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Sustainable Health Care Information Systems by Activity Driven ISD Model

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Abstract

The purpose of our project is to 'zip up' the distance between the different worlds of work improvement and information systems development. The initial premise for development activity comes from the needed improvements of services provided to e.g. health care customers. In addition to the suitability of the technology itself, the development activity should be participative and transparent through the organization. We have developed an applicable model for work and information systems developers to create sustainable information system. The model has been applied in several pilot cases in health care sector (in collaboration with researchers, system developers and health care practitioners). In this paper the basic idea of the model is presented and reflected to the aspects of sustainable information system.

Keywords:

work, information systems, program development

Introduction

The purpose of information system (IS) - which is a socio-technical system including technology and people - is to facilitate and help work activities. To develop effective health care services with the help of information and communication technology (ICT), we have to combine IS development with work development.

In the ZipIT-project[1] (2004-2007) we have participated as researchers on IS development projects in various health care organizations. The objective is to develop a model to be used when a health care organization needs to improve their information system. The model is based on activity theory, and participatory design. It is meant to be used for example by work developers in health care organization, data administration professionals in health care organization, and system designers and analysts in software companies. The purpose of this paper is to discuss the model in light of sustainable information system development by advocating the users' position.

1 www.uku.fi/zipit/english

Methods: Activity driven research approach and sustainability

In order to create appropriate, sustainable and usable information systems in organizations, the basic object of analysis should be activity system instead of information system [1] [2]. Activity theory cf. [3] has been elaborated and re-developed at the University of Kuopio and Savonia University of Applied Sciences for the needs of IS research in several research projects [1] [4].

The basic value of technology comes from the improvements achieved by technology and how these improvements are sustained and enjoyed over time in organization. Sustainable development means a process that meets the need of the present state without compromising the ability of future development. The criteria of sustainability must be considered during information systems development (ISD) that should empower user community, meaning user participation [5]. The aspects of sustainable IS are derived from appropriate technology, supportive activities and the real need of ICT [4].

Result: Activity driven ISD model

According to the activity driven ISD model (Figure 1) we have to analyze activity at different levels, and integrate the different levels to each other; individual level (actions), group/activity level (work processes), and organizational level (network of activities). At each level the work and information system, linked up with each other, are analyzed with different fineness of detail.

Level 1: Network of activities and information needs

This level of description provides shared understanding of the network or the chain of activities focusing on:

- Overview of activities: Networked health care service providers, stakeholders, patients, motivation.
- Overview of Information systems: Infrastructure, information entities, communication in the network.
- Sustainability factors: supportive activities (technical, system, intellectual, managerial), top management competence and commitment.

Level 2: Work activity and information system

This level zooms in to the essential activities focusing on:

- Work activities and processes**:** professionals' work, goals, inputs and outputs of processes, users, tasks, tools.
- Information systems and data flows: Means of communication and coordination**,** information needs and information tools in processes, information flows
- Sustainability factors: appropriateness to group work, operational and technical suitability of ICT, usability, affordability, flexibility.

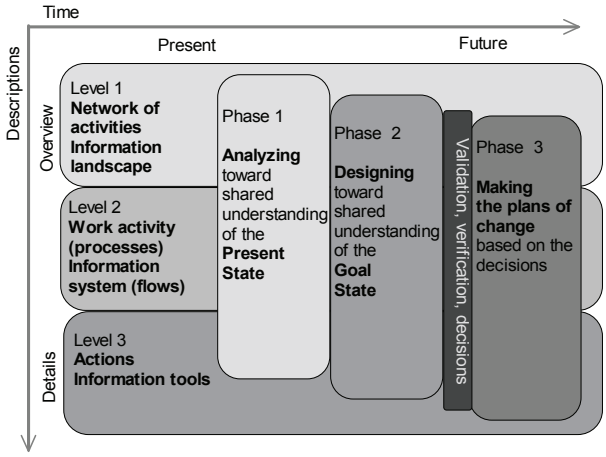

Figure 1 - Dimensions, levels and phases of the Activity Driven ISD Model

Level 3: Actions and information tools

This level of description provides shared understanding of the actions of individual actors focusing on:

- Actions: information processing tasks, interaction between user and information tools
- Information tools: data compositions, interfaces
- Sustainability factors: appropriateness to individual tasks, standards, usability.

On the other hand, the model has three main phases of development: analyzing the **present state** of an activity, defining the **goal state**, and **planning** how to reach the goal state. The phases do not follow each other like a water-fall, but the process is usually iterative. Also, depending on the case, the project can be restricted for example on the first phase if we only need to find out problems in our activity for decision making. The change actions can be in different scales. Sometimes it is necessary to take big steps, but also less dramatic gradual changes can be planned based on different time perspectives.

Discussion and conclusion

When it comes to requirements of appropriate and sustainable information system, user participation is one key element. Firstly, clinical staff, like nurses and doctors, is responsible to provide the nursing services as good as possible. As experts of their work, they are in key position to give requirements to appropriate tools, e.g. ICT.

The main responsibility of the service chain is for top management. Top management is in the position to realize the impact of new ICT in the service chain; what is the real need of ICT for better services. Top management should be able to set long distance and short distance goals, and decide the proper actions for next development phase. They should provide sufficient resources to development work, and create proper supportive activities for sustaining the use of IS.

We believe that the Activity driven ISD model can act as a tool in decision making and practical realization of IS development and work development. Top management can apply the two uppermost levels to decide the real need of ICT, the need for resources, and essential changes in work activities. With the help of the model it is possible to illustrate the real impact of ICT for services, and this way to improve ICT's suitability to work. On the other hand, clinical staff and people operating with development activity have a tool to analyze the present state and to decide the proper actions in ICT introduction. With the help of the model the management and the practical level have a common tool to see the development objectives and phases and thus achieve a common understanding of the development and make the development process more transparent.

Acknowledgments

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