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An example of Indigenous HCI: Interactive climate control in greenhouses in Denmark

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Abstract. This paper argues that we should focus on creating examples of indigenous HCI. This should be done by becoming more sensitive to regional and national differences in how work styles and interaction design across time and use merge, adapt, localize and reduce the ambiguity of the technology. A case of climate control is reported. The method is interpretive phenomenological analysis that focuses on idiosyncrasies. The climate control experience of a Danish expert is compared with the experiences of a similar Israeli expert. The conclusion says that many similarities exist, but also meaningful differences that should be the basis for Indigenous HCI design.

Keywords: Indigenous HCI, sustainability, user experience.

1 Introduction

Until recently, culture in HCI was considered a matter of internationalization or localization. However, as computer use spreads around the world, the traditional approaches to culture and HCI have proved to be deeply insufficient approaches. Today, the challenge for HCI as a discipline is to develop the local HCI communities and local perspectives on HCI, and at the same time, maintain the universal assumptions, priorities and values that together constitute the discipline. This paper aims to contribute to such a reframing of the discipline from explicit indigenous perspectives with an illustrative case study of an example of indigenous HCI.

Finding concrete examples of indigenous HCI is not a simple problem, but one that requires developing sensitivity towards national or regional differences in the subject and object of the interaction design [1]. We must take the broader context into account in order to understand the usefulness of any interaction design [2]. Hence a starting point for developing such sensitivity may be to look at how regional work styles and human-computer interaction are related. Regional styles in HCI are not static results of local social relations (e.g., power relations between employee and leader), and also not simply determined by imported HCI methods or interactive artefacts. Rather time and effort are needed for work processes and organizations to merge, adapt, localize and reduce the ambiguity of the technology. Some cultural psychologists believe that social constructiveness of technology take part as a process with two faces named by Bartlett: conventionalization and schema formation, the first being the outer, observable process, the latter being the inner mental process [3]. Surely something happens both with users and artefacts across time and use, and though not all changes in HCI are equally smooth

and some changes may be negative and not successful, contested and controversial [1], they are examples of regional/local and indigenous HCI. Thus, we must study concrete examples to see how the particular combination of conventionalization of interaction design and users' schema formation explains the emergence of regional styles of HCI. Focusing on local or indigenous awareness and practices in HCI pushes the envelope in a very exciting way. The potential contribution of explicitly local or indigenous perspectives, approaches and experiences with HCI, see e.g., [4], have not yet become clear and uniform. In particular, the question of *What constitutes a useful and usable system in different cultural contexts?* remains only partially explored at the very least.

We have to make a disclaimer here; by indigenous we do not mean HCI for native or minority user populations, e.g., like the study by Nakata [5], though we include these user populations in our approach. Rather, by indigenous we mean HCI anchored in culture understood as national-regional cultural characteristics of HCI, e.g., [1,6,7].

In this paper, we focus on 1) local designer and 2) local environment, though more points may be relevant for understanding a mature indigenous user experience [8]. Looking at the local designer, for example Kumar and Andersen [9] found that Canadian designers were more concerned with efficiency issues (cost and manpower usage), whereas the Danish designers were more concerned with effectiveness issues (management of organizational resources). Looking at the local environment, George et al. [10, p5] considered the "environmentally contextualised narratological nature of Aboriginal knowledge traditions" and discussed the use of appropriate landscape metaphors to adequately represent indigenous knowledge.

2 Case – interactive climate control in greenhouses

At the workshop, I will present and discuss a case of interactive climate control in greenhouses in Denmark. Internet- and sensor based ICT systems for climate management in greenhouses presents challenges for the understanding of how technology mediates the interaction between humans and specific work contexts. Regional styles in climate control practices may be very important. In Denmark, currently greenhouse growers spend several hours daily with the computer, working with the greenhouse climate management systems. Insight into the needs and reasons for spending much time on a certain task using a computer in a given work context and region of the world can help in planning future software systems for the needs of the growers and to contribute to reducing unnecessary work time and stress while increasing time for pleasure, eventually increasing work efficiency and reducing labour costs. I think that to produce sustainable climate control in the agricultural sector, the US based HCI research on sustainability, e.g., [11,12], will not be sufficient, and an indigenous HCI approach is needed.

To collect and analyze data on interactive climate control, I used Interpretative Phenomenological Analysis (IPA) [13]. This approach is unique since it has an idiographic focus that focus on how a given person in a given context experiences and makes sense of a given phenomenon. The phenomena should be important to the person, and he/she will attempt to make sense of it. So the approach is both descriptive phenomenological and interpretive hermeneutic. I did 10 three hour long

interviews with the most experienced experts on interactive climate control that I could find in Denmark and Israel (by asking our research partners from the horticultural industry). The interviews were loosely structured, with the main question to the participant being “how did you experience climate control (last time you did it)?” I got all the interviews meaning-transcribed in full. Here I report on two interviews, one Danish and one Israeli. I coded all the text from these two interviews closely for insights into the participants' experience and perspective on climate management, looking for patterns and themes in the codes. I produced networks of codes around the most important concepts, see the figures below. The important analytical thing was to keep the idiographic focus so that particular variations were not lost. The choice of comparing the Danish with the Israeli interview was informed by the grounded comparisons suggested by the Comparative informatics approach [14].

The kind of results that we may expect from this research is illustrated by Figure 1, which shows the findings from both the interview with the Danish and the Israeli expert. CM is Climate Management.

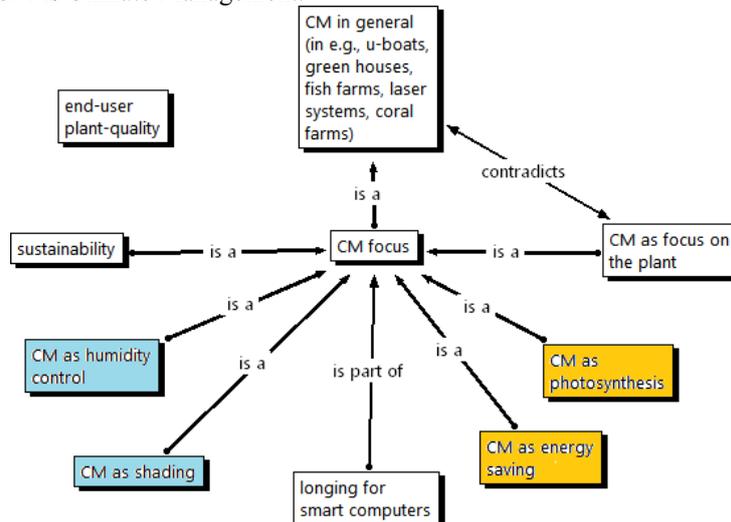


Figure 1. Climate management focus.

The shaded boxes on the left express the Israeli expert's experiences, and on the right the Danish expert's experiences. The white boxes show shared experiences. These results could be discussed as cultural usability phenomena by Cultural Models of Use (CM-U) or Artifact Development Analysis (ADA) theory [15,16].

3 Conclusion

The results of this research, which will be presented in more detail at the workshop, indicate the idiosyncrasies of one Danish expert in climate control, how he experiences doing climate control and how he makes sense of the experience. By

comparing these results to findings from an interview with a comparable Israeli expert, it is possible to see how similarities and differences in the interactive climate control exist, and what the idiosyncratic approach to climate control in Denmark is.

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