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Mike Stott trained as an industrial designer during Bruce Archer's research period at the Royal College of Art, London. He moved to Sweden in 1970 to work on human factors research in hospital systems and became a partner in the design consultancy Ergonomi Design in Stockholm, where he worked on interface design and participatory design methods in the graphics industry. After 25 years of experience as a designer he became program leader and project tutor for the Interaction Design program at Umeå University's Institute of Design in 1996. He also teaches and lectures at other Scandinavian design schools.

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The Institute of Design was founded in 1989 and is part of **Umeå University**, which has a full-time enrollment of 24,000 students. The university is one of the largest in the north of Sweden and is situated about 600 km (about 373 mi) north of Stockholm and 300 km (about 186 mi) south of the Arctic Circle.

The Institute of Design offers four educational programs. Currently about 90 students from representing more than 15 different nationalities are enrolled. One bachelor of arts degree program is offered in industrial design and is open to Swedish-speaking students only. Three two-year master's programs—in transportation design, advanced product design, and interaction design—were started in 1996 and are open to international students. The interaction design program accepts between eight and 10 students each year.

Philosophy of Design Education

Our interaction design philosophy has emerged from the need for industrial designers to redirect their professional activities as a result of the impact of information technology. Industrial design education and practice traditionally focuses on the qualities of the three-dimensional object. The emphasis has been on object-oriented design intent on creating improved versions of existing products. Information technology demands a shift of emphasis from the traditional idea of "product-as-object" toward the notion of "product-as-event," whereby dynamic and behavioral qualities of products, services and environments are becoming increasingly important. This shift of focus demands additional elements in the education of industrial designers as well as radical changes in the structure and content of courses.

Our interaction design program explores the need to incorporate software and hardware into pleasurable, useful and practical products, services, and environments. We see graphical user interface design as an important part of the potential activities of an interaction designer, but this should not restrict students from exploring other forms of behavior and interaction. Much of current digital technology can be described as "solutions looking for problems," shifting creators' needs toward a closer understanding of people's needs as well as the ability to generate new product concepts and applications. A major challenge for interaction design students is not just to understand the convergence that is taking place between communications, data technologies, and entertainment, but to be able to visualize the consequences in the form of new products and services and to firmly place them in their context of use. Scandinavia has a long tradition of user-centered research focusing on the relationship between people and technical systems. Actively involving users in design projects is a central feature of the interaction design program. Emphasis is placed on user involvement in the design process and iterative prototype evaluation.

Design education in Scandinavia is generally carried out within art schools. However, the Institute of Design is part of a traditional university and more closely aligned with other interdisciplinary programs rather than classic art school education. We cooperate with university departments including programs in informatics, cognitive science, computing science, and applied physics and electronics.

All project work is carried out in collaboration with industrial partners or research institutions, including major Scandinavian companies such as Ericsson, Nokia, Telia

Alistair Regan trained as an industrial designer in Sheffield, England. He moved to Australia in 1979, where he worked for three years in the design of new public telephony before joining with two partners in the trade display and exhibition company Profile Exhibitions Pty, in Sydney, Australia.

In over 20 years, Alistair has gained much experience in the design and production of interactive displays and exhibitions. He also spent several years in sheep husbandry, running a large sheep property in New South Wales, Australia. In 1999 Alistair moved to Umeå, Sweden, to pursue a master's program in interaction design. He now coordinates the work of the Interaction Design Lab at the Institute of Design, Umeå University.

Daniel Fallman holds a master of arts in informatics and is pursuing a doctorate in the subject at Umeå University, sponsored in part by the Interaction Design Lab. His research interests transcend traditional disciplinary borders and include mobile technology; perceptually seductive interfaces, and applying the phenomenological notion of embodiment to the design of information technology. Specifically, his proposed thesis deals with finding novel ways of looking at, thinking of, and interacting with mobile technology beyond the currently applied models of use. He also takes great interest in the amalgamation of practice and theory of design in scientific research.

Research, Electrolux, Volvo, and IKEA. Project proposals are formulated by the Institute of Design in cooperation with the relevant company. A three- to five-year technological perspective is usually adopted. This offers the possibility for the students to explore converging technologies and new market scenarios that can be both inspiring for the students and provocative for the company.

The Interaction Design program prepares students for working in industry; some students move into research. Students are frequently employed at major corporations as well as design consultancies. Ongoing research is conducted through general research grants as well as collaborations established with companies including Volvo Trucks and ABB.

A new doctoral program was recently started at the institute and will coordinate research topics with other departments at Umeå University.

Preparing Students for User Interface Careers

Students admitted to the interaction design program are expected to have experience in traditional design skills such as sketching techniques, 3-D form studies, design methodology, and ergonomics. Requiring these skills frees the the Interaction Design program to focus on skills and theoretical knowledge specific for interaction design.

The curriculum has been structured to introduce theory and skills at a point when they are most relevant to concrete project work. Actively involving users in the design process is strongly emphasized. Each term includes a major 10-week project based on a specific user group rather than a product category. The first major project focuses on the *specialist user*. Specialist users are defined as those having expert knowledge and experience in using a product or system. Understanding and designing for specialist users is often characterized by specific circumstances. The designer often lacks first-hand user knowledge and experience. It therefore requires time and skill to understand what the specialist user is doing. Failure to do this can result in defining problems incorrectly or oversimplifying user behavior. The designer needs to employ specific methods to obtain information rapidly and understand what users are doing. Later term projects follow a similar pattern but focus on other user groups.

Courses are given in a range of subjects including human–computer interaction, graphic design, contextual inquiry, and experience prototyping. Software programs such as Macromedia Director®, Macromedia Flash®, the 3-D modeling program Rhino (Robert McNeel & Associates), and Alias|Wavefront's Maya® are used. An important feature of the program is student participation in the annual CHI conference combined with study visits to local companies and research institutions.

Interaction design is in a constant state of flux and requires continuous course development. For example, 3-D form courses were developed recently to include sound and tactility, and basic electronic courses have been realigned under the broader concept of Experience Prototyping.

The impact of information technology on design is challenging the foundations of design education. Should we be educating "designers as thinkers" rather than "designers as doers"? How do we successfully collaborate with new development teams that include programmers, ethnologists, and cognitive scientists? How do we extend the traditional visual skills of the designer to include more abstract creative skills?

Sample Design Projects

Example 1: IKEA, information-based products

In the second semester of the first-year interaction design program, students, in coop-

eration with IKEA, carried out a 10-week project focusing on information-based products. Eight students participated. IKEA, a Sweden-based company, is a global organization whose furniture stores are visited by about 230 million people yearly. The company is dedicated to quality at affordable prices, with a strong focus on sensible and well-designed products for the family. One of their mottoes reads "IKEA is for people who are young in all age groups." The company relies on large-volume production, global distribution, buyer participation, and trouble-free home assembly. It also depends on stable manufacturing technologies that do not require after-sales technical support or repair facilities, which can often be required for information-based products. The challenge of the project team was to present ways of introducing computer-based products into the IKEA concept.

A project brief called Living With Media was prepared, with the following major aims:

- ✦ Identify information-based products and produce design proposals that fit IKEA product and marketing strategies
- ✦ Employ user studies as a means of identifying problems and exploring solutions
- ✦ Explore different aspects of interaction and communication that are specially suited for home users.

The project had two important learning objectives: students were encouraged to understand the issues posed by a global furniture company working in information-based products; and they were expected to focus their analysis and design exploration work on a particular user or user group.

The project began with an introductory seminar from the company explaining the philosophy, structure, and strategies of the company. Subsequently, a visiting professor from the United States held a three-day seminar on digital personalization and home products. The seminar resulted in a project plan from each student defining detailed aims, user group, methods to be used, and expected deliverables. The students chose a wide variety of different products and user groups ranging from children to users with impaired vision.

An important educational part of the project consisted of participation at CHI 2001 in Seattle by both the students and the teachers. Each student was encouraged to obtain information and conduct research on his or her particular project and user group. This was followed by study visits to both local and east coast companies.

Subsequent project work involved further background research work, discussions with users, and iterative testing of hardware and software ideas. However, during the course of such a short project it is difficult to evaluate final solutions together with users.

The students made a final presentation of the projects to the teachers, visiting professor, and other students at the school consisting of on-screen presentations describing the design process, hardware and software models where appropriate, and a report summarizing the results. A similar presentation for the company was given at a later date.

The following eight projects were carried out:

- ✦ "Token," A Communication Device for Home Use, Jerome Brasseur (Belgium)
- ✦ Image Viewer for Sharing and Presenting Digital Pictures, Anne Kathrine Nissen (Denmark)
- ✦ Digital Media Storage, Kent Lindbergh (Sweden)
- ✦ "Gabriel," A Tactile Messenger and Home Security



Image Viewer, Anne Katherine Nissen



"Symbios," Britta Burlin

Practitioner's Workbench

Resources

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Device, Johanna Grahn (Sweden)

- * "Symbios." A Digital Note Board for Families, Britta Burlin (Sweden)
- * Mood Sharer, Anna Ståhl (Sweden)
- * "The Carpet," An Interactive Collaborative Toy, Diana Africano (Colombia)
- * Digital Storage, Mikael Kangas (Sweden)



"The Carpet," Diana Africano



Digital Media Storage, Kent Lindbergh

Example 2: ABB–Volvo, communication interfaces for workers within an automated environment

Alistair Regan of Australia designed a project that was part of a larger project within the Interaction Design Lab, studying the effects and problems of working within an automated environment.

The project addressed how workers within an automated environment find out the "state of the system," how they communicate within the work area, and how they become alerted to impending or required actions. Research into, guidelines for, and design of a coherent set of example interfaces to support the decision making activities and internal communications of and between process operators, maintenance personnel, supervisors, production controllers, and their managers. The project has centered on research and analysis of ecological, social, and cognitive issues. Ultimately the problem was one of empowerment and the solution of knowledge management.

Example 3: ABB, automotive base library

Niklas Andersson, a Swedish student at the Interaction Design Lab, aimed for development of a new standard of graphical representations for the user interface for opera-

tors within the automotive industry for ABB Body-in-White. User studies in Sweden and Belgium indicated that the current system was experienced as complicated and awkward. The resulting graphics combined information from three different screen windows, with increased legibility derived from a consistent use of clear structure, simplified symbols, and desaturated colors.

