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Sustained Participatory Design and Implementation of ITHC

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Abstract. Participatory design includes engaging in large-scale information-systems development where participatory design approaches have been applied throughout design and organizational implementation. The keynote suggest to extend the iterative prototyping approach by (1) emphasizing participatory design experiments and pilot implementations as transcending traditional prototyping by evaluating fully integrated systems exposed to real work practices; (2) incorporating improvisational change management including anticipated, emergent, and opportunity-based change; and (3) extending initial design and development into a sustained and ongoing implementation that constitutes an overall technology-driven organizational change. This sustained participatory design and implementation approach is exemplified through a large-scale project in the Danish healthcare sector

Keywords. Participatory design, iterative prototyping, improvisational change management, anticipated-, emergent-, and opportunity-based change, pilot implementation.

Introduction

Participatory design is a diverse collection of principles and practices aimed at making technologies, tools, environments, businesses, and social institutions more responsive to human needs. A central tenet of participatory design is the direct involvement of (representatives of) future users in the design process [1]. This involves collective 'reflection-in-action' [2] through the establishment of a process of mutual learning between designers and users from the work domains in question.

Many approaches to information technology in health care (ITHC) include iterative prototyping as part of the early design phases. The iterative prototyping approach is well-known within information systems in general [3, 4]. Prototyping is the process of creating, in advance of the completion of the final product, a working model (the prototype) that exhibits essential features of the final product and using this prototype to test aspects of the design, illustrate ideas or features, and gather early feedback and experiences from usage. The prototyping approach is most often described as an iterative process reflecting a hermeneutic circle as in the task-artefact cycle [5] where the new system (artefact) – and the task it is developed to support – interact and mutually define each other: "A task implicitly sets the requirements for the development of artefacts to support it; an artefact suggests possibilities and introduces

constraints that often radically redefine the task for which the artefact was originally developed" [5, p. 97].

Studies of information systems that allow for quick iterations of design, use, and redesign have stressed the importance of using the system for real work in order to learn about the possibilities and constraints imposed by the artefact. Orlikowski and Hofman [6] characterized this as 'improvisational change management' and made a distinction between anticipated and unanticipated change. Anticipated change denotes the desired change that is planned ahead and occurs as intended by the originators of the change. It is impossible to plan and predict all changes that occur when introducing new artefacts such as IT to a clinical work context. The nature of clinical work itself is characterized by being 'situated' [7] where the course of the work process depends of the material and social circumstances at hand. Thus "[u]nanticipated use of computer artefacts reflects the fact that work itself is undetermined until realized in situ" [8, p. 189]. Unanticipated change can be divided into 'emergent' or 'opportunity-based' change [6]. Emergent change is defined as local and spontaneous change, not originally anticipated nor intended. Such change does not involve deliberate actions but grows out of practice. Opportunity-based change is purposefully introduced to take advantage of unexpected opportunities, events, or breakdowns that have occurred after the introduction of a new information system: "Over time, however, use of the new technology will typically involve a series of opportunity-based, emergent, and further anticipated changes, the order of which cannot be determined in advance because the changes interact with each other in response to outcomes, events, and conditions arising through experimentation and use" [6, p. 13].

Traditionally, iterative prototyping has been conducted in the initial phase of the development process and led (in commercial settings) to a contractual bid [1, 9]. And typically, the development process succeeding the contractual bid is based on a traditional sequential waterfall-type process, where the system is eventually 'rolled out' in the organization [10]. Today, standard, one-size-fits-all systems are, however, increasingly giving way to an 'era of configurability' [11], where information systems are based on flexible, generic frameworks [12]. Configurable frameworks include high-level configuration tools (often XML based) and embed standard interfaces for other systems as well as general business logic for specific domains. One example is the Oracle Healthcare Transaction Base (HTB)™, which constitutes a development framework that enables agile modeling of processes and objects native to the healthcare domain. Such generic frameworks substantially ease the creation of individual applications because much of the work is transformed from development of functionality from scratch to configuration of domain-specific building blocks.

The 'era of configurability' introduces increasingly mature technological means for an iterative, real-life experimentation-based participatory design approach, comprising design as well as organizational implementation of ITHC. Configurable information systems may be implemented, used, and evaluated as part of an overall iterative design process. This opens for an important aspect of the design process since only real and situated use of the system enables emergent and opportunity-based change. During the period where a system is exposed to real use, evaluation studies can be conducted to investigate how the system affects the clinicians' work practices. Such evaluations might identify and analyze emergent and opportunity-based changes, hereby informing the subsequent design and implementation of the system. This acknowledges the uncertainties of technology-driven organizational change and at the same time poses the challenge of treating the entire design and implementation process

as a process of genuine development. Sustained participatory design and implementation of ITHC include a stepwise implementation, defined by Markus [13] as 'technochange management' combining large ITHC projects with organizational change programs: "Here what is to be prototyped is not just a technical solution *or* just an organizational change, but both together" [13, p. 17].

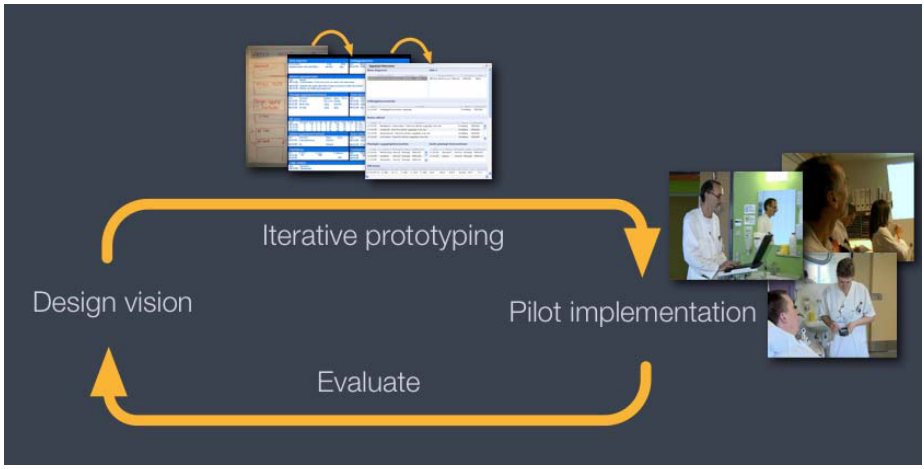

Figure 1. A model of sustained participatory design and implementation of ITHC. The model outlines a process that enables mutual learning, including collective reflection-in-action, through trial use of information systems for real work. The potential and impact of the model is during the keynote illustrated by an ethnographic study of emergent and opportunity-based changes resulting from clinicians' trial use of a new electronic patient record system.

The sustained participatory design process outlined in Figure 1 is adopted from Simonsen and Hertzum [14] and emphasizes the evaluation of ITHC through exposing them to real work. The starting point of an iteration are the changes that are anticipated and aimed for. The anticipated changes are further specified, in terms of what effects the clinicians expect from using the system. The system (or a part/prototype of it) is then implemented and tried out under conditions as close as possible to real use – a process which sometimes is referred to as a pilot study or pilot implementation [15-17]. Actual use of the system allows for emergent and opportunity-based changes to occur and inform subsequent design iterations. The model in Figure 1 outlines a process of long-term engagement of both the designers and the clinicians of the proposed and evaluated ITHC.

The keynote is based on a research program on 'effects-driven IT development' [14, 18, 19, 20]. The program's aim is to establish sustained participatory design and implementation processes through an effects-driven, participatory, and experimental strategy for managing large, long-term ITHC projects. This includes strategic partnerships based on trust, mutual learning, and close collaboration between vendor and customer. Effects-driven IT development focuses on (a) effects of using information systems instead of products and processes; (b) measurement and evaluations instead of expectations and estimates; and (c) specifications of the anticipated effects of system use instead of specifications of system functionality. The vendor and the customer should, based on these three characteristics, design and implement information systems that demonstrate utility value and measurable effects on the work they support. Measurement of anticipated effects and identification and

evaluation of unanticipated effects are important means to manage the general design and implementation process. Thus, the process is driven by several iterations of formative evaluation through sustained participatory design and implementation of ITHC.

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