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Human–Computer Interfaces: Constructing Information Spaces, Regulating Practices

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1. Realms and Transparencies

In accounts of information and communication technologies (ICT) and their transformative powers it has become quite common to address the new realms of Personal Computing and, especially, the Internet as a "cyberspace" of rather amorphous nature. If today's personal computers offer access to "running" programs and "open" documents, they bring forth a multiplicity of communication possibilities and work or leisure-time activities. ICT thus appear as a topos of its own that provides individuals and communities with possibilities of innovative practices well beyond the scope of those located within 'traditional' social order. On closer scrutiny, such accounts rely on the evidence of an often and readily invoked "transparency" of the interfaces, which allows for immediate concentration on the observable or alleged effects of the technology. According to a renowned diagnosis, a general presence of the possible relies on the computer screens, being disseminated by them. With computer desktops no less real to the user than "authentic" ones made of wood and steel, a cyclical vacillation between the real world and a number of virtual worlds is enabled (Turkle 1995). Essentially, for this type of investigation of the technology, which is often labeled a "medium", Human-Computer Interfaces represent entities which are taken-for-granted in their existence as well as in their specific shape. They seem to be considered neutral mediators between the two parallel and yet easily linked spheres of VR and RL.

Do interfaces play a role in this process of enrichment and transformation, and how can it be described? If today the effects of the computational devices that have entered the everyday world can be discussed, it is because sensations and operations are actually interwoven at and through the interfaces to evolve into patterns of actions. When notions such as "navigation", "interaction", or "simulation" address the specific acts supported by the technology, the implication is always made that the user of a machine which essentially forms a black box actually reaches and effectively handles the data. The "bottleneck" (Krämer 1995) of the Human–Computer Interface obviously plays a decisive part in realizing the functionality of the machine. The modalities of achieving its aim are, however, considerably different from traditional instructions for use just explaining the instrumental, rational approach to the functionality residing in the machine (Tholen 1997). Rather, Human-Computer interfaces imply an understanding of a certain vagueness, merging recognition, exploration, and effective

operations. In how far interface configurations influence the encounter with the "infosphere" becomes quite evident when, for instance, an alternative Web-browser is employed. While we all have "seen" the WWW, maybe not too many of us have seen it this way. With a different program used for access to identical data, different visualizations and, simultaneously, different options for data handling influence the users' position (see figure 1).

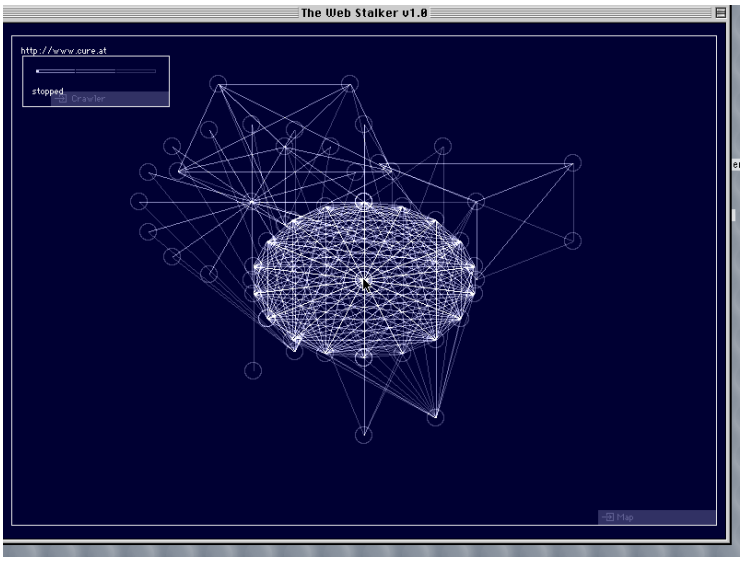

Figure 1: A different view of the WWW

The communication possibilities and activities based on computational technology emerge at the interface. In all instances where "transparency" is invoked the user interfaces, in their genuine role of offering access paths to the world of information prove, on closer scrutiny, to be an intermediary world that cannot easily be dispensed with. They facilitate, provoke, and determine a specific way of interaction with the data "waiting" to be processed – which would otherwise just be something laid off or stored away. User Interfaces obviously do not reside as mere parasites between spheres that could just as well do without them, and in the peculiar stratification of digital technology in hardware and software layers they take various shapes.

Since today's standard interface of keyboard-mouse-screen has replaced its predecessor (i.e. the command line interface), Graphic User Interfaces (GUIs) vest the empty the screen with a distinct structure. It generally used to be assumed that such GUI applications are inherently more "user-friendly", since they enable certain interaction styles, above all the direct manipulation of screen objects. Yet, there is evidence that the mere existence of the desktop-

metaphor and the typical interaction elements of icons, buttons, and menus have not completely relieved the users from annoyances and hindrances when attempting to engage with some part of the "infosphere". The everyday experience of computing is not only marked by hardware or bandwidth problems, but also by moments of disorientation.

The fragile nature of the features that promote Human-Computer Interaction is the object of a scientific domain which has emerged over the past 20 years. Located in university departments, independent consultancies and also within IT industry to a growing extent, the disciplines of *Human-Computer Interaction (HCI)*, *Usability Engineering*, and *Human Factors* lend a different perspective to the idea of increased capabilities emerging from man-machine relationships. The discourse and the field of practice embodied by these disciplines circumscribes and systematically tackles the 'intermediary zone' where the links between computational artifacts and users, between datascapes and practices, are established.

The following brief discussion will concentrate on the discourse of Usability Engineering. Although the manifold variations of this discourse shall and cannot be oversimplified, the systematic appearance of specific notions and types of argument, with their corresponding non-discursive techniques for constituing objects (see a.o. Bowker and Star 1999), gives insight in some properties of the technology in the hands of specialized experts. Once major traits of this epistemology are better clarified, interest will be in possible consequences for a cultural anthropology and social sciences perspective on the societal spread of ICT.

2. Constituing User-Friendliness

An over-arching definition can be seen organizing this dicourse and the related practices. The Association for Computing Machinery's Special Interest Group for Cumputer-Human Interaction (ACM–SiGCHI) has established a definition which states: "Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (http://www.acm.org/sigchi/cdg/cdg2.html#2 1). For the experts and practitioners organized under the roof of this professional organization, "the focus (…) is on how people communicate and interact with a broadly-defined range of computer systems" (CHI 2000, 38). Virtually all digital artifacts are addressed here in a broad variety of aspects and contexts. Where others would content themselves with regarding interfaces as simple objects, this discourse aims at addressing them as entities entangled in unfolding processes. Considering computational technology a realm of "systems-in-use", where the outcomes of the interplay between humans and machines form the focus of attention, it rather explicitly deals with performance. Regarding the results of technology usage, the User Interface is, vice versa,

ascribed the position of a means, whose functions can be defined in a specific way so as to then be used as a basis for evaluating this mediating construction.

The general rule for a promising approach to digital technology as a viable complement to RL is found in the general formula of Usability Engineering: programs and devices have to be "easy, enjoyable, satisfactory, and efficient to use". By recourse to this formula, the discourse refers to a technical development task that has yet to be performed adequately and can only reach a satisfactory result on the grounds of expert intervention. An indictment is made in a humanistic tone to claim a substantial failure of current technology. At the same time, it is not ascribed to individual users who might not have learned enough about their machines, nor to a lack of human adaptation in general, but to technology itself. In the words of a renowned European Usability Consultancy: "Usability is an ubiquitous problem of today's society. ... This is the result of ignorance of appropriate know-how to develop usage-oriented systems and to integrate usability knowledge" (CURE 2000). Other experts state: "Usability is more difficult to engineer than other parts of the system" (Reiterer 2000). With the reproach that the actual realizations of the technology contribute more to the creation of unnecessary barriers than to the exploitation of the possibilities inherent to GUIs in principle, this discourse recalls the ongoing work through which today's approaches to data and information are facilitated and shaped. The information and communication technologies are subject to a perspective of construction: each device and each software has evolved in this one particular way, to be used in a specific way and to enable a specific handling of data. These activities are supported in a distinct, non-arbitrary manner and, in that sense, intrinsic to the artifact.

The usability discourse thus enters the picture in-between development processes on the one hand, where new functionalities are created, and design decisions on the other, where industrial or graphic designers determine the manifestations of products mainly on the basis of market considerations. Usability establishes a location of its own where its specific epistemology shall be enacted. When "Interface Design" surfaces as the pre-eminent issue, this hence does not address superficial appeal or touch-ups, but the objective conditions of viable "front-ends" of computational machinery. Graphics no. 2 shows how HCI and its major sub-disciplines move in to assume their role in tackling the problems of technology usage (see figure 2).

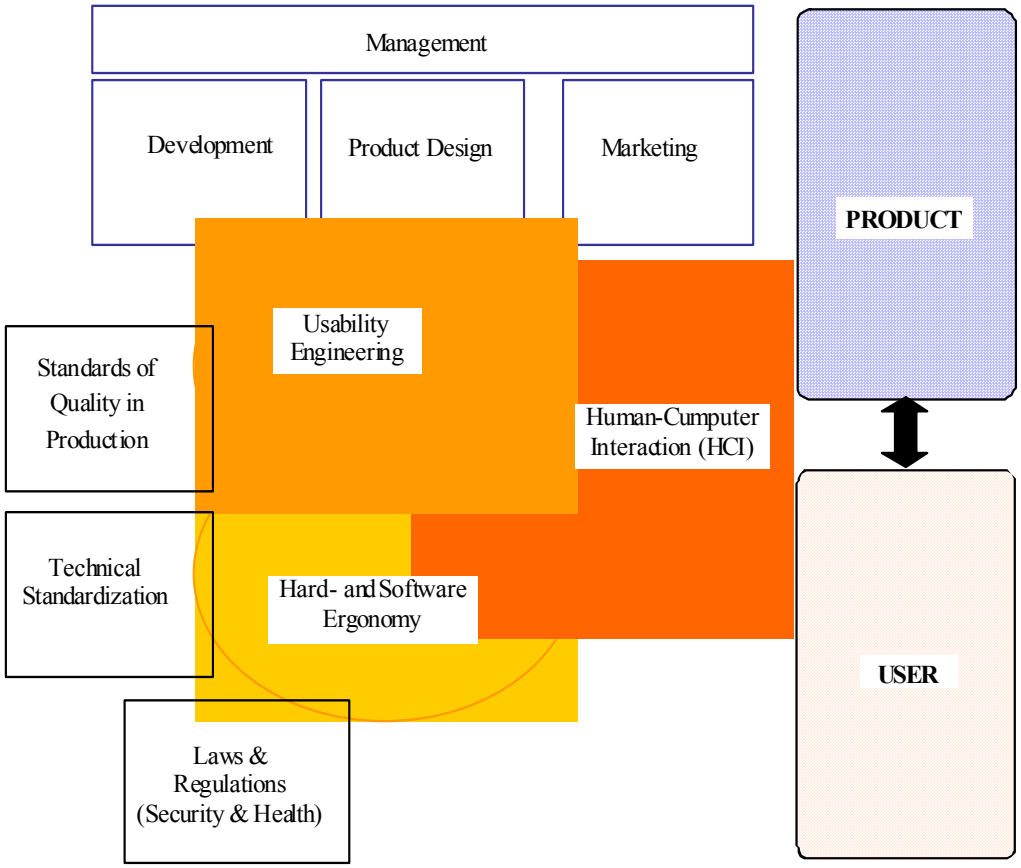

Figure 2 ICT Product Development & Design Cycle and specialized HCI know-how

Striving for "user-friendliness" of "systems-in-use", the imperative is that it must be possible to use a computer without reflecting on it every now and then, without being surprisingly thrown into a problematic space and thus forced to take problem-solving action. This position of facilitating the user position is clearly articulated in titles of Usability Literature such as: "Don't Make Me Think: A Common Sense Approach to Web Usability" (Krug, 2000). An "understanding" nature of the Computer is in demand, which is neither inherent to the processors nor the networks. Rather, this attribute is built into the machines through the design of their front-ends. Former Xerox PARC researcher Lucy Suchman has stated that the language of interactivity obscures the flows and the boundaries between persons and machines. At the core of the triggering of interactivity effects lies a process which not only entails an understanding of the user of what the machine does and offers. When it comes to establishing "user-friendliness", it is also "the machine's access to its users" which forms a precondition of actual flows and a temporary breakdown of barriers (Suchman 1987).

Additional requirements of technical development thus enter the scene. Today's Usability

Engineers are busy identifying these especially in the field of standard software for everyday use at work places, where routine tasks are to be solved by users who cannot be expected to be equipped with a deeper technical understanding. Yet, consumer electronics, handheld devices or communicators, or more specialized systems such as navigation systems or air traffic control are equally addressed. All of these have to be sorted out on the basis of the overarching task. A series of notions unfolds the properties of a viable system: The rule of intuitivity of user interfaces articulates the success of interface construction, aiming at the achievement of a non-problematic status in everyday contexts for what has just before been new and alien. Functions such as constancy and consistency, predictability and expectability designate that through which the interface creates a familiar situation and thus embeds technology in taken-for-granted conventions and meanings (see also Johnson 1999). Where computers are operated and information is retrieved from their deep recesses, the meaningful, interpretable and evident again and again differs from that which remains problematic, raises problems of understanding, and hinders actions.

3. A Methodological Provision of Interactivity

Various techniques and methods are employed by specialized experts to make the haunting problems of usage visible and transform users' needs into system requirements. The ever-more refined methodological set is usually roughly summoned in the four stages of analysis, design, evaluation, and implementation. This highly differentiated methodological set can be viewed as a transformation of the routine production processes within industry, and, simultaneously, corresponding to an internally differentiated picture of "usage" (see figure 3).

To approach the goal of "good User Interfaces", as a somehow vague expression often puts it, this discourse finds its foundations in a knowledge of the "real cores of understanding". Laws of human information processing, the psychology of cognition and perception, industrial engineering perspectives on the body at work, and ethnographic observations provide a scientific form for the problems on the user's side. Moreover, they allow for an optimization calculus. A realm of seeming banalities thereby becomes accessible to experts, where, however, a lot is at stake, since all these elements account for the gestalt and the viability of User Interfaces. On the basis of approaches such as "visual perception and data visualization", "basic phenomena of human memory and problem solving", or "basic concepts and applications of activity theory" (CHI Conference Program 2000) this delicate realm can be dealt with. By recourse to these concepts the Usability of the interfaces can also be transformed from a speculative entity into a measurable one, allowing for specific procedures for discovery of interfering and obstructive factors. By re-aligning the epistemologies of established scientific

disciplines and pushing them forward through new developments, the Human which is to engage with the technology can be measured, and this measure can be applied to digital technology.

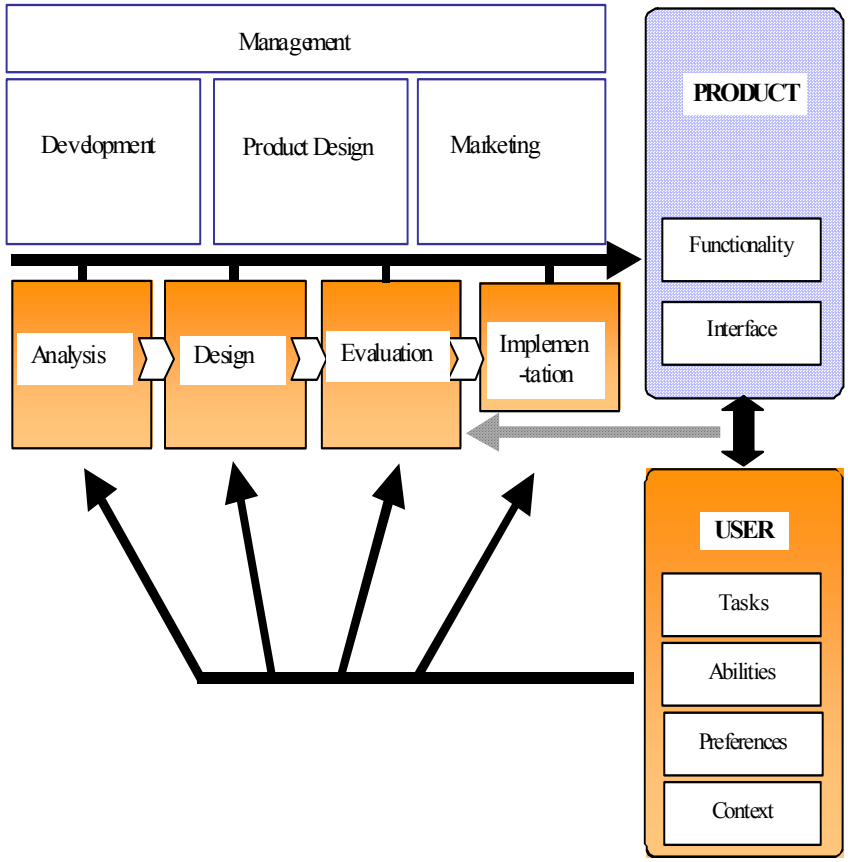

Figure 3: User Centered Design of Information- and Communication Technology

Initially, the methodological focus is on "testing" and "evaluating" through which design decisions made by others can be elucidated and undergo critical scrutiny on the basis of empirically secured knowledge. Most notably the Usability Lab, as the location for appropriate user-testing (see for instance Nielsen 1993, 1994), demonstrates the fundamental perspective that digital technology in its concrete realization often falls short of its potential effects. More than other usability methods the Lab clearly defines a topos where user problems soon become manifest. The rich variety of methods and tools which has evolved since the early days of Usability puts more and more emphasis on a refined work of usage anticipation, ideally already in the earliest stages of system development. In this process, Usability becomes more abstract, taking the discursive form of design principles to be observed in the engineering process. At the

end of the last decade, one of the major compendia listed 3600 design principles (Vanderdockt 1999).

It is not a general, anonymous image of usage with which the discourse on usability can content itself with. Human-Computer Interaction only becomes tangible in direct reference to a given activity that is carried out within a specific situation of use and by a specific user group. Only then does the act of usage emerge from its obscurity und unpredictability. The precise knowledge of this set of factors makes it possible to conceive of a promising interface and to estimate the probable degree of its success (Myers 1994, Hix & Hartson 1993). The user becomes visible in the form of "problems" and "needs", which are transformed into "system requirements" to be considered and met as early and as thoroughly as possible. The user-machine-relationship is, according to this discourse, ideally accomplished through an iterative cycle, involving methodical investigations of salient user properties, prototypes, and steps of evaluation. The general rule of "ease of use" which takes sides with the user to spare her difficulties and unpleasant experiences, is now implemented on the basis of criteria such as error reduction in operating the program. To free the use of computers from hindrances one has taken an interest in expectable behavioral patterns of the user, in modes of perception, attention spans and stress factors, as well as mental models of objects and situations. These properties of the user intrinsically relate the Human-Computer Interface not only to understanding, but also to issues of purpose-orientation and functionality. "Task performance" is the main parameter in this approach to digital technology which one might be inclined to call a "doctrine of prudence in approaching the user". Form the task perspective, the boundaries between users and machines dissolve and a relational entity is articulated (see figure 4).

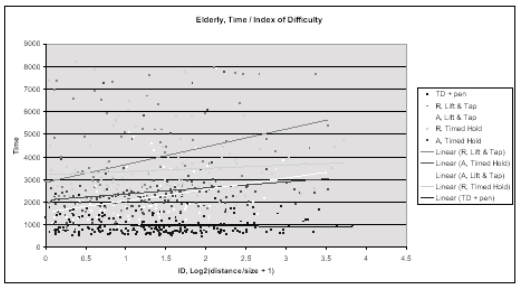

Figure 4 Elderly performance on different input methods

Source: Maypole Concept Documentation 2.0

Figure 4: Making Usage Visible: Evaluating a touchpad design

By means of "user testing" and the early anticipation of user properties, the experimental thrust of technological realizations is receding into secluded areas where human information processing can be studied with direct reference to artifacts under development. In the social reality of the use of technology, however, there is no place for an experiment which only appears in a dysfunctional light. The unclear outcome of experiments stands in sharp contrast to that which is tested, adapted and conformed, ensuring a smooth use of technology with a predictable outcome. The Usability model forces a wedge between a type of technology that has been endowed with the assumption of a substantial improvement based on testing and norms on the one hand, and freely-floating innovation on the other, which leaves the object open and allows it to move in any direction. It has been drawing a demarcation line to the radically new and different, the surprising inventions prevailing not only in the common view of digital technology, but also in many analytic views of the 1990s. The innovative tends to be assigned the character of something merely imagined here, invented and creative but still naive, still lacking a secure grounding. Yet, HCI specialists and Usability Engineers are at the forefront of innovation processes. Far from hampering innovation as such, the search for new forms of artefacts and designs is allocated to a circumscribed zone which gives priority to purpose-oriented means of interaction.

In view of the above, one of this discourse's peculiarities is to be found in the fact that the concern for its objects can only be enacted via a detour. In the context of the specific form of the production system, it will only reach the artifacts by addressing the programmers, media designers and industrial development departments which are constantly producing what users really work with. This gives rise to a second definition of user-oriented efforts: "design change effectiveness" (cf. for instance John & Marks 1997). Parallel to the prominent notion of "ease of use", it focuses on the impact of the influence exerted on the development processes which initially remain external to this discourse. With the central tasks of ongoing technical developments articulated in terms of "systems-in-use", the Usability discourse is marked by reflexivity vis-à-vis all the distributed acts of technical construction. What programmers and media designers bring forth within isolated realms must, by necessity, return at other locations as a viable interface and a data space which can be entered and navigated. Hence it is important "to convert usability from a 'last minute add-on' to an integral part of product development" (Macleod et al. 1997). The Usability effort turns out equivalent to an alteration of the production cycle, so that the distances of technology producers and technology users can be reduced. "Usability can be defined in a number of ways, all of which address some aspect of quality in use of a system or product. .... Regardless of the definition there is agreement that the means of achieving usability is a human-centered approach to design" (Earthy 1998).

If a general point of reference for usability-related knowledge is to be identified, it is probably best found with the idea of "quality assurance". What can, and should be, attained is often expressed in terms of general benefits, which are not just limited to the experiences of individual data navigators. In particular, in the notion of "efficiency", which regularly appears in this discourse, the over-arching strategic value of usability-related knowledge and procedures is articulated. This notion refers to expectable forms of use as well as, in a much broader sense, an overall optimization of the information and communication society. Representing an essentially multivalent concept, it demarcates and organizes the environments, contexts and alliances that the technology under way has to deal with.

At least five dimensions of the "quality" concept employed by HCI experts and Usability Engineers can be identified at this stage. Firstly, the concept entails the accessibility of data, information, and the technology as such. The needs of so-called "special user groups" are well known to the Usability community, addressing primarily the elderly and the handicapped. For example the development of adjusted front-ends for the blind mobilizes some more democratic issues in regard to the evolving information society. The "localization" of a globalizing medium re-focuses differences of language and culture. Distinct properties of localized user groups become visible on a more fine-grained level through an ever-refined methodology, leading to a partial relabelling of User Centered Design as "Design for all" or "UI4all" (cf. for instance Smith/Dinn 1999). After all, the intended reduction of problems that users might face amounts to a substantial and permanent critique of the actual artifacts deployed in today's society. The implied argument seems to be the following one: If the investigation of perception modes, abilities and preferences sheds light on a considerable inhomogeneity of actual as well as possible users, it is not justified to consider the "info-sphere" a homogenous realm that would offer equal possibilities to everybody.

Then, the concept of quality proves capable of incorporating the competition of products and producers in the market. It hence also takes into account the socio-economic environment of production and consumption that the deployment of ICT applications has to rely on. On the one hand, it relates ICT artifacts to market transparency and the possibility of well-grounded acts of choice by informed consumers. On the other hand, market advantages get into the reach of producers through the proposed reorientation of the development cycle. The Usability discourse represents, as shown above, a critique of a badly oriented production sector. Yet, Human-Centeredness of products will only be achieved by Human-Centered producers, so that management techniques are questioned. Consequently, Usability Knowledge is argued to form part of a state-of-the-art scientific management of design & development processes (see e.g. Seawright/Young 1996).

Thirdly, "task performance" addresses the relationship between humans and computers in a way which is overtly concentrated on the user and his or her intentionality. Yet, it covertly is about the achievement of a process that might be called a restricted symbiosis embodied in successful "systems-in-use". It tends to dissolve the individual user as a distinct entity opposed to the machine, stressing continuity of the entities involved.

But the tasks remain there. The promised improvement of digital artifacts links the efficiency of "easy-to-use" programs and devices to a well-defined work process. In all cases where the use of digital technology forms part of a bureaucracy or business process, the problems and needs of users are, by definition, intertwined with those of the organization of work, division of labor, and management. While this is probably most obvious in CSCW (Computer Supported Cooperative Work) solutions, it also holds for other forms of ICT usage where users remain individually in charge of all steps of fulfilling a task. What is at stake is an optimization of a process which enables employees and users in general to better, and predictably, achieve the tasks accorded to them: the "user requirements" are inextricably linked to properties of the organizations and structures where these tasks and processes are inserted and also determined.

After all, the concept of quality in HCI sometimes also raises the issue of sustainable development. Criticizing established production systems, it points to a waist of resources and presents lack of usability knowledge as an avoidable source of re-iterations of identical or similar efforts.

The quality concept, more clearly than other notions employed in the usability discourse, gives insight into which spaces are linked by the shaping of computational artifacts through the distinct historical manner in which the discourse organizes its objects.

4. Mediation

It is the anticipation of the situations and contexts of use which defines the path to be followed by usability investigations and procedures. While this subsequently allows for determining the suitable forms of digital technology, it does not seem to be without consequences for the role social theory ascribes to ICT artifacts. All the small steps of continuous improvement, the pursuit of inconspicuous elements and their concatenations are ultimately geared to the possibility structure which the user encounters when engaging with the program or device. This space must – as elicited by the HCI & Usability domain – be put up, equipped and shaped in a circumspect manner. The distinct means of orientation and manipulation deployed here substantially contribute to constructing the morphology of data spaces. If today there is access to a "docuverse" (Winkler 1997), if "datascapes" can be entered and experienced whose

character can be grasped to a certain extent by metaphors such as those of architecture and urbanity, it is due to the construction and deployment of these means.

Media theorists have repeatedly pointed to the influence of earlier cultural techniques and techniques of the mind on today's approach to digital technology. According to their insights the computer operates to a considerable extent on a territory that sorts out and prolongates predecessor technologies that have become congealed as a part of our culture (Krämer 1998, Winkler 1997, Manovich 2000). Libraries and films are just some of the institutions which have been pointed out as providers of cultural resources for mapping and establishing the digital medium.

On the other hand, the usability discourse stresses that interfaces are actants. By creating familiar or at least easily explorable locations where data can assume an evident gestalt, interface configurations turn out to be constitutive elements of such socio-historical gravitation. Yet, not only typographical models, culturally well introduced memory operations, or imaging techniques are actualized and re-iterated through interface constructions, but so are also the underpinnings of the knowledge and procedures that enable the recognition of user requirements and situations of use.

It is due to the socially located effort in mastering situations of use in advance that interfaces as "intermediaries", as ANT would have it, reliably perform the fundamental task of guiding the user by means of information visualization and interaction elements. On these grounds the volatile entities constituing the "info-sphere" become tangible and can complete or enrich the world that the user has found so far. In keeping with the discourse on Human-Computer Interaction and Usability and its key concept of accessibility, entering virtual worlds is intrinsically linked to the conveying of meaning. It is not by chance that this research domain speaks of metaphors and analogies where visual and conceptual elements of the screen are negotiated (cf. for instance Gaver 1995). The machines are thus endowed with the ability to successfully have ascriptions referred to them, so that finally a confrontation can be defused which finds its semantical condensation in the German expressions of "Schnitt-Stelle". Only by recourse to knowledge about the conditions under which the users "can be picked up wherever they are" this type of reliable terrain is established that is aloof from pending considerations, struggle for understanding and search for problem solutions. The intuitivity of handling and use is quite obviously indebted to the bridging of a gap between man and "interactive" technology. Consequently, the readily conjured seductive force of digital artifacts and artificial worlds is less based on a radical alterity than on an ability of machine-"objects" to take given societal endowments and cultural resources seriously, and to incorporate them.

The art of successfully grounding Human–Computer Interaction takes the burden of interpretation and orientation off the user. This task present in each act of computer use could otherwise sometimes not be achieved. An identification of connecting points for a translation is always in demand in order to render the computer a decodable, that is social and a relevant (in the sense of social constructivism and phenomenology) place. HCI experts are the ones who are doing this work, and they are doing it on the grounds of a specific epistemology. With this epistemology also comes a differentiation of the all-too generic 'symbolic machine' and its continuous replacement by a conceptual modeling of users and situations of use. It thus points to situated practices and a fragmentation of 'cyberspace', to a multiplicity of systems-in-use and of overlapping user-machine relations.

The interfaces by means of which the computer has been successfully introduced and inserted in the realms of work and leisure thus can be understood as the specific locations where the qualities deriving from epistemologies, standardized methods, tools, and norms, are inscribed into objects and features and thus brought into material being. Binding all handling and manipulation whenever information flows and data exchange is to be triggered, they enter into the sphere of all those features and elements that constantly provide points of reference and support to everyday practices. Forming additional elements of this sphere, the Interfaces open up territories as much as they provide particular, well-defined locations where RL and the "infoscape" inertwine. Where the usability discourse is involved in the production of artifacts, relationships start earlier than most users and commentators would be aware of.

According to STS researchers such as Callon and Akrich, the elaboration of each technology should be understood as the elaboration of a scenario for an action program that involves both the pre-elaborated orders of the technical and the social. It implies a double-sided process of "confrontations between the environment inscribed into an artifact and the environment described by its displacement" (Akrich 1993). This "formative confrontation", through continuous operations of translation, leads to re-partitions of the work program and to the shaping of the various entities involved, which are ever more clearly defined to assume their competences and responsibilities. If in HCI & Usability both technical and Human "resources" are scrutinized and re-aligned, both are endowed with an essentially relational character that derives from a thorough joint construction.

In relying on the evidences of everyday life and the organization of work, today's interfaces assume the character of a well-defined medium by means of which infospace inserts in, or links up with, social situations. Suitability and viability here become crucial parameters which indicate how the technology assumes the wordly character of something successfully deployed in society. While the self-referentialities of an overly autonomous engineering are overcome, the

technology is re-oriented, or even set back, to a movement of differentiation regarding structured and structuring activities of strictly local – and we might add: historical – character. A topology of social practices can be seen being dragged into that of the machines, while machines are mapped onto them, so that the "infoscape" no longer constitutes a uniform topos where the non-human would directly, and without effort, link up with the human. Rather, we seem to witness a process of stabilization of "immutable mobiles" (Latour) which enable the durability of a specific network of heterogeneous elements and the enactment of a certain type of space (and mobility).

Accommodating and settling in data space, feeling at home in it, thus can be considered an actualization of the structured and structuring meaning that interfaces both offer and impose. The "exploring" or "discovering" user on his "data journey" enters spaces that others have configured for her so that she can orient herself, is lead in and through information spaces and is given support in performing her tasks. These grounds of a distinct and historical "selectivity structure" (Ihde 2002, 93) seem considerably different from some expectations of freely-floating users in an emerging world of ICT-practices just sometimes confronting a certain extent of external control. Rather, the technical conversion of the art of guiding users in data space brings to mind a type of governmentality that has been described as "pastoral". By leading and "soft" guiding it accomplishes the creation and sustainance of order where "hard" governance and/or discipline remain absent. It provides a perceptional and cognitive framework that directs practices to preformed paths (Foucault 1983, 1994). If today "navigating" and "interacting" takes place according to the deployed conditions of HCI, the Usability discourse provides definite strategic references for the conception of these activities. This framework for the actualization of ICT becomes visible in the multivalent concept of quality assurance. With its dual thrust of guiding both users and engineers, it situates the computer in the context of a re-regulation of the socio-technical order, of the relational "social game" (Bourdieu 1987) of which these artifacts partake of to an ever-greater extent.

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