement of methods and tools for the development of interfaces with good communicability and usability.

2.4 Semiotic Engineering

First presented in 1993 as a semiotic approach to users interface design, Semiotic Engineering evolved for a theory of HCI [2]. It begins in a general semiotic perspective and attributes to the users and interface designers the same role in the HCI, interlocutors in a communication process. The interface designers communicate with the users through a myriad of messages codified in words, graphs, behavior, help online and explanations. When the designers use this theory to study, analyze and to make decisions about the users, they are simultaneously studying, analyzing and taking decisions about their own behavior and strategies in communication. This eminently reflexive theory assign to designers a so important ontological position as much to the user.

2.5 Communicability

There are several qualities that an interface must have to be considered as a good usability interface, such as applicability, adaptability, flexibility, reliability, amongst others. For Semiotic Engineering the key-quality of devices based on computers interactivity is the communicability [8].

The evaluation method of interface communicability evolved inside the structure of Usability Engineering and its main objective is to evaluate how the interface designers communicate with their users, through the interface.

This method consists on three stages: to identify the interruptions in the communication between user and interface, interprets them and to establish a semiotic profile of the joined problems. It was developed originally to evaluate how users understand the messages sent by the designers, through mono-user interfaces.

2.6 Groupware

Groupware is a collaborative environment, propitiated by the union of software, hardware and networks; it helps teams to work together in the execution of tasks of the group [9].

The number of users in a system of groupware is not limited to two, therefore it has some applications that involve work groups with sets of dozens of people. The complexity of the communication magnifies

in the same measure that magnifies the complexity of mediation of a debate, in accordance with the number of involved participants.

Beyond the concern with the communication between the programmer and the user, through the interface, in the groupware systems there are new factors. For example, the interaction between user and other user, through the system. Fact that generate new problems and new communication elements that were not foreseen in the original theory of the communicability. Such facts had been treated by Prates [3, 10] in an article that categorizes the interruptions in the communicability evaluation in groupware applications and in a doctorate thesis that presents a meta-communication model that serves as a base for the development of tools for supporting the description of multi-users interfaces.

3. Relevant questions

Many new questions for HCI had emerged after the dissemination of computer networks and the groupware applications, investigation is needed to extend the scope of communicability evaluation, according to Semiotic Engineering. The lack of practical methodologies to evaluate the groupware applications suggests the needs for research and development of such methods [11].

An important conclusion founded by Prates, after the accomplishment of case study for communicability evaluation in groupware applications was that interface designers of such applications would have to consider the impact that the interruptions of individual interactivity cause to the group [3]. The interruptions in the individual level are equivalents to that they can occur in the mono-user applications. However, in the groupware applications they frequently also cause interruptions in the group.

Although it has been established this causal relation between the interruptions in the individual level and the level of the group, the researchers more deeply suggest the scanning of this relation and the inquiry on if is there an hierarchic structure of interruptions. Specific interruptions in the individual level always lead to the same interruptions in the level of the group? This is an important question to be investigated.

Another important question is the validation of a new set of interactions describing the interruptions in the level of the group, during the use of groupware applications. The method of communicability evaluation could be extended to enclose the groupware applications. Once this set of interactions is defined, is necessary to define how the tags can be associated to the categories of problems proposed by Prates and then to carry through tests allowing the evaluation of its adequacy to the method. The following step would be the integration of this extension proposal to the original method, identifying how the new set of interactions and problems relates to the original set.

4. Final considerations

The intention with this work is to excite the interest of other researchers for Semiotic Engineering and to stir up debate about the importance of the quality of communication in groupware environments; in other words, the communication between man and the information devices and between men "through" the information devices.

The author of this article, as well as the main researchers in the area, recognizes that there is a lot of work to be done in Semiotic Engineering and Human-Computer Interaction, in general. It is necessary to awake the curiosity of a bigger number of researchers and to spread more information about this subject, in the search for stimulate future research on the basic questions of the communicability.

Due to the innovative character of the subject, is necessary to consider the improvement of the employed typology and taxonomy, as well as publicize them for critics and upgrades made by the scientific community.

Semiotic Engineering has an important reference in the research done in the SERG – Semiotic Engineering Research Group – based on PUC-Rio – Pontifical Catholic University of Rio de Janeiro, Brazil – established by Dr. Clarisse Sieckenius de Souza and currently under the coordination of the Dr.

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This group does the major part of the research in this area and stand out in Brazil, as a reference in the study of Semiotic Engineering in the Human-Computer Interaction.

Recently Donald Norman cited Semiotic Engineering in an essay [12], where he says "Clarisse de Sousa makes a major advance in our understanding of the communication model. If the designer explains the reasoning behind the model, the user will find the task of uncovering the conceptual model much easier. In other words, what we need to provide to people is reasons, not just methods".

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