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MEGATEXT makes Nokia color TVs more user-friendly

The remote control is an important interface between user and television set, but often it is not given sufficient attention. When developing a new series of high-end TV sets a few years ago, the Finnish company Nokia Consumer Electronics specifically aimed to improve the remote control system. Its functions should not only be easy to use, self-explanatory and match user practices in different countries, but also be fun and encourage exploration. Using the MEGATEXT IC, Nokia's designers were able to meet all these software requirements and implement sophisticated hardware functions.

Until recently, design and use of the remote control were not top priorities for prospective purchasers of television sets. But as the remote controls of similarly priced TV sets on the market were largely indistinguishable in performance – and in view of the frequency with which the remote control is used – Nokia decided that a truly ergonomic interface would not only benefit viewers, but also provide a distinct competitive advantage. The company therefore invested considerably in developing an easy-to-use remote control and on-screen interface of attractive and functional design.

In the summer of 1991, Nokia commissioned IDEO Product Development to design a user-friendly interface for its Feature Stereo Television - a high-end product with wide-ranging functions plus excellent sound and picture quality. IDEO is a design consultancy with unique expertise in human factors, user interfaces and on-screen graphics, not only for consumer electronics, but also for mechanical and electrical engineering applications. Its design philosophy is that technology should not drive the product, but that user-centered design must drive the technology to arrive at the optimum solution. IDEO's user observation and iterative user testing techniques ensure that the design process focuses on the human user throughout product development.

Designing the ideal TV interface

Before user observation trials started, IDEO and Nokia defined the basic requirements. The new TV interface was to

- be engaging and fun,
- not be intimidating
- encourage exploration
- use words, not symbols, and
- be consistent and self-explanatory in layout, operation and feedback.

User observation

IDEO representatives visited the homes of 20–25 users living in four different European countries and observed them using their TV sets and other entertainment electronics equipment. They wanted to understand how TV-related products are used, and how viewers understand and rate various functions (**Fig. 1**). IDEO also visited dealers in three different countries to listen to the needs, complaints and suggestions of sales people, because this important user group's familiarity with, and liking for, a product can influence its sales performance.

User scenario development

With these findings, IDEO developed scenarios of users handling their TVs, from unpacking and setting up to everyday viewing. Instead of merely reproducing the functions available, the scenarios were developed from issues highlighted in the observations to focus design work on real situations and needs. Four scenarios, each with its own interface concept, were produced and developed into simple paper simulations or interface "walk-throughs" for user testing (**Fig. 2**).

User testing with paper and computer prototypes

The paper prototypes illustrated the logic of each of the four different concepts applied to simple tasks such as selecting a channel, adjusting picture quality and so on. Users were asked which key they would press to obtain the desired result. The accuracy of their performance with each concept indicated the strengths and weaknesses of its navigation, control and general appearance. One concept out-performed the others for convenience and user appeal. This was refined and simulated on an Apple Macintosh with an animation software package. For realistic simulation, the remote control was replicated on a touch-screen monitor mounted with the screen facing upward. A second monitor displayed canned TV images and the interface. Users were again asked to perform a series of tasks, this time by touching appropriate key surfaces on the touchscreen monitor (Fig. 3), while the second monitor reacted as a normal TV screen would.

The design was tested on a total of 40 users in the UK, France and Germany in two iterations. Analysis of the results revealed how the on-screen appearance and behavior of the design could be refined for optimum user comprehension. The finalized designs were specified for implementation by Nokia in the end product.

Parallel technical development

During conceptual development of the user interface, Nokia evaluated the Siemens MEGATEXT[®] IC, and found that this combined teletext decoder and graphics processor met all requirements for the new interface and control system. Major factors in favor of MEG-ATEXT were its extremely flexible combination of multiple definable colors and a programmable character set (PCS) as well as the ability to drive animations, even during control procedures.

Several design requirements for the user interface had a direct impact on the IC functions used. Ruling out symbols, for example, meant that a fair amount of MEGATEXT's memory had to be assigned to supporting textual titling and prompts in at least ten languages. What's more, PCS characters and colors are in inverse proportion: the more colors used, the fewer characters are available. So designers opted for increased PCS characters and reduced colors to obtain an interface capable of supporting the complex functionality of the high-end TV. Colors are restricted to color coding of controls, while the background to the functions shown on the monitor is kept neutral in color (Figs. 4 to 6) for better contrast with the TV picture being received.

Fewer features make more sense

Increased graphics and animation capabilities are not necessarily prime ingredients of ergonomic interface design. Some of the world's most successful interfaces have been built on monochrome, character-driven platforms. The value is added when the combined effects of color and animation help convey the nature and method of controlling the system. This can be achieved with selective but consistent application of MEGATEXT's functions. Indeed, using the full arsenal of features would only detract from the simplicity and user-friendliness of the interface.

The final concept

The successful design concept has been implemented as an on-screen control panel adaptable in size to requirements and displaying plain text in the language selected by the user. It provides a physical look and



feel, plus a visual connection so that the user can quickly identify the "soft" keys on screen with the "hard" ones active on the remote control in a given situation.

Feedback – the product's reaction to the user's action – is essential to ergonomic

Market response and future prospects

The new user interface has been very favorably reviewed by the European trade press, e.g. by the Finnish magazines *HIFI & elektronik* (August 1994) and *HIFI-lehti* (October 1994 and January 1995), and also acclaimed by Nokia's retailing community. It marks the first step in a strategy to put the user first in product development by Nokia Consumer Electronics.



Fig. 1 User observation in the home revealed how viewers understand and rate various functions

- Fig. 2 Developing the interface concept
- Fig. 3 The remote control unit was replicated on a touch-screen monitor



Figs. 4 to 6 Self-explanatory menus in plain language make it easy to select a channel or adjust the sound or picture with the remote control of a Nokia high-end TV

interface design. Generally speaking, there should always be a reaction, whether audible, visual or physical, to acknowledge the user's command, link events in the control sequence and reinforce comprehension of the control system. Feedback from the Feature Stereo Television keeps viewers aware of the status of the controls at all times.

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