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Exploratypes: Expressing and Provoking Actions

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Introduction

Information technology has seen only limited up-take in industrial work practices compared to its wide-spread adoption in office work. In industrial plants, like breweries, information technology is mainly used to support administrative and communicative aspects of daily work. The skilful actions of specialized brewery workers, the actual doing, is an area still left untouched. In this paper we report on recent work aimed at exploring new ways of supporting brewery workers' skilful actions through applied pervasive computing technology.

If we are to move beyond current visions of information technology and empower people's skilful *actions* we require new modalities of interaction design. Concomitant with this, is a need for new expressions and explorative tools that engage a range of physical and social skills. In this paper we describe how the development and use of 'exploratypes' helped the design team to explore the social and technical relations between design themes grounded in field studies, and existing pervasive computing technologies.

Themes from the field

Field studies were carried out in Denmark and Australia from July 2002 until October 2003. Preliminary work-studies were conducted at a brewery in Denmark. A base on the Australian brewery was established, and video observations and field design sessions were carried out for a 4-week period. Final full-day observations at the Danish brewery wrapped up the work-studies. Themes were developed from the field material using methods such as the video card game (Buur, Binder et al. 2000; Buur and Soendergaard 2000). Three of these themes were chosen to explore further, they are described below.

Awareness; Brewery workers maintain an active awareness of what their colleagues are doing and their immediate environment. This awareness allows them to coordinate their work efforts and respond purposefully to changes in the situation.

Force Feedback; Brewery workers rely heavily on their senses. Turning a valve is not only a question of open or closed. The direct feedback embedded in the action of turning the valve adds meaning to the situation at hand as well, for instance the vibrations of the handle, the temperature of the handle and the friction in the valve.

Rhythm; Work is performed in rhythms, e. g. footsteps on the floor, fingerprints on buttons. The sound of work performance reveals a unique rhythm of its own, thus creating a sense of situated awareness (Suchman 1987), eg. a worker opening and closing a number of valves in one choreographed action-sequence.

Expressing themes as exploratypes

We organised a workshop to which we invited several fellow researchers. The workshop was called ‘Feel the Force’ and the purpose was to investigate the themes outlined above. We designed five activities to investigate different aspects of these themes, (four of which are described here). For the activities we made physical models to let people experience the activity through their senses. We used the term ‘exploratypes’ to describe these devices because they weren’t intended as final design ideas, but as tools for exploring a theme in order to reveal design potentials.

4 Hands on the wheel

This activity was based on the awareness theme. Each person in a group of four was given responsibility for a different part of a radio-controlled car (forward, reverse, left and right) and asked to drive the car in a circuit. The task was repeated with variations in the amount and type of communication as well as the view of the car.

There were a number of surprising results from the activity. It became clear that the physical affordances of the exploratype affected how participants were able to cooperate and maintain awareness of one-another’s actions. Participants also became aware of different zones of responsibility depending on the position of the car. When participants were restricted in one sense modality they relied more on their other senses. For example sound was mentioned by several participants as being important when the car was not visible.

Secret Admirer

The secret admirer was another activity built around the theme of awareness. In this activity participants were asked to wear a Radio Frequency Identification tag during the workshop. Everyone was given someone to

admire. When a person went near a tag sensor the system would show who they admire. Participants were asked to figure out who their secret admirer was by watching the system's output and trying to see who was causing it.

Two tag readers were placed next so that they could be inadvertently activated and the other one was placed in a central position and required a more deliberate activation. Participants found the different tag readers to be good for different uses. The one that made a sound was good for getting an immediate response, but was sometimes hard to decipher. On the other hand, the one that showed text messages was less noticeable but easier to grasp.

Handling Actions

In response to the force feedback theme we developed an exploratype that allows people to explore possible active uses of feedback. For instance to amplify, restrict, force, direct, or inform the operator's actions. The setup consisted of a lever, a set of different shaped handles, a shield and a tray hidden behind the shield. It was possible for people to move the lever up and down, push it back and forth, and turn it in both directions. The 'operators' were asked to think aloud and discuss their experiences while operating the handle. The facilitator placed different objects in the tray and restricted the movement of the handle.

From this activity we learned several things. First of all the laboratory-like setup missed out on the game element and thereby the explorative atmosphere needed. The increasing play in the mechanism throughout the day made people uneasy because it was difficult to distinguish between play and feedback. There were some instances where the participant's reaction inspired new ideas for us. For example, when one participant broke an egg shell with the handle she was clearly surprised and afterwards the handle acted differently.

Coffee Cha Cha Cha

This activity emphasised the rhythm theme. In groups, participants were asked to design the rhythm of actions necessary to operate a coffee machine. To do this they were provided looped brewery video clips and a sound tinker tool with which they could record and loop sequences of sound for inspiration. A variety of different materials was also at hand, such as foam blocks, cardboard boxes, rubber bands, different pins and sticks. For a final presentation the teams enacted their interaction rhythms using one or more of these resources.

The outcomes of the 'Coffee cha cha cha' activity were quite poetic. While the sound-tinkering tool seemed to be very useful for one of the groups, the

other two had not used it. We were surprised by the notion that materials don't only afford actions, but also rhythms. We also realised that rhythm is also related to social cooperation.

Conclusions

In this paper we have presented the idea of exploratypes. Unlike more traditional prototypes these are directed towards cooperative exploration with and between participants. People make sense of exploratypes by learning from the results of their own actions and simultaneously their interactions with other people. This is particularly important when we are designing for networks of people and products because it emphasises social dynamics. Further, exploratypes emphasise dynamics between people and technology, in particular, how technology influences the way people act. This is also important when designing webs of technology.

Of course, to say that exploratypes encourage social interaction and exploration in and of themselves is a simplification. This also relies on the facilitation and set-up of the workshop and the involvement of participants. It is necessary to build a co-operative and game-like spirit of engagement.

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