Human factors top priority

Human factors have become a lot more important in the design of HMI (Human Machine Interface) than when Grethe Tausvik entered this field in the 1980s. This Oslo-based consultant tells *Generations* about her work.

You've been working as an HMI discipline lead at ABB for several years. How did you become involved in this field?

I started work as a draftswoman back in 1983. The switch was just starting from analogue to digital and to screen graphics for control systems. I worked on the early versions of HMI systems, which were very simple. Then I was recruited to a huge oil platform project in 1986. This was my first real HMI project. From there it spiraled because not many people did this work at the time. It was either technical drafting or engineering. This was sort of in between.

What other type of projects have you worked on?

I've worked mainly in process industries for things like paper, pulp, plastic and oil and gas. I spent time in Canada working on a magnesium plant and with oil terminal projects in India. I've also worked on supply vessels and subsea projects.

What has changed in HMI since the 80s?

Now there is increasing focus on human factors and ergonomics. It's the ambience, chairs, screen, sounds, lighting, keyboard, mouse. This is in part due to rules and standards. Almost all companies now follow ISO 11064, which concentrates a lot on ergonomics. Control rooms also look a lot better nowadays. So human factors have become much more important. Every company has to have a human factors specialist.

It's my job to make the end user happy – within the boundaries of the system, the guidelines and the rules and regulations.

What is important to the operators?

Unlike a lot of human factor specialists, I have always worked very closely with the users. Every one I've met wants as much information as possible on one display. This gives them an overview. That's not what the human factors people say. For the project I'm working on now, we had system problems because the operators wanted so much information. The display became too heavy for updating so we had to split the information across two screens.

The operators tell me what's relevant and if there is too much information, I suggest ways to filter out small parts, put in other displays, maybe split the display into two. It's my job to make the end user happy – within the boundaries of what is required.

How can HMI improve safety and availability?

The big safety issue in HMI at the moment is the question of alarms. ABB engineers are focusing on making smart alarm systems to prevent operators from being annoyed by unnecessary alarms that follow other alarms. They only need to hear or see the important ones.

Several companies have separate projects to manage their alarms. When they upgrade their plants to new systems, they set aside separate projects to clean up their old alarm system. What almost all plants have now are these large screens that fill the whole wall and reflect mostly only information. Part of that screen is the alarm list and it only shows the key alarms. The screen is dull during normal operation and when something happens you see quickly where and what it is.

How do you understand which alarms are important?

I work with the instrument automation and process engineers. I need to have a good overview of the process, how it works and how it connects to the shutdown systems. The most important safety concerns are fire and gas. Statoil, ConocoPhillips, BP, Elf, they all have their own alarm philosophies, which ABB has to try to fit into its system. When I design the displays or when I design the systems, I try to make the critical parts stand out more than others. The less important parts may even go into separate displays.

What is the biggest challenge in designing an HMI?

To make the user interface as close to the process reality as possible. The engineer makes a technical drawing of the process, which is a simplified version of the process. But that's not what the operators want. They want it to resemble reality. It's a challenge to convert the drawings into user-friendly interfaces.

The whole thing is a team effort. I work with human factors experts, the vendor and the end-users. If it's an upgrade job, then the operators and engineers on site are important to have on the team. They know how it works. If it's a new project, say a new platform engineered from the bottom, we need to add process and instrument engineers to the team. They have designed it, so they know how it should work.

Some operators work 12-hours shifts. How do they cope with these long hours in front of screens?

They have good chairs, a pleasant environment, long breaks, attractive areas to relax in. Their job can be boring. If everything works, there's "nothing to do". That's actually the ideal situation. So then they focus on maintenance or helping staff out in the field. They move around a lot, they talk to each other. It's not supposed to be very stressful. Many operators in oil and gas use the big screen, which gives them an overview of the whole platform. If nothing

is happening, they can find other things to do on their work computers, which are also connected. Even keeping themselves occupied on the Internet is allowed. The days are long and the work extremely important. If they are tired and something happens … I know I would want an alert operator.

What do you like most about your job?
The challenge of making these complicated customers happy. I try to juggle between the engineers, the users, the system vendor, the bosses and everyone else who has an opinion. In all this, it's always good when the product works for the end user.

Since I have worked with these people so much and for so long, I have got to know them. They are kind of the same type of people. I know all their quirks. That's a good part of the job.

What do you like least about it?
Sometimes the teams can be too big and there are too many opinions. Eventually we end up with what just a few of us said in the beginning. I can see the need for following company and other standards but sometimes the standards are interpreted too literally. I like to keep things simple.

What is the future of HMI?
It's getting more remotely operated and automated. Instead of having the operator pressing things in a sequence, we are moving towards pressing just one start button. Control systems are getting more sophisticated and we can program sequences of the process to act as they are designed to.

One way to rationalize offshore operators is to move part of the control offshore, like BP did with the operation of their wells. They have a control room on the top floor of their building in Stavanger. There they can work closely with the geologists and the people who plan operations. They sit onshore anyway. That's one way of reducing costs. Also, on their new platform, the process is more or less automated so it's less operational and more a case of monitoring. But then the job can become boring.

So I'm not so sure it's a good idea to move from the operator doing the work to just monitoring the process. When we upgrade systems there are new sets of rules and regulations that come in. Sometimes the operators lose some of their previous possibilities. They are not allowed to do certain things any more. They find this very frustrating because they might

have done it for 20 years. They feel that their expertise doesn't count for anything.

What other trends do you see?
One of the trends that is coming is to have what we call integrated operations, where other systems, such as maintenance systems, are tightly connected to the control systems. Instruments and equipment are getting more advanced with their own separate computers attached. So, if a valve starts to get close to its maintenance period, the operator gets a message. Things are getting more and more connected. Now these data communication protocols are standardized, so when a vendor comes in, he can easily plug into the control system.

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Apps for the iPad are also being developed. So you can hook the iPad up to the control system and take it with you to the plant, effectively bringing your operator station with you. In the future it could even be possible to use your phone to hook up to parts of the plant.

Text: Helen Karlsen