Method to build good usability: Task analysis and user interface design using operation flowcharts

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1. Current Problems

1.1 Introduction

The method of user interface design introduced here is a design technique actively utilizing operation flowcharts. This technique attempts to determine usability logically and visually by describing all the elements forming usability on operation flowcharts. By taking examples from 15 development project cases performed to date, the concept of flowcharts, the methods of describing them and the effects of introduction of the technique will be reported.

1.2 Current problems associated with examination of usability

Problem 1: Naturally, designing a user interface is to consider a design from the standpoint of end users by thoroughly understanding the operation requirements of the customer. In examining user-centered usability, it is desirable that designers should speculate what users may consider or desire as much as possible, but there are no methods established to date in which designers can experience users' positions, which is one of the factors that makes reflection of users' desire for usability difficult.

Problem 2: To solve more fundamental problems of usability or examine more complicated usability in detail, the conventional method for description relying on screen transition diagrams and flowcharts is still insufficient. This is because technical ready-made ideas and limitations often penetrate into prototype screen images and flowcharts produced in the early stage of development.

2. Application To User Interface Design

2.1 Various operation flowcharts

We have been drawing unique flowcharts for the following 15 systems.

(1992) • Semiconductor production apparatus, • ATM control system

(1993) • High-quality car audio system

(1994) • TV conference system, • Airline ticket reservation system

(1995) • Network management system, • Semiconductor production control system

(1996) • Production data generation system, • Information collection system

(1997) • 24-hour unattended store, • Mobile information terminal, • POS system

(1998) • Examination sample transportation system, • Medical diagnostic system

(1999) • Digital still camera

3. Missions Of Operation Flowcharts

3.1 Types of operation flowcharts

Operation flowcharts can be categorized by the four missions {(1) grasp of the overall system, (2) standards for evaluating usability, (3) idea source for screen configuration, and (4) verification of consistency in operation rules} and the three types (A: Screen transition diagram, B: Operation flowchart and C: Thought flowchart). In one development, flowcharts are used to judge screen configurations, while they are utilized as evaluation standards of usability in another development. Although roles played by flowcharts may vary from one development to another, an overall flowchart for the purpose of grasping the outlines of the entire operation has been able to be drawn for any development project.

3.2 Visualization of usability

Usability and its user friendliness are invisible. Therefore, considering that it is an important step to have the invisible usability visualized as much as possible, I have tried out several visualization methods. First of all, I tried to describe the entire current operation as finely as possible. This is different from assembling story boards by utilizing prepared screen images beforehand, instead, various operation elements including phenomena took place and users' thought are to be drawn along the time axis in this process. (Figure 1) To perform this task, it is necessary to ask users very closely and put down every information obtained from observation of users in their routine activities along the time axis. A chart obtained in the first instance is some unorganized scattering of tasks jotted on a sheet. What is shown

on the sheet is just a scribbled description which is never called an operation flow nor classification of tasks. But this messy description itself is what truly represents the users' actual operation.
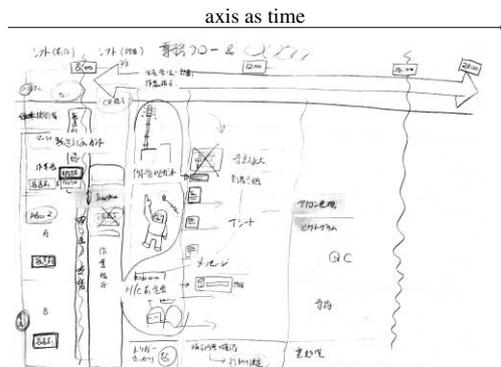

axis as time

Figure 1: To describe current operation methods in detail

3.3 To understand users' operation

It may not be too much to say that understanding of users' operation through observation of their routine activities is the most important process in designing a user interface. Actual user operations are often affected by manners of operation or customary practices, and therefore, it is important to understand what judgment criteria users have in conducting their routine or emergency operations. However, most of the system engineers are not aware of the importance of understanding users' operation.

3.4 To draw flowcharts

DDetailed drawing rules are now under analysis. Only the concept of rules are discussed here.The rule is to establish a firm time axis and to draw the importance and frequency of operations in bold lines.(describe operation procedures along the time axis faithfully) Figure 2 is an operation flowchart of a 24-hour unattended store drawn by using the rules. As for this flowchart, following two flowcharts were united. One is "operation flowcharts" to understand the entire flow of work and the other is "thought flowcharts" to understand customers' thought. And the purchasing operation block (background is gray) in this flowchart is drawn as a separate flowchart. This block is accompanied by detailed flowcharts prepared on separate sheets.
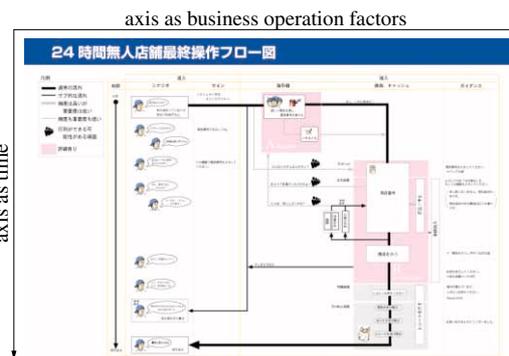

axis as business operation factors
axis as time

Figure 2: 24-hour unattended store operation flowcharts

3.5 To judge logically and visually

Operation flowcharts which are easier to understand visually can be drawn when an operation system is organized logically. It is also understood from a number of experiments that an operation flowchart is much easier to understand visually, when it is classified precisely with one of the axis as time (sequence of operation opportunity) and the other as business operation factors unique to the system.Furthermore, it is possible to judge effectiveness of operation procedures, arrangement of displayed information and arrangement of buttons, when a simple operation flowchart is drawn according to fixed drawing rules. Fixed drawing rules refer to the drawing of flowcharts that distinguish the importance and frequency of operations based on business and operational information, while simple drawing refers to the work to simplify lines drawn on a flowchart.

4. Practice By Engineers

4.1 To measure how easily this technique can be introduced

There was a case in which this technique was utilized by a team consisting of only a company's designing engineers which produced and sold a exclusive-use POS system for gas stations. This company had quite a high level of interests in user interface design, but never had participation of a user interface designer into development due to various reasons inhibiting such arrangements. Therefore, this technique was introduced to this company and its development team, securing the work hours they can afford for added tasks, utilized the technique for clarification of specifications by drawing operation flowcharts and active discussions on screen configurations.

4.2 GUI study for the dedicated POS system

Situations: Prior to the commencement of consultation with us, they were in a transition phase from using there own hardware and OS to the Windows NT environment and their plan to convert CUI base screen displays to GUI was in progress. However, as they did not have judgment criteria for GUI, their plan was stopped after
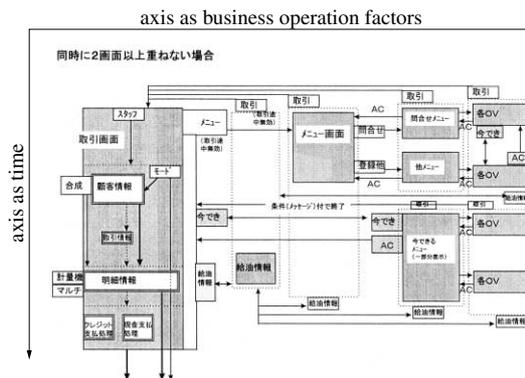

Figure 3: Dedicated POS system operation flowchart

completion of designing of the primary study screen configurations in the paper model stage of the fundamental specification examination phase, because various opinions were raised by directors, the project leader and project team members. After consulting, the company's engineers decided to introduce two items out of the four missions mentioned earlier, to the GUI, namely (1) grasp of the overall system and (2) standards for evaluating usability, and their development work ceased in mid-stage was resumed in consequence.(Figure 3)

4.3 Engineers' impressions of introduction of the technique

Engineers in general who are engaged in designing of a user interface have very strong interests in usability. However, what they have learned so far in their experience is mostly centered on programming techniques for accurate performance of functions, in other words they have never had chances to learn user-centered methods. What they recognized and appreciated among things they experienced in the consultation is (1) to define relationship between primary and secondary things, (2) to have an overview of the operation and (3) the fact that it can be done by themselves.

5. Future Potential

Drawing of operation flowcharts is an effective tool to clarify required or fundamental specifications. They also give various labor- and cost-saving effects such as reduction of design work hours and lowering a program modification rate with respect to usability. Of course, the largest advantage is that they provide a means to explain the effects of a user interface concisely to designing engineers, which leads to successful development of commercial products with good usability.To improve usability, it is desirable that a user interface designer participates in a project from the stage to examine required and fundamental specifications so that he/she can utilize his/her logical thinking methods. The current method to draw flowcharts uses quite a primitive drawing method, because there is no specialized tool available. I am trying to develop a specialized tool for this technique or an add-in tool to an existing application software.

References

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