SHELL model analysis of the *info.csu* Call Centre.

Abstract

A Call Centre environment is analyzed using the SHELL model of component interaction Edwards 1988, Hawkins 1993) and Wickens' (1984) model of information processing as an example of the applicability of these models to any environment.

Introduction

For the purposes of this assignment I have chosen my former workplace – *info.csu*, an integrated contact centre within Charles Sturt University tasked with providing information to prospective students via telephone and email. The two models – SHELL and the expanded model of information processing developed by Wickens and Flach (1988) are discussed individually and examples from the contact centre are used to illustrate them.

SHELL Analysis of workplace.

The SHELL model (Hawkins, 1993) is a theoretical framework designed to aid in the analysis of workplace interactions between people (defined under the model as Liveware) and all other aspects of the working environment (composed of Software, Hardware, Environment and other Liveware).

At *info.csu* the Hardware included Telephones (with headsets), computers, display board (showing number and length of time for waiting calls), desks and chairs (Kroemer & Grandjean, 1997). The Software included the Contact Management Software used on the computer to record details of customer contact and to trigger follow-up actions (such as mailing brochures and application forms). The phone system also utilized software to perform more complex tasks (such as call monitoring, transfers etc). Under the SHELL model, other software included government legislation, University and departmental policy, and informal guidelines in use in the centre. The Environment included factors such as the temperature in the centre, light levels, and noise. Finally Liveware included the staff member, supervisors, managers and of course the customer on the other end of the phone or email.

The SHELL model (Edwards 1988, Hawkins 1993) seeks to analyze the interaction between these discrete components. Hardware-Liveware interaction includes the use of the telephone to facilitate communication between the staff member and customer, and the ergonomics of the workplace and interaction between desk, chair, keyboard, screen and staff member.

Liveware-Software interactions include utilization of the computer software to capture information received from the customer of chosen by the staff member (for instance course of interest would be populated based on an assessment of the customers needs by the staff member while customer name would be taken directly from the customer and staff ID would be provided directly by the staff member), staff following operational procedures and regulatory requirements (for instance being conscious of the limitations imposed on information provision by the Privacy Act, 1988 (Australian Federal Government, 1988)).

Liveware-Environment interactions include distractions from noise, interactions between temperature and performance, and reduction in productivity caused by light glare on screens

reducing the speed at which the staff member can absorb information provided onscreen (BASI, 1995).

Finally and perhaps most importantly in this environment there are the Liveware-Liveware interaction including between the staff member and the caller, between the agents on the phones, between agent and supervisors and amongst the supervisors.

Main Features of Information Processing in this environment.

According to Wickens' model (1984), information processing can be broken into four discrete areas, Perception, Memory, Decision Making, and Selection of Action. Each of these areas can be further broken down into a variety of components and all of these interact to produce information processing and interaction in human beings.

Perception

The expanded Wickens' model (Wickens & Flach, 1988) of information processing begins with Perception – the ability of a person to recognize necessary information on which decisions will be made. Perception begins with signal detection – in the case of *info.csu* possible signals include fairly recognizable ones such as the telephone ringing to less obvious ones such as the queue information displayed on the wall board, key words or concepts expressed by the customer within the context of a telephone conversation, and email subject lines.

The second component of perception Wickens' (Wickens & Flach, 1988) details is selection of relevant signals, a simple example would be recognizing the difference between your telephone ringing and that of the person sitting next to you. The former is relevant the later is not in most cases (Gerow, 1997).

Wickens' (Wickens & Flach, 1988) discusses linguistic factors which are particularly relevant in the context of the contact centre described. Agents frequently have difficulty in understanding callers from non-English speaking backgrounds due to heavy accents, poor grammar, and unusual choice of phrasing. These linguistic factors require that the agent devote a greater amount of attention to comprehension which results in a slower call handling time as secondary tasks (data entry, looking up relevant information) are sacrificed in order to provide more attention to the spoken word (Gladstones et al, 1989). Similarly, logical reversals and order reversals can also delay response times either because of language difficulties or when a caller offers a large amount of information in an order other than that used in the center – for instance providing name and address details in an order that is different from the order used in the contact tracking software will require the agent to either jump around the screen to enter it or to hold a large amount of the information in there head and to translate it into the 'correct' order prior to entry.

Absence of cues can also occur in this context which can hinder perception. An agent providing information over the phone will hesitate if there is no verbal confirmation from the customer from time to time that they hear (and hopefully understand) the information being provided.

The final part of Wickens' (Wickens & Flach, 1988) description of perception is the creation of a mental model. The mental model is built up over time by the agent and provides a framework that informs perception. This model includes relative priority and urgency of input sources (the

phone ringing requires an immediate cessation of most tasks and quick action while verbal cues from a customer may be built up until a satisfactory picture has formed) and is tied into memory.

Memory

Wickens' model (Wickens & Flach, 1988) incorporates two types of memory – working and long term. Working memory is the ability to hold newly acquired information and act upon it (Baddeley & Hitch, 1974). Working memory is used when taking information from a customer and entering it into the contact management system. Working memory is also used to build up a series of key words and concepts during a call that indicate which degree program is most suitable to recommend to the caller. In contrast, log term memory is built up over time and includes such areas as operation of the phone and computer system, knowledge of the layout of campuses, and information regarding legal requirements (such as the Privacy Act, 1988).

On occasion there is conflict between these two types of memory (Loftus, 1979). For instance, degree programs change frequently and staff are required to access a computerized knowledgebank of course information in order to answer customer inquiries. Some programs are very popular and so through simple repetition staff come to remember most of the information on the program. Conflict arises when the Information in the knowledgebank is altered due to course changes. This is essentially why the need to refer to the knowledgebank is stressed.

Decision Making

Perceived information and memory together provide the basis on which decisions are made. In Wickens' (Wickens & Flach, 1988) model there are four main components to decision making – Situation Assessment, Cue Seeking, Hypothesis Formation and Testing, and Decision Formulation.

In the context of *info.csu* situation assessment includes making a judgment as to the suitability of a caller to a requested program which includes an estimation of prior academic suitability, interest in the field, and likely dedication. Other situation assessment items include assessing the business of the centre when determining how much time to spend on a call or if it is an appropriate time to take a break.

Cue seeking (Kaempf & Klein, 1994) within *info.csu* takes the form of listening for key words, phrases or concepts expressed by the caller that can help to determine appropriate courses. Another important cues is the type of response given providing an indication of the level of the customers comprehension of the information provided or question asked.

Hypothesis formation and testing in this context would be determining an appropriate course option and asking following questions designed to either confirm or invalidate the appropriateness of the course selected.

Finally decision formulation results when a hypothesis has been successfully tested (Orasanu, 1993) - in this example when the choice of course has been confirmed as suitable. Decisions are then made regarding what appropriate action is then required such as initiating a mail out of material, providing key information over the telephone, or referring the caller to another area with specialized services.

Selection of Action

Once a decision has been made it is necessary to determine what action is to be taken. Wickens' (Wickens & Flach, 1988) breaks action into seven interdependent areas – Information Transmission, Preparation, Speed-Accuracy trade off, and Stimulus-Response Compatibility, Dual-Task Performance, and Task Structure.

Information transmission (Wickens & Flach, 1988) varies depending on the volume of competing stimuli. In this case the perceived urgency of response to the phone ringing is higher when there are many phones ringing in closes succession to when there are fewer. Similarly preparation for common tasks aids response – a ringing phone elicits a very quick response while the front desk bell ringing which requires an agent to attend (and happens only occasionally) will often have a slower response time simply because the infrequency of the task results in low levels of preparation.

The Speed-Accuracy trade-off is particularly important in this environment. During peak periods when there are high levels of customer calls, decisions to send information are reached sooner which results in less thorough analysis in caller needs than at other times and increases the likelihood that the caller will receive information on a non-optimal program.

Stimulus-Response compatibility as described by Wickens and Flach (1988) is not as prevalent in this environment. The use of software interfaces results in variable relations between certain types of stimulus and response. A conscious effort was made in designing the interface screens to allow agent customization so that each agent could adjust screen and information display to suit them (and therefore to align stimuli and response more closely).

Stimulus sequencing, the spacing and repetition of stimuli over time, can be easily shown in *info.csu* via the telephone ring. An experiment was conducted where the phones would chime only once instead of a traditional ring in order to reduce the noise level in the centre. Response times to answer calls increased and more calls were missed under this system and so the centre returned to the traditional multi-ring setting on the telephone handsets. It seems that the single chime was too easy to miss amidst the other activity of the centre.

Dual-task performance, or doing more than one thing at a time, is common in the *info.csu* environment. Agents enter information into the contact management system while talking to the customer and will also navigate the knowledgebase to find course information that may be relevant while talking to the customer. As these tasks are directly related there is a fairly high level of performance in both. By contrast, the ability of agents to handle email and telephone calls at the same time can result in the agent dealing with two unrelated inquiries at once. In these circumstances it has been found that performance degrades for all but the most routine inquiries (in this case the complexity of the email inquiry seems to largely determine degradation – very routine email that can be answered with a form response causes little problem in the quality of the telephone call while complex emails are unable to be appropriately handled at the same time as a call is handled).

Task difficulty as described by Wickens and Flash (1988) is the level of attention required to perform a task – in the example of *info.csu* certain highly practiced tasks such as completing a mailing request or answering a simple email with a template response are rapid and are perceived as having low task difficulty while analyzing the needs of a hesitant caller with little prior University contact is considerably more difficult resulting in slower responses.

Conclusion

As has been seen in this brief analysis of the *info.csu* Contact Centre utilizing the SHELL and Wickens models all work environments contain multiple components which interact at various stages with human information processing through perception, memory, decision making, and selection of action, to create a working system.

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