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Design Patterns For User-driven Workplace Software labeling

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Abstract

This position paper presents a small set of organizational design patterns formulated within a long-term R&D program on how to enhance the quality of the digital work environment of Swedish industry and public agencies. It then relates the patterns to two of the "next steps" that the Silberman et al. article, referred to in the CFP, concludes with. This amounts to an operationalization of possible next steps for HCI sustainability research aiming for enhancing the social sustainability of business critical workplace systems. The paper argues that these steps would not only benefit the long term social sustainability of tomorrow's working life. They may also be regarded as facilitators for harnessing the innovative potential of employees, consumers and citizenry that is needed in the slow, ongoing transformation to a more sustainable society.

Author Keywords

Pattern languages; social sustainability; workplace systems; user organization, user-driven sustainability labeling.

ACM Classification Keywords

K.4.1. Public Policy Issues; H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Environmental impact

In his UN report Per Erik Boivie summarizes the impact of the TCO (The Swedish Confederation of Professional Employees) labeling program as of 2007:

Thanks to TCO's quality and eco-labeling of computer screens, emissions of bromated flame retardants has been reduced by 50,000 tons – equivalent to the contents of one whole oil tanker. The energy saving resulting from the use of energy-efficient screens with an automatic "Shut down" function is estimated at 25 terawatt hours in 2006 alone, corresponding to the annual production of four normal-sized Swedish nuclear reactors. TCO- certification saved approximately 25 million tons of carbon dioxide last year alone, corresponding to almost half of all Swedish emissions [2].

Introduction

The background for the design patterns to be presented in this paper are two Swedish national programs about how organized users can impact the quality of the hardware and software they use in their daily work. The patterns are written to explain in everyday language what the second program tried accomplish, and why. The patterns will be briefly presented in the order they evolved. By relating them to one of the "next steps" proposed in the Silberman et al. paper we want to point to a rich and valid frame of reference for all authors of patterns for sustainability, the original work of Alexander et al.. This works was, after all, about how to design sustainable towns, buildings and constructions. While relating to another of the Silberman et al. questions, I point to one expected, and one unexpected source of knowledge for doing this integrative re-use of the Alexandrian knowledge framework.

Two user-driven IT quality certification programs

At the 15th Session of the UN Commission on Sustainable Development (CSD-15), April 2007, Per Erik Boivie presented a report titled "A case study from Sweden about TCO labeling of computer displays: Change is possible" [2]. In its introduction the report summarizes the partners cooperating in the TCO environmental labeling program:

Half a billion computer users worldwide are now using a TCO-labeled computer screen as a tool in their workplaces, schools and homes. The labeling system was launched in 1992 by three Swedish organizations working in cooperation with one another: a trade union - TCO (The Swedish Confederation of Professional

Employees), an environmental organization - SNF (The Swedish Society for Nature Conservation) and NUTEK (The Swedish National Board for Industrial and Technical Development). Their inspiration came from the UN Conference on Sustainable Development in Rio de Janeiro in 1992 [2].

In the report Per Erik Boivie, the initiator of the labeling program, highlights two strategic decisions that had proved to be fruitful. One was to successively upgrade the environmental requirements of the hardware to be labeled, and to have these requirements reflected in modified logos with the year (TCO'92, '95, '99, '03) and the key terms defined (emissions, energy, ecology, ergonomics). Another, more controversial decision was to enter into a dialogue with the manufacturers before each set of new requirement specifications were decided on. This step, Boivie argued, "ensured that the requirement specifications always kept pace with what the 'front runners' in the industry were technically capable of managing." On the overarching, institutional level Boivie concludes that "[w]hen two popular movements (a trade union and an environmental organization) decide at national level to work together on a long-term basis and to act globally in the market, it can have hugely positive effects for employees and the environment alike" [2, 3].

Inspired by the early successes of the TCO hardware quality labeling program the UsersAward (UA) *software quality labeling* program was initiated in 1998. The program has continued to operate, with some variation in its design, until 2015. It was initiated by the LO

A use story about the Users' Quality Network

Taking Alexander's and his coworkers' small language to help build a porch onto the front of a house as an example of how a small set of patterns could become a pattern language [1, xxxv] the use story tried to explain why and how the UA program got started.

Here the *User-driven software quality labeling* had been split up into two patterns, a *Users' IT quality network* and a *Users quality centre,* both being supported by five patterns that summed up the five key organizational designs which at that time made up the UA program: *Users' quality research consortium, Users' IT prize contest, Users' quality conference, User survey, Users' quality certification* [19].

(Swedish Trade Union Confederation) in cooperation with the TCO and a group of researchers from KTH (as research coordinator), Uppsala University, Gävle University, and Luleå Technical University [16]. The UA program has followed the "Scandinavian tradition" of involving users in IT development for use at workplaces. In the seminal Utopia project in the 1980s the focus was on *user involvement in the design and development* of workplace software [12]. The investigations and opinion making activities that the UA program has performed since its inception (domain specific user surveys, software certifications, prize competitions, user conferences, research workshops) indicate that *the users also have to participate in the procurement, deployment, periodic screenings and further development of the software* if the full potential of innovative workplace software is to be realized [15].

Patterns for understanding workplace software labeling

The research and development activities of the UA program has been reported extensively [9, 10, 14, 15, 16]. However, the theme of this workshop is "design patterns, principles, and strategies for Sustainable HCI". Therefore, the account of the UA program's organization and impact will have to be held on a very general level. In fact, one of the major HCI research challenges of the UA program has been its broad societal scope. To make a difference in the workplace software market for Enterprise Resource Planning software (ERP), Electronic Health Record software (EHR) and other business/organization critical software genres demands an action research approach that goes beyond long-term multi-disciplinary academic cooperation and enters into something like a "multi-institutional" cooperation. Since this was obvious from

the outset of the program, a series of attempts have been made to account for the program in more popular terms than what is possible in academic articles and papers. The solution was to try to articulate a set of organizational design patterns that would summarize and argue for the program's key design principles that emerged in the UA program work.

At the CHI 2000 workshop "Pattern Languages for Interaction Design: Building Momentum" a first attempt was made to formulate a design pattern that would operationalize the idea of user participation in one of the key processes studied in the UA program, the procurement process. The aim of the pattern was to enhance the chances for workplace users to understand, engage in and have a say in the procurement of new software – *Software suppliers apply design patterns to present their solutions,* (if the software developers and UI folks use design patterns to understand what they are building, why are not the marketing people doing it too?) [18]. At the Directions and Implications for Advanced Computing (DIAC) conference in 2002, three somewhat less futuristic organizational design patterns to illuminate the UA program were presented, *User-driven software quality labeling* with its two supporting patterns *Interdisciplinary usability research centre* and *User satisfaction measurements* [17]. At the CHI 2004 workshop "Human-Computer-Human Interaction Patterns: Workshop on the Human Role in HCI Patterns" a further attempt to make sense, in the public eye, of the UA program was made. Now in the form of "a use story about the *Users' Quality Network*" (see sidebar) [19]*.*

Identifying critical software genres and combining knowledge from unexpected sources

An interesting shift in the overarching values driving the union activities relating to IT quality issues is that, although the self-direction and the economic sustainability of the company is still at the heart of the efforts, the work environmental consequences of bad systems have become more visible and explicitly addressed. The UA program and the activities it has spawned are now in a phase of transition with the major organizational shift being that unions, rather than union centrals, seem to take over the lead in demanding quality IT tools at work [13, 14]. This makes it tempting to again try to envision, in terms of organizational designs, how HCI research could play a role in supporting sustainability efforts of trade unions and professional societies. We do that by commenting on two of the recommendations for "next steps" presented in Silberman et al. [11]

Build and support systems people use in their everyday practices, and do studies that inform the design and operation of such systems

The seminal book by Christopher Alexander and his colleagues, A PATTERN LANGUAGE, TOWNS BUILDINGS CONSTRUCTION (APL) [1] was written at the Center for Environmental Structure at Berkeley. It is about how to design, in a sustainable way, the socio-technical systems that make up the built environment. In our view, many, if not most, of the patterns proposed in the book are still valid. This makes it an ideal common reference source for HCI researchers who want to work in a participatory way with developers and users who "build and support systems people use in their everyday

practices*". (In the DIAC´02 paper *18. Network of learning*, and *43. University as a marketplace* were obvious APL patterns to reference [1].) With more and more researchers and practitioners getting to know and articulating pattern languages for their respective field, it would be of great benefit for all of us to acknowledge APL as a common reference. However, APL was written before IT and networking appeared as productive tools for cooperation. Therefore, we see that one important strategic step towards articulating a "sustainable HCI pattern language" would be to *identify what kind of IT system genres that have the greatest potential to renew (break) and revitalize some of the original patterns proposed in APL*. In our view, patterns that address networks that support the innovative power of professionals trying to enhance the quality of their work should be among the new patterns to vitalize *18. Network of learning*, *41. Work community*, *43. University as a marketplace, 45. Necklace of community projects, 80. Self-governing workshops and offices, 146. Flexible office space, 157. Home workshop* and other patterns in APL that relate to working life [1].

Specify and operationalize sustainability goals in our work and articulate approaches to evaluating our work in view of those goals

In our view, patterns and coherent pattern languages emerge among practitioners in a slow way. The kind of values a set of patterns support is explained in the way the declared solution is resolving the problems the patterns address. In our case, the *Users' Quality Network* has the goal to support the human and social values of *the rewarding work organization* (see sidebar). One way to "specify and operationalize

Social sustainability
ISO 26800 states that "Ergonomics can support all three [economic, social, environmental] of these considerations." Then, it explicates in what way it does this. What is claimed about how ergonomics and "socially responsible designs" can support social sustainability gives important insights into what future sustainable HCI pattern languages could contribute with [7]:

Social: the application of ergonomics results in tasks, jobs, products, tools, equipment, systems, organizations, services, facilities and environments which are better for human health and well-being, including the needs of older people and those with disabilities. Consequent improvements in effectiveness, efficiency and satisfaction will also have implications for acceptable employment.

sustainability goals" would be to specify systematically, and map out, the *values* inscribed in proven patterns. In 2005, then again in 2015, the UsersAward program applied the Value Sensitive Design (VSD) approach to review the values the program aimed at supporting [14,15]. In the same way VSD could be applied to review a set of organizational patterns – a conceptual investigation of what values they aim at and empirical and technical investigations of whether these values were indeed manifested in the set of practical, real world examples that the patterns referred to. For HCI researchers already applying the VSD approach in their projects, this corresponds to the iterative evaluation of how their empirical and technical solutions match the values declared by their stakeholders and themselves. If they are re-using earlier solutions, then indeed there may be a pattern or two worth writing and sharing.

With its clear focus on values, we also think that the VSD approach could be helpful in identifying "sustainability critical system genres" and how patterns that support their successful design, development and deployment could be articulated [5]. We think that there is empirical and technical knowledge to be reflected on and referred to in such a search for systems that are more important than others. But the source of this knowledge may be unexpected, since it belongs neither to the third or the second of the HCI paradigms, or waves, as they have been described in [6] and [4] respectively. It belongs to the first paradigm, Human Factors and Ergonomics.

Although ergonomics has been identified as a "first wave" in the evolution of HCI, ergonomics has had its waves too. While *technical* ergonomic ISO standards have had a tough challenge to keep pace with new technical innovations, the standards addressing the *social* and *economic* requirements and ramifications of these innovations have succeeded much better. In our view, some of the most fundamental and sharp articulations about social and economic sustainability are to be found in current ISO standards. We will conclude with three quotes which, in our view, demonstrate this. The first is from the introduction of "Annex A. Sustainability" of the overarching standard for ergonomics, ISO 26800 Ergonomics – General approach, principles and concepts [7]:

In modern society, a key issue is to encourage socially responsible designs through consideration of sustainability, which can be defined as forms of progress that meet the needs of the present without compromising the ability of future generations to meet their needs. In terms of standardization, this involves considering the integration of, and balances between, economic, social and environmental considerations.

We present how the standard specifies Social sustainability in the sidebar. Considering who are to be held responsible for complying with these goals and measures, we quote the second paragraph of the Introduction to ISO 27500 Human centered organisation – Rationale and general principles [8]:

This International Standard explains to executive board members the values and beliefs that make an organization human-centered, the significant business and operational benefits that arise, and the policies they need to put in place to achieve this. This International Standard identifies the key criteria which demonstrate that each principle has

been met, the implications for the organization of failing to meet the relevant criteria and what steps can be taken to mitigate the risks of such failure.

Concluding remarks

We look upon pattern languages as practitioners' open and agile "folksonomy" counterpart to formal international standards. In the quest to "*operationalize sustainability goals*" , to be able to evaluate our work against them, we think that current ISO standards, transformed and made accessible as design patterns, have a lot to contribute with. The ISO goals of *human health and well-being* and the way they are operationalized coincide to a striking degree with the goals and methods of both Value Sensitive Design and the underlying values of the pattern language method, as originally conceived of by Christopher Alexander and his colleagues.

We think that the rich and well researched domain of workplace systems (still) is a critical systems genre to investigate for sustainable HCI. Identifying and designing for sustainable systems at work is not only about health and well-being. We see it as a way to harness the innovative potential of employees, consumers and citizenry that is needed in the slow, ongoing transformation to a more sustainable society.

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