THE INTERFACE SPECIALIST: CONTRASTING OPINIONS ON ROLE CONTENT

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Abstract: Through involvement in on-going development projects, we investigated issues brought about by having interface specialists rather than generally trained system development staff designing and developing interfaces. This article reports on some of the issues raised, discusses the activities associated with this project and points out differences in the perceptions of the tasks seen as relevant to this role by a human factors professional and by systems development staff.

PROJECT ORIENTATION

Although many individuals and companies have become interested and involved in developing interfaces in the past ten years, there is no well-accepted or tested set of cookbook methods that consistently result in easy-to-use online systems. Human factors, which is a discipline derived from applied experimental psychology and industrial engineering, has developed methods designed to improve the fit between users, tools, and work environments. Two development environments could, in theory, incorporate human factors methods and principles into the interface development process. The first would require developing and using a training program for all staff members involved in interface design so that they could effectively use appropriate methods and principles. An alternative is creating "interface specialists"--individuals whose work would focus on interface-related tasks and who could be assigned to project teams to coordinate interface-related tasks.

Each alternative has advantages and disadvantages. The broad-based training approach would provide general expertise within a company, but could be time consuming and costly if the training needed was extensive or complex. Because interface development is only a part of overall application development, individuals would tend to work at interface related tasks only part of the time. As a result, a broad-based program would have to consider the costs of maintaining interface-related skills once acquired.

The interface specialist alternative has the advantage of requiring training for only a small group of staff members, thereby providing greater depth at a lesser cost. Because this group would focus its activities on interface development, skill maintenance would not be a major problem. The disadvantages associated with this approach are primarily organizational. Within a project, separating the work of interface design and development from the work of designing and developing the application could have social and political consequences. It requires good communication between interface and application developers and might suggest some organizational changes in the project structure. If the specialists do work once left to the project leader or project staff, specialists might be seen as threatening to those staff members.

CONCEPTUAL TASK ANALYSIS

The system development methodology used at Chemical Abstracts Service is called the System Life Cycle approach, a

common variation on the waterfall approach to development. To minimize the required change needed to incorporate human factors principles and methods into the CAS development environment, an initial analysis was made of activities associated with the current life cycle development method to identify suitable activities.

A major task during the System Initiation phase is User Requirements Definition. This task involves interacting with users to understand the functions needed for the system that is to be developed and to develop scenarios describing the typical user and use environment. This could be a fruitful area for intervention because behavioral science data collection methods are designed to elicit these kinds of data.

In the System Design and Development phase, many activities could potentially benefit from human factors input. Early in this phase, project leaders must develop a sufficiently detailed view of the proposed system so that technical design and functionality reviews are possible. To supplement the general user requirements identified in the previous stage, the existing and proposed workflows must be documented and the impact of such changes on staff assessed. Training and experience in task and job analysis would be beneficial at this stage. If the project leader wishes to use prototyping as a method for carrying out an in-depth functionality review, interface specialists could work with project staff and users in designing the prototype interface. The specialists' knowledge of human information processing and cognition and different dialogue types would permit them to give advice about possible interaction types and dialogue designs. Their knowledge of perception, memory, and human performance would provide input to the more effective design of menus, forms, and command lines. Specialists may also be able to assist project staff in designing testing conditions for later user evaluation because of their experience with collecting behavioral data. As development proceeds, other opportunities arise. Knowledge about basic human information processing and of alternative interface techniques allows the interface specialist to aid in making tradeoffs among various implementation alternatives and in developing specific interaction guidelines which can serve as reference works for project staff. During this stage, it is desirable that issues concerning the forms of training and general user assistance be decided. The interface specialist's knowledge of users combined with their knowledge of basic instructional needs for the type of dialogue chosen would make this individual a useful team member in this area. Getting input from users to aid in evaluating early working versions of the system (sometimes referred to as prototypes) and working with system developers to understand the impact of such user input could be functions directed by an interface specialist.

During the System Implementation phase, formal acceptance of the system by the user group must be acquired. This should include collecting objective data so that system performance, user acceptance and user satisfaction be accurately measured. These tests, designed during Preliminary Design, need to be systematically carried out using techniques associated with collecting and analyzing behavioral data.

DATA GATHERING AND RESULTS

The data on the interface specialist role are drawn come from experiences in the project described here and from approximately five years of working with System Development staff on interface-related projects. Experiences outside the project involved both large and small development projects that provided tools intended for internal use.

Much of the in-depth project data was gained from involvement with a project to develop a budget system to be used by management to prepare semi-annual budgets and, eventually, to permit easy access to budget data for this class of users. Other projects that provided significant input to this analysis involved the development of a sophisticated chemical structure input system for an Editorial Operations production system and the development of a structure drawing subsystem for a PC-based user-friendly front end for online searching.

A questionnaire was designed as a data-gathering instrument on the topic of interface design and development, on training and on the role(s) of an interface specialist. A questionnaire was chosen rather than staff interviews because the person providing the training and filling the role is the same person who would have had to conduct the interviews, which might have more greatly biased the results. The questionnaire was sent to eleven CAS staff members who had either been involved with this project or who had been known to be involved in projects with significant interfaces and had shown interest in interface development. Nine of the eleven responded to the request for data.

Respondents were involved for the most part with large-scale development projects. All of the repondents had participated in one or more of the interface related activities in the questionnaire. Almost all had been involved in issues involved with user requirements definition and with screen/form/ command line and interaction design. Most felt that they had been moderately successful in carrying out interface-related tasks. It is interesting that two of the three individuals who rated their performance as highly successful were those who worked most intensively with this project.

A number of different training methods were used: audio-visual courses, external seminars and courses, directed readings, and "on-the-job" training with an experienced interface specialist (apprenticeship). All of the respondents had had some form of training in interface-related activities, the average number of different training forms experiences being four. Respondents rated apprenticeship as the most effective form of training overall. Other training forms were somewhat to moderately effective for screen and interaction design only.

These findings are consistent with the impressions of the project leader.

The final set of issues in the questionnaire specifically concerned interface specialist tasks. Respondents were asked which of five roles (Project Leader--PL, Project Staff--PS, Interface Specialist--IS, Users--U, or Other--O) should be involved in the various tasks associated with underline interface development. Respondents were allowed to assign multiple roles to a task. They assigned, on the average, 2.6 roles per task. The distribution of role assignments is shown in Table 1.

Table 1. Number of responses assigning a given role to a given interface development task (N=9).

	PL	PS	IS	U	O
User Requirements Gathering	8	3	3	7	1
Screen, Command Line, Form Design	3	7	8	5	2
Interaction Design	5	7	9	5	1
Interface Evaluation & Testing	1	7	7	8	1
Interface Guideline Development	4	4	9	3	1
Specific Interface Problem Resolution	5	9	7	7	0
Interface Documentation	3	8	5	3	0
User Documentation & Training	3	5	5	4	2

This reveals that almost all the respondents assign the Interface Specialist to tasks associated with interface definition and user testing. Only one third saw the Interface Specialist role as part of user requirements definition.

DISCUSSION

Three classes of data collected in the course of the entire project (of which the interface specialist work was only a part) supported the conclusion that there is a need for a specialized interface specialist role.

The first class is concerned with methods. There is an ever-growing set of methods available to help the interface designer and developer. The sheer amount of information available suggests that most organizations have only begun to skim the surface of the tools available to assist us in interface-related efforts. Experience with methods like prototyping, too, suggest that there is much to learn if such methods are to be applied effectively.

The second class of data is derived from explorations of user interface development tools. There are many tools available to assist with user interface design and development. However, these tools are often complex and demand a significant learning time if they are to be used for anything other than the simplest applications. This demonstrates a need for wide-ranging knowledge and experience.

The third class of data is derived from the experience described above. The need for extended training to provide assistance with interface considerations beyond simple screen design supports the conclusion that a dedicated function is needed. Both task experience and data from the questionnaire suggest that there are a number of tasks within the development cycle for which current SD staff would like to have assistance from an interface specialist. This suggests that our user interface development effort would benefit from extended participation by interface specialists.

Differences of opinion do exist about what such an individual should do. There is general agreement that the interface specialist should be involved in designing user interfaces (screens, interaction flow) and in evaluating user acceptance. A major area that would benefit from the skills that an interface specialist brings is user requirements gathering. This is very important because unidentified needs are difficult to meet when discovered late in the development process. However, only 33% of the involved developers saw the need for the interface specialist in this phase of the development cycle. This perception should be the cause for concern: it is in requirements gathering and evaluation that a sophisticated use of behavioral science methods could be most beneficial. These skills are often not part of a conventional computer science curriculum. Without these skills, important data about user requirements may well be overlooked and data that could assist design not gathered. The result is likely to be systems that do not provide substantial user support and thus contribute to product failure.

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