Information technologies in services: old and new problems

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RESUMO

O desing e a introdução de informação tecnológica no campo de trabalho serão discutidos no que diz respeito ao sector de serviços. Este sector devia ser uma das principais areas ergonómicas de estudo, pois precisa cada vez mais de forças de trabalho. A primeira parte da comunicação terá como objecto uma tentativa conceptual de focalizar arelação entre cliente e performer. A tese do autor consiste no facto que esta relação devia ser o alvo da intervenção ergonómica nos serviços. Na segunda parte será descrita uma avaliação ergonómica dum projecto "call-center", realizada por expertos em interação entre humano e computador. Este projecto é particularmente relevante pois é caracterizado por um processo altamente estructurado, tendo em conta a elevada quantidade de informação de que se precisa por cada chamada. Os resultados deste estudo serão discutidos considerando os aspectos tecnológicos e de organização do projecto. Por fim, estes resultados serão proporcionados tendo conta dos antigos e dos novos problemas em relação ao design e à introdução de informação tecnológica no lugar de trabalho.

Palavras chave

Ergonomia, serviços, call-center.

ABSTRACT

Information technology design and its introduction in the workplace will be discussed with respect to the service sector. This sector should be one of the main ergonomics field of study, as it continues to employ a growing majority of the workforce. The first part of the paper is concerned with a tentative conceptual framework for the analysis of the client-performer relation. The authors' thesis is that such relation should be the focus of ergonomic intervention in services. In the second part an ergonomic evaluation of a call center project, performed by experts in human-computer interaction, will be described. This project is particularly relevant, as it is characterized by a highly structured process flow with a large amount of data to be requested over the conversation that takes place during each phone call. Results from the study will be discussed taking into consideration the technological and organisational aspects of the project. Finally, these results will be shown to account for the old and new problems concerning the design and introduction of information technology in the workplace.

Keywords

Ergonomics, services, call center.

1. INTRODUCTION

Bainbridge (1987), in a well known and very frequently cited paper, pointed out some paradoxical aspects (ironies) when discussing the ways in which automation is introduced in process industry. Such paradoxes emerge as soon as one looks at technology as something that interacts with human beings rather than existing by itself. More than twenty years later, new workplaces, especially in the service sector, appear. The design (both of the technological and organisational aspects) of such new workplaces still does not take the human component into consideration thus causing old and new problems. The service sector currently employs more workers than any other sector. Despite this, very few studies face the issue of the ergonomics of services. On one hand such a scarcity might be due to the multitude of activities that go under the label of 'services', making it hard to find common features. On the other hand the theoretical frameworks developed until now and still used in research on man at work seem inadequate to capture the complexity of tasks and relation in service activities (Falzon and Lapeyriere, 1998). As a consequence, while guidelines and studies for the design of human-centered tools have been devised for supporting the execution of different tasks, the same is not true for services. It is our thesis that the success of (new) services is less dependent on the efficiency in task execution than on the settlement of the appropriate conditions for the relation (the interaction that occurs between the client and the supplier) to be managed and maintained. In the following of the paper a first attempt in the direction of a better understanding of the nature of service will be discussed and some consequent problems concerning the way in which information technology is designed and introduced in new worksettings (i.e. a call center) will be highlighted.

2. WORK IN SERVICES: FROM PRODUCTION TO CO-PRODUCTION

In recent years two different trends can be identified with respect to the issue of services' organisation. On one hand an effort has been made to transfer to services the ideas that allowed, some years before, the renewal and the great expansion in productivity and quality for the manufacturing sector. As a consequence, services have been structured as product-oriented organisations and the effort has been focused on the rationalisation of the production process (Butera and De Michelis, 1995). On the other hand, the design of services has been driven by

the 'discovery' of the client. Along this direction tools to measure client satisfaction have been taken both as means to verify the service's efficacy and as a way of evaluating and managing the initiatives for service's improvement.

However, the two above-mentioned trends of action do not capture the main element that characterises services, namely: the shift from production to co-production (Gadrey and de Bandt, 1994). Differently from manufacturing, services imply a direct relation between the client and the performer and, what is even more relevant, the very same needs that a service should fulfill cannot be standardised. Rather, they always have to be customised, each time being defined in the conversation between the two actors. It is during such a dialogue that the service is evaluated, accepted or rejected.

3. A (BORROWED) TYPOLOGY FOR CLIENT'S BEHAVIOUR IN SERVICES

If we agree on considering the relation between the client and the performer as the focal point of work in services, it can be useful to identify a typology of the possible behaviours that can take place. Hirschman (1970) indicates three possible client's behaviours in relation to service supply: 'exit', 'loyalty' and 'voice'. It is worthwhile mentioning Pettie's comment (1995) that one more client's behaviour exists that is hard to reduce to Hirshmann's cathegories: the boycott. This behaviour implies, not only exiting from the service, but also a following 'reclaim'.

The 'exit' behaviour is a punitive sanction as it implies taking the decision to reject the service. This behaviour is only possible, and effective for service's quality improvement, when one can choose among different suppliers, it cannot be enacted inside a monopolistic context.

The 'loyalty' behaviour takes place whenever a service is chosen because of fidelity instead of convenience (that is without comparing the possible options). This behaviour seems to characterise the client-supplier relation in banking services (Bagnara, Failla and Polo, 1991), where people rarely compare cost-benefit among competitors. Rather, they stay with the same bank because of typical reasons of loyalty, such as: "it was our family's bank"; "it is near my house"; "I know the office clerk", and so on. Loyalty type of behaviours do not result in any useful impulse for improvement of the service's quality.

The 'voice' behaviour is, for our purposes, the most important of the three behaviours indicated by Hirshmann. To pursue a 'voice' behaviour, in fact, means to maintain the same service supplier while re-negotiating, interacting, participating and even conflicting with them. Such a behaviour, when adequately considered, is the one that gives the service's organisation a chance to change and regain quality. In contrast to task-oriented support systems, where the main factors affecting system's usability are referred to the system/operator interface, the critical factors for service systems' usability reside in the relational conditions that the tool allows to establish on the client/performer conversation.

Ergonomics can play an important role in specifying the conditions that can improve the expression of clients' 'voice' behaviour thus facilitating the client-performer interaction.

4. ERGONOMICS IN SERVICES

Ergonomics has played and still plays an important role in the analysis, design and quality of support systems. Falzon and Lapeyriere (1998) distinguished four different ways in which ergonomics looks at the workplace, as a function of the role that is given to the user: the absent user; the user as part of the working conditions; the user as the task's end goal, and, finally, the user as a co-participant in a cooperative task. These phases took place at different times, however, ergonomics actually integrates the four different moments that are herewith described.

In the first phase of ergonomic intervention in services, the separation between client and performer is so precise that, in the ergonomic analysis there is not any client: he is completely absent, only the 'working conditions' are taken into account. It is the 'classical' approach to worplace design that applies to services the same knowledge that applies to classical productive processes. In such a perspective there is no qualitative difference between a steel mill operator and a bank clerk. What is taken into account are factors alike noise, space, vibrations, light, tools' dimensions and weight, etc.

In the second phase the client/user begins to be taken into account, but his status is equivalent to the other elements of the operator's workplace. For instance, it is considered important that the clients' affluence to the service does not result in too long queues, which would negatively affect the operators' well being in terms of anxiety and too high workload.

In the third perspective the client is not only 'there', but he is considered as the main task's goal for the operator: user's satisfaction is the ultimate objective. Design, in this case, is not only steered by operators' needs, but also by users' characteristics and requests. To reach this goal, ergonomics put forward tools and methods to perform user modelling before the system's specification.

However, also in this third perspective, the user is still seen as a landscape element who does not actively participate to service's supply but it is the goal and the object of it.

The last perspective is the most adequate to the service sector. Only when the client (or user) is conceptualised as one of the actors that actively concur to task performance (and thus the relation between him and the operator is taken as the unit of analysis) it becomes possible to correctly recognise the co-operative nature of work in services. The knowledge to supply a service does only partially reside in the supplier's head (his competence), another relevant part resides in the client's head. Service's quality improves only when the adequate conditions for the communicative exchange are settled. That is to say, only when service is equipped with the right technology (and organisation) to support the operator in a conversation suited to elicit and combine the data from the context (client, environment) in a smooth and direct

way with process' rules and procedures can service quality improve.

The focus of the ergonomics' contribution, thus, resides in the provision of solutions for giving fast and complete answers to the client's needs. However it also resides in the definition of the conditions that facilitate the formulation of questions and the attribution of meaning to the interaction (Weick, 1995; Brown and Duguid 1991). This contribution can adopt the 'distributed cognition' approach (Norman, 1988) as a frame of reference that allows to conceptualise services as the dynamic outcome of the interaction/communication among different intelligent agents (both clients and performers), organisational settings, cognitive and physical artefacts. Consequently, the main directions for the ergonomic improvement of services' quality concern: i) the physical conditions of the interaction; ii) the knowledge that is necessary for the management of the interaction; iii) the technologies (cognitive artefacts) that can support the communication (see Bagnara and Mariani, 1998; 1999). In this context we are interested in the second and third lines of action, that is in the ergonomic study, design and evaluation of the technologies and of the organisational rules and procedures that support the communicative transactions. Cognitive ergonomics, in particular, is thought as capable to put forward tools and methods to choose, design and adapt the artefacts, e.g. cooperative technologies (Baecker, 1993; Medina-Mora *et al.*, 1992) to the specific contexts of use.

5. THE CALL CENTER

 Call centers are one of the new, fast-growing, work realities of recent years. Within Europe they actually are around 9,700 (data of this section are by *Datamonitor* and the Merchant Group) with a pace of diffusion around a 30-35% each year and about 40% of them have more than 100 operators. If this trend continues, one million individuals (that is 1.3% of the workforce) will be working in a call center by the year 2002. Call centers are highly demanding places: 72% of operators' answers in 10 second, with a total average response time of less than 25 seconds and 81% requests solved in one call. These new workplaces have a great intensity of information technologies.

Our case study concerned a call center implemented by a large insurance company for claim management. The company's main and explicit goal was to increase the quality of its service by speeding up the process of claim management and improving the level of customer care. Actually, the company was also fostered to undertake this new service by similar initiatives of other insurance companies operating in Italy. Thus, though not explicitly declared, the need to find new markets, still defending old ones, was evident.

The communication between the client and the call center was essentially and ideally divided in three phases. The call center itself was instead splitted in two physically and operationally different parts: the front office and the back office (see figure 1).

In the first phase of the interaction, the call center was designed to have an initial filter, the Interactive Voice Responder (from now on IVR), whose main roles was to identify the caller (the policy holder or the damaged party) and the type of damage (e.g. fire, theft). It is an IVR task to decide whether some information on an already reported claim can be automatically provided or if the client must speak with the operator of the front office. Otherwise the IVR can also 'decide' to quit the conversation.
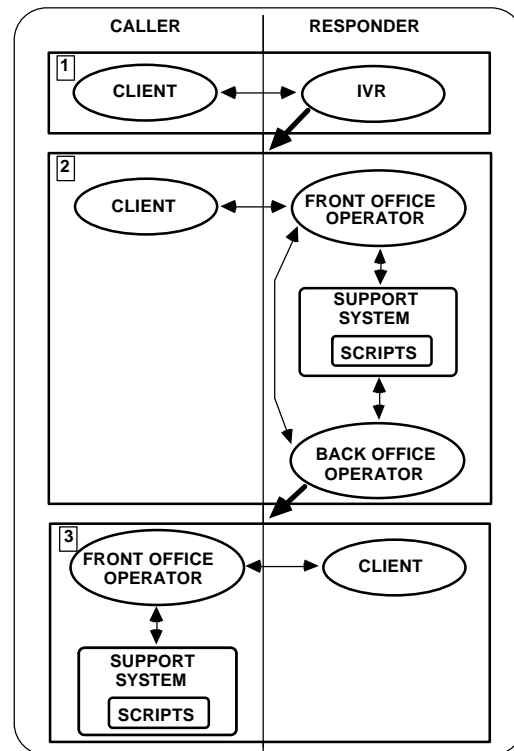

Figure 1: Representation of the agents and of the communicative elements inside the three phases related to the call center activity.

In the second phase, the client is connected with an operator to get and give information about his claim. To manage the conversation (that is to ask the right questions, input data, and give the appropriate information), operators have at their disposal a support system with an interface mainly made up of forms to be filled in and "scripts". The forms in the interface are not sequentially organised. They are just spatially disposed in three different areas of the screen based on their relevance and meaning inside the process related to the management of a claim. In a fourth area of the screen the "scripts", namely short sentences to be used as examples during the conversation with the client, are presented. Information stored in the system is provided to the back office that is in charge of the administrative management of the claim. Communication between the front and the back office can also occurr indipendently from the support system.

In a third phase, usually triggered by the back office, the operator of the front office calls the client to ask for further information or to inform him about the state of the relative claim. The support system was designed to

provide assistance to the operator in the course of this activity as well.

Before the release of the service, the company was interested in an expert ergonomic evaluation of the information system that was designed to support the call center. The evaluation was performed by three different experts which together inspected the system in four observative sessions each lasting about three hours. The first two observative sessions were performed on a paper version of the system's interface. The three evaluators inspected each form in the interface trying to find out violations of the guidelines put forward by Nielsen (1992, 1993). Since this kind of evaluation did not specifically address usability issues related to conversational purposes, the evaluators conducted two additional observative sessions of an interactive software prototype looking for specific aspects related to the conversational task. Results of the the four sessions were delivered to the company along with suggestions for fixing the drawbacks found. In the following part of the paper the results of such an evaluation will be firstly described and then discussed.

6. ON THE CLIENT'S SIDE: THE INTERACTIVE VOICE RESPONDER

The IVR was adopted as a technical solution to make an initial screening of inbound phone calls, separating claims notifications from requests of information. The conversation that takes place between a client and the IVR has two main paths. The first answering modality leads to: i) identify whether the caller is the policy holder or the damaged party and ii) determine the type of damage. The second modality gets information about a damage that has already been reported and ask the client to wait until an operator is available. In the following, some the main design faults that were identified in the expert evaluation will be described.

Subversion of client's expectations

The client is not given any motive that justifies the existence of the IVR. He is just faced with an artificial system that provides information about the name of the service and asks him to follow a set of instructions. As the system asks the client to follow a set of instructions, client's expectations are subverted: I call to get information, and, on the opposite, it is the service that asks information to me. Such a situation is a good example of the difficulty of designing a system capable of putting together customer care and process efficiency. When the first goal is out of sight the second one prevails and the 'call center' becomes a means of accelerating the process, in a way that does not take into account client's needs and expectations. In addition it can be noticed that, from a theoretical point of view, it is a well known finding that (Cialdini, 1993; Langer, 1989) the most powerful way to persuade people to do something (in our case, to remain in a conversation) is to give reasons (even casual reasons) for this. The fact that a system, rather than a human operator, answers, would be more acceptable if accompanied by an explanation, e.g.: 'the IVR is here because it speeds up the time requested to connect you with the requested service'.

Precision and sequentiality

The IVR requests are formulated using a very precise and technical wording. The client is asked to 'choose from the main menu'; 'notify the damage', etc.. In addition, the interaction requested is strictly sequential: the system asks the user to make subsequent choices, following a top-down decision tree, until a decision can be taken from the IVR's point of view.

Such a design approach goes against the characteristics of the human information processing. Human beings are good in telling stories (Bruner, 1990) and in elaborating mental models (Johnson-Laird, 1983) which have the characteristic to be fuzzy, not univocally determined, and sensitive to the context of use. They perform poorly when requested to be precise (Nickerson and Adams, 1979; Norman, 1988) and systematic (Kahneman *et al.*, 1982). Finally, reality itself (and conversation even more) is very difficult to be coded in pre-planned trees of events. For example the system does not foresee the possibility that the caller can be someone different from the policy holder or the damaged party. As a consequence, if someone else is calling to the service (e.g. the husband of the policy holder) he has no alternatives but 'exit' from the service.

Cognitive underspecification

The system accepts input in two different ways. The IVR is able to recognise user's 'yes' and 'no' and it is also sensitive to user's digits on the phone keyboard. At some point of the decision tree, clients are requested to give numbers in order to make a choice (e.g. 'choose 2 if you are the damaged, choose 3 if you are the policy holder'). However they are not told whether the number has to be communicated by voice or by keyboard input (in the designer's mind only the latter is accepted). Human beings are very good in finding (and following) patterns of regularity: if a previous input has been given in a vocal format, it is very likely to find a tendency for the following one to be given in the same format.

Either the unification of the interaction paradigm or the provision of an instruction or warning could prevent the occurrence of errors in conversation that can result in an 'exit' behaviour.

Cognitive load

When the IVR asks for a numerical modality of answer, the choice can be as many as six different alternatives. This number is very near to the upper limit of short-time memory capacity (Miller, 1956). This limit is very likely to be overcome in many cases, given that human information processing capability is lowered when: i) the respondent is under pressure or fatigued; ii) the alternative choices are not straightforwardly comprehensible (see also the next section). A warning to the user that he should paper and pencil ready (that is a kind of external memory) at the beginning of the conversation would greatlyhelp solving this design fault. Another problem with verbal instructions, because of its nature, is the redundancy of information that is mandatory for understanding (see Ong, 1982). In this respect, the IVR shows two main drawbacks: i) its dialogue was designed to avoid redundancies (that, from a technical point of view, are clearly seen as a waste of

time); ii) it does not provide the user with any clear way to listen to the same message again.

7. ON THE OPERATOR'S SIDE: SYSTEM'S INTERFACE, SCRIPTS, AND DIVISION OF WORK

The IVR does not interact with the operators (see fig. 1), whose cognitive environment is influenced by three different artifacts: system's interface, scripts, and the subdivision of functions.

System's interface

The interface is segmented into four different areas. Three areas consist of forms to be filled in with a fourth area containing the 'scripts', (see the second paragraph of this chapter). It has been proved in different worksettings that the level of usability of a system affects to a great extent its efficacy in fulfilling the purposes for which it was built. Interaction sequence and constraints were found as major usability problems with respect to support the operator in a conversation suited to elicit and combine the data from the client in a smooth and direct way with process' rules and procedures.

Interaction sequence

The forms contained in the main three areas of the interface are not sequentially ordered. On the contrary, they are grouped according to different domains such as 'general policy information'. The main drawback of such a solution is that the knowledge on the right sequence of forms has to reside in the operator's head, thus lowering the cognitive resources for conversation management.

Interaction constraints

The majority of the forms do not allow the operator to cope with the unexpected. Screenshots do not foresee any empty field in which the call center operator can freely take note of some relevant information to be transferred to the backoffice.

Scripts

Scripts were designed as linguistic guidelines to support the call center's front office operator in the management of the phone call. However, they seem to have been designed focusing on the necessity to fill in the forms that serve to the company to track the process of claim management rather than to support a conversation. This assumption is supported by two pieces of evidences: i) mix up of roles and knowledge; and ii) decontextualized but prescriptive format.

Mix up of roles and knowledge

An optimal interaction between the operator and the client foresees that the first actor should hold the rules and procedures (knowledge of the process), whilst the second one should give the 'data' (knowledge of the event) for the transaction to be successfully completed. Unfortunately, the way in which the scripts are actually written, these two different perspectives are not distinct. This result in utterances to the client that presume, on his side, background knowledge on claim evasion (e.g. "the CID convention is not applicable").

Decontextualized but prescriptive format

Scripts are not phrased as guidelines or headlines but as 'ready to use' sentences. Their format is such that the operator is stimulated to use them directly, with the result

that the conversation would take a surrealistic tone. It is completely depreciated, in this case, the well known observation that the different wordings of any conversation cannot be planned in advance, given the fact that a process of mutual knowing of the other will take place, giving to each interaction a character of unicity that makes it efficient and pleasant.

Subdivision of functions

The present design of the call center organisation (roles and procedures) does not match the vision of service as a place where complex problems are solved, customer care is the focal goal, and new ideas for improvements are collected. The main objection is that whilst the whole process of claim management is complex and interconnected in nature, the organisational design tend to fragment it in separate, different phases, each one carried out by different roles, without foreseeing the necessity for shared knowledge (see e.g. Hutchins, 1995) and responsibility. Two different evidences from the different job profiles will be herewith considered: i) the tayloristic division of work and, ii) the focus on control rather than on shared responsibility.

Taylor strikes back

The first sketch of the subdivision of functions foresees a rigid separation between 'back office' and 'front office' operators. The former have to take decision on the basis of the information collected by the latter. As Folcher (1998), in a recent study on a phone support service pointed out: "the reception of the question by the expert is constitutive of the expert's competencies, and a component of their expertise ... a work organisation which divides receiving and answering questions may not allow performing the support required".

From supervisors' control to client's satisfaction

The role of supervisors is described in terms of control and account of the job done rather than in terms of facilitation of the operators' performance. As a matter of fact, the supervisor is asked to listen to a sample of the phone calls to assess the operator's professionality, who is seen as a mere executor of given tasks. Such an attitude, once again given the complexity of the work in the call center, will seriously undermine the cooperation climate that is a critical factor for the success of problem solving activities. A better choice that has been suggested is to assess the service efficiency through e.g. 'customer satisfaction' enquiries.

8. CONCLUSIVE DISCUSSION

We tried to highlight some old and new problems of information technologies in services. Our observations were made on the basis of some theoretical considerations about services and of an expert evaluation of an information and organisational system that will support a 'call center'. Evidence from user testing and goal of the system in use have still to be collected and this will be the objective of our further investigations. A first, and probably more relevant problem becomes more evident when observed in services and it concerns the opposition 'customer care' vs. 'process efficiency'. The technological systems, traditionally have been thought and designed to spare time. However, speed in service

delivery is just one aspect of customer care. The IVR is a good example of intentional optimal speed of performance and very low attention to customer's needs. The second problem concerns the use of a constrained system when 'openess' would be required. The system's interface is greatly constrained, as no spaces are foreseen to let the operators take notes on some unexpected problems. Under such conditions, the chance of exploting the call center as a source of information for service's improvement is lost.

The third problem is the use of a technical and 'exact' wording, together with a rigid sequentiality of the process of claim management (at least for the IVR). This do not fit in with the nature of human dialogue (conversation cannot be pre-planned in advance).

Finally, the last problem concerns the high fragmentation of competencies. This contrast with the nature of the call centers activity itself which is characterized by a highly structured process flow with a large amount of data to be requested over the conversation that take place during each phone call. For this flow to be appropriately managed, places and tools to share information should be available to all the call center operators, that should constitute a 'community of practice' (Lave and Wenger, 1991) rather than an assembly line.

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