Activity Driven ISD Model

Sustainable Health Care Information Systems

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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.

In the ZipIT project, 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.

MedInfo'07,
Brisbane, Australia.
August 20-24,
2007.

Activity driven research approach

Effective health care services with the help of information and communication technology (ICT)
=> **combine IS development with work development**

Activity Theory

Information Systems Research

Health Informatics

Software Engineering

Health Care Services

Work Development

Participatory Methods

MedInfo'07, Brisbane, Australia. August 20-24, 2007.

Activity Driven ISD Model

The process for activity driven requirements includes **three main phases of development**.

The idea is to **analyze activity at different levels**, and integrate the different levels to each other. At each level the work and information system, **linked up** with each other, are analyzed with different fineness of detail.

Three phases of development:

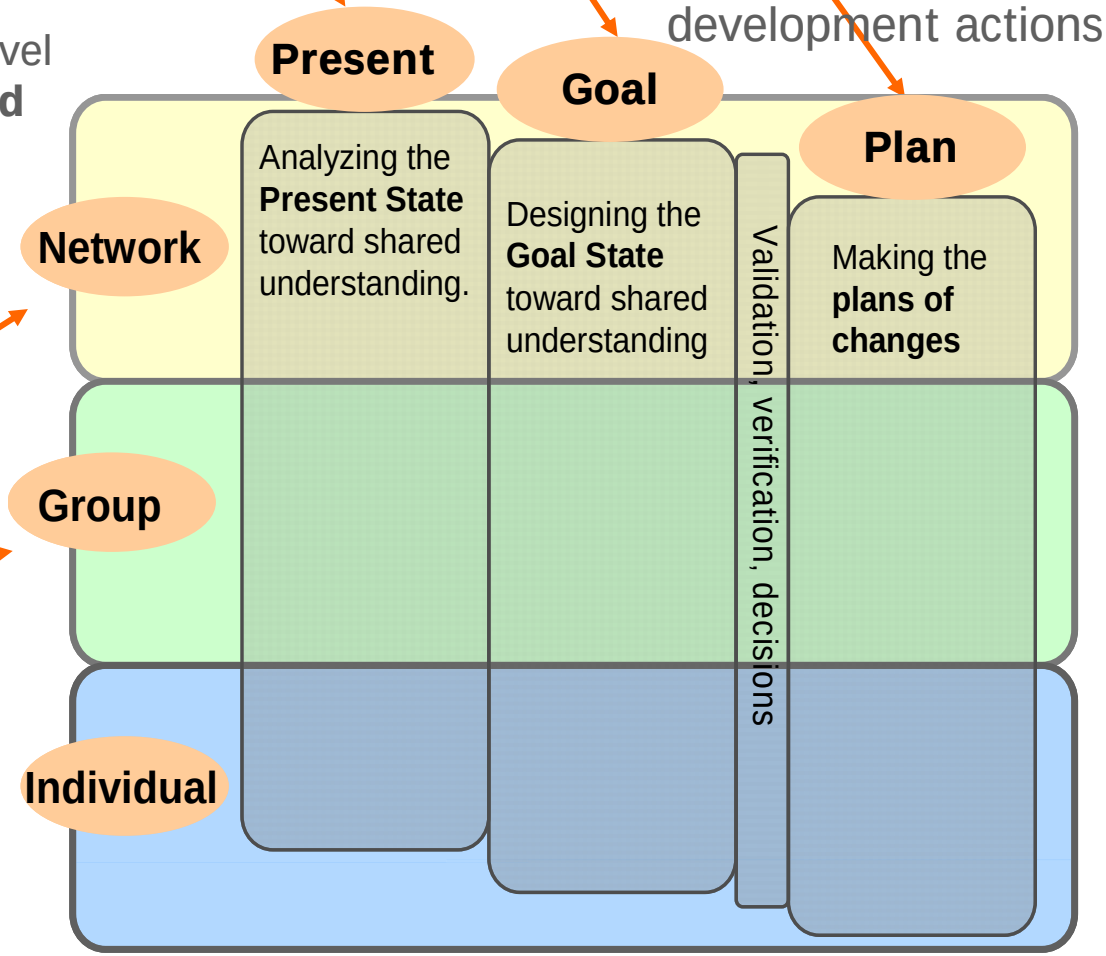
1. **Analyse** the present state
2. **Design** the goal state
3. **Make a plan** for development actions

Three levels of analysis:

1. Organizational level
Network of activities & information landscape

2. Group/activity level
Work activity (process) & information system

3. Individual level
Actions and information tools



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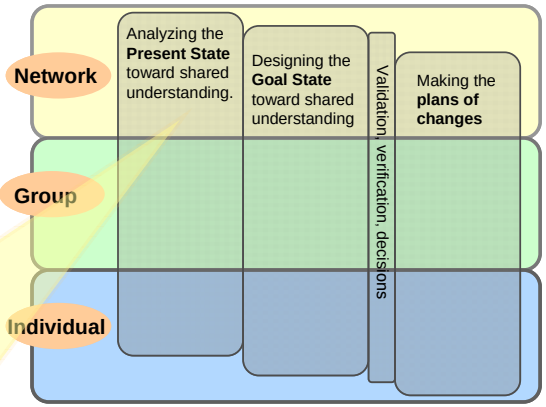
Level 1: Network of activities and information landscape

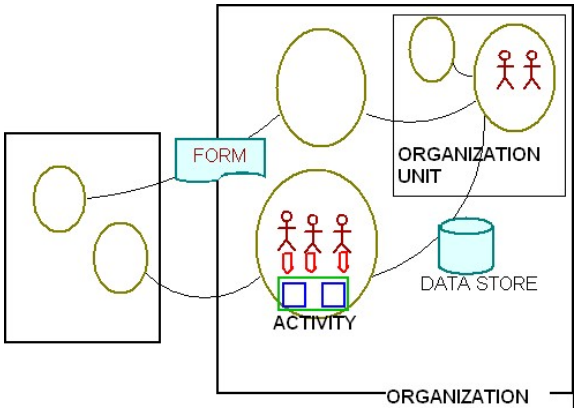


Level 1: Network of activities and information landscape. This level of description provides shared understanding of the network or the chain of activities focusing on:

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.



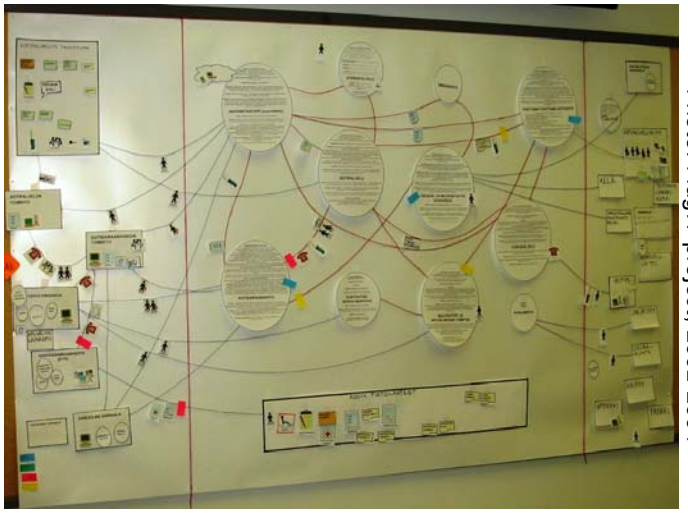


Photo: PlugIT project, 2001-2004

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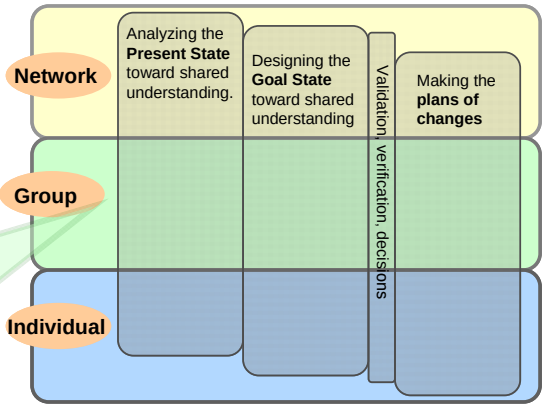
Level 2: Activity and information system

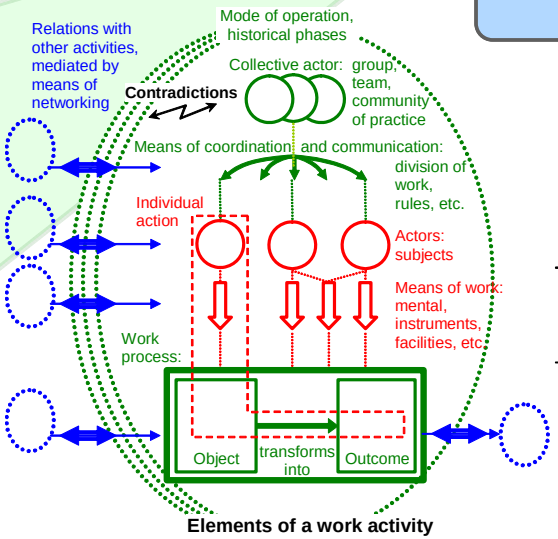
Level 2: Work activity and information system. This level zooms in to the essential activities focusing on:

Work activities and processes: professionals' work, goals, inputs and outputs of processes, users, tasks, tools.

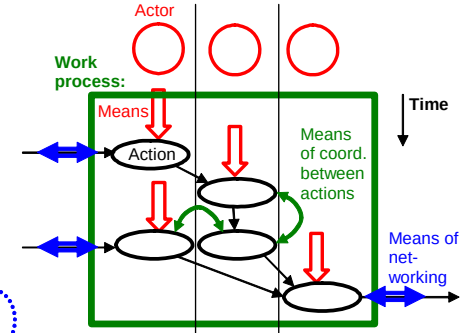
Information systems and data flows:
Means of communication and coordination, information needs and information tools in processes, information flows

Sustainability factors:
Appropriateness to group work, operational and technical suitability of ICT, usability, affordability, flexibility.





(Korpela et al. 2004)

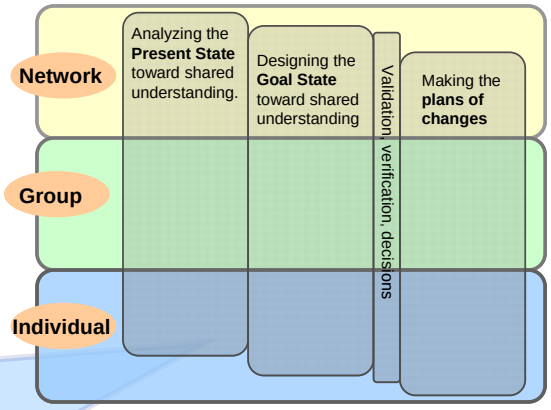


(Korpela et al. 2004)

Photo: ZipIT project

Photo: ZipIT project

Level 3: Actions and information tools

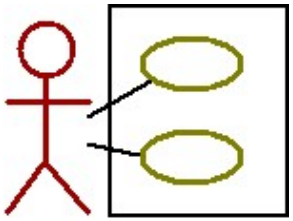


Level 3: Actions and information tools. This level of description provides shared understanding of the actions of individual actors focusing on:

Actions:
Information processing tasks, interaction between user and information tools

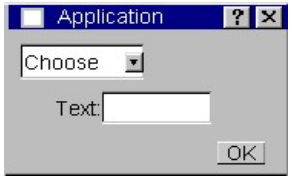
Information tools:
data compositions, interfaces

Sustainability factors:
Appropriateness to individual tasks, standards, usability.



USE CASES

Photo: ZipIT project



DRAFT OF USER INTERFACE

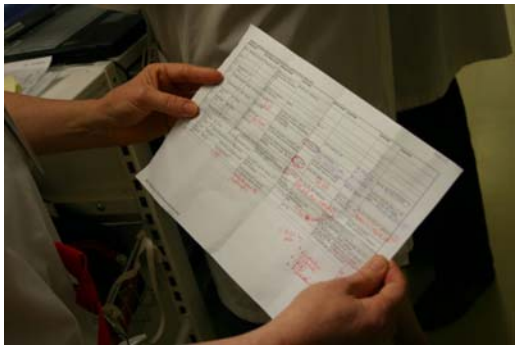


Photo: ZipIT project

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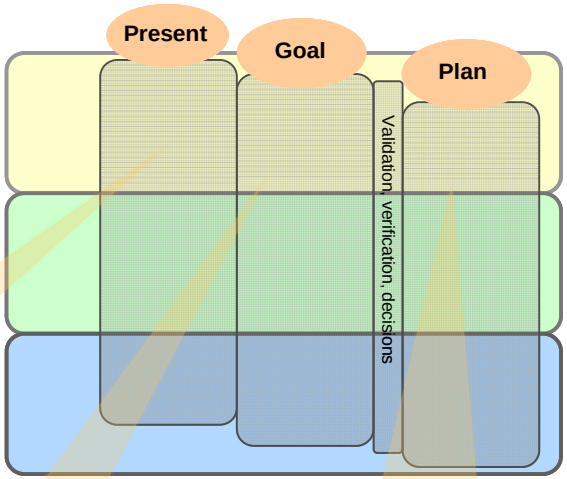
Phases

The Activity driven ISD model has three main phases of development. The phases do not follow each other like a water-fall, but usually it is necessary to **iterate**.



1.Analyzing the **present state** of an activity

For eliciting data e.g. interviews, observation, guided work-tours.
For validating data e.g. workshops and focus group sessions.

2.Desining the **goal state**
For goal state elicitation e.g. brainstorming and workshops.

What would be the perfect world look like?
How would we like the information system to serve us?

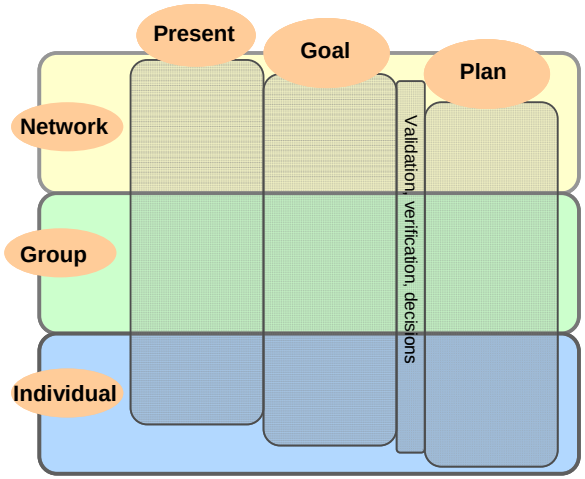
3. **Planning** how to reach the goal state.

Based on the present state and the goal state the development actions need to be planned and organized.

Also, the project can be **restricted** for example on the first phase if we only need to find out problematic points 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.

Sustainability



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 for sustainability are threefold:

- Firstly, the **capacity to sustain** the IS in use by the network of **supportive activities** and the possibility for **further development** must be ensured.

- Secondly, the **appropriateness of ICT** as means to use activity must be analyzed. New ICT must fit technically and be functionally correct.

- Thirdly, the demand of ICT for **improving the service** for clients must be real, and the impact of ICT for the service must be clear.

These criteria must be considered during information systems development that should empower user community, meaning **user participation**.

Participation

- advocating the users' position
=> **involving users** to the development process
- make the development process **transparent**
- **different** professionals have their own **viewpoints**
=> need to achieve **shared understanding**

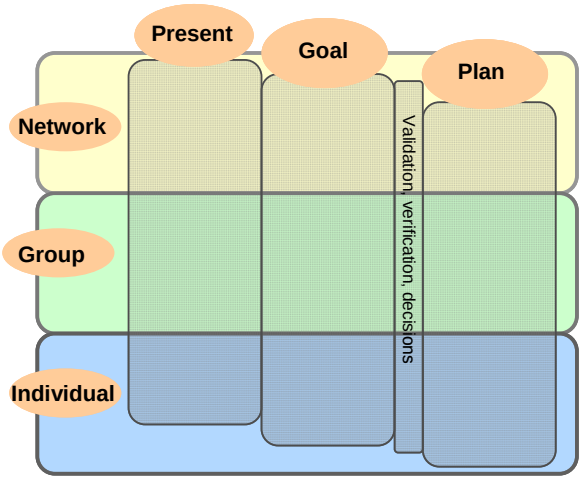


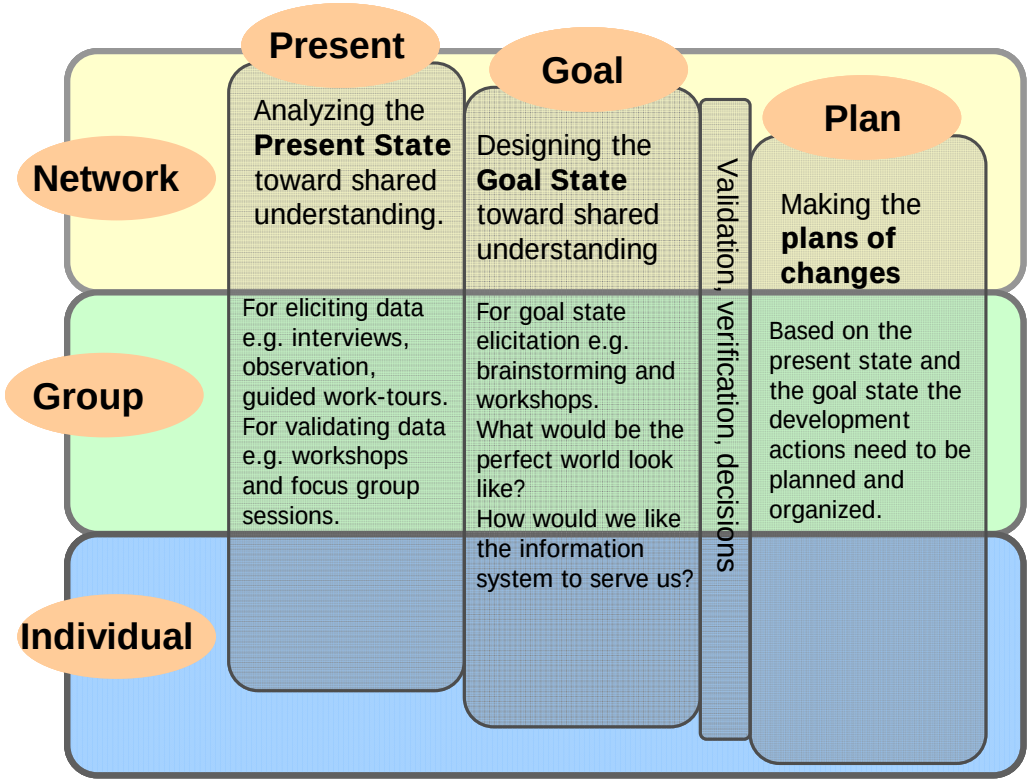
Photo: ZipIT project

As an example we had a pilot case where the task was to analyze how a new digital radiological imaging and archiving system would impact on activities in a health care centre, before purchasing any equipment. Radiological imaging unit produces services to other health care units, and information needs of those units do have impact on how radiological imaging should be arranged in future.

In couple of multi-professional workshops
the work flows and related information and information system were discussed.

With the help of the activity analysis,
- the changes were easy to locate,
- the goal state of an activity was possible to define and
- ensure the suitability of technical solution to the workflows.

Summary & Discussion



When it comes to requirements of appropriate and sustainable information system, **user participation is one key element**.

Activity driven ISD model can act as a **tool in decision making** and practical realization of IS development and work development. It is possible to illustrate the **real impact of ICT for services**, and this way to improve ICT's **suitability** to work.

Clinical staff and people operating with development activity have a **tool to analyze the present state**, **ideate the goal state** and to **plan 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 **shared understanding** of the development and make the development process more **transparent**.

Acknowledgments:

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References:

[1] Korpela M, Mursu A, Soriyan HA, Eerola A, Häkkinen H, and Toivanen M. IS Research and Development by Activity Analysis and Development - Dead horse or the next wave? In: Kaplan B, Truex III D, Wastell D, Vood-Harper AT, and DeGross J. *Information Systems Research – Relevant Theory and Informed Practice*, Boston: Kluwer Aca-demic Publishers, 2004; pp 453-471.

[2] Kuutti K. Activity Theory and its applications to informa-tion systems research and development. In: Nissen H-E, Klein HK, and Hirscheim R, eds. *Information Systems Re-search: Contemporary Approaches and Emergent Traditions*, Amsterdam: Elsevier, 1991; pp 529-549.

[3] Engeström Y. Activity theory and individual and social transformation. In: Engeström Y, Miettinen R, and Punamäki R, eds. *Perspectives on Activity Theory*. Cambridge University Press, Cambridge, UK, 1999; pp 19-38.

[4] Mursu A., Luukkonen I., Toivanen M. and Korpela M. Activity Theory in information systems research and prac-tice: theoretical underpinnings for an information systems development model, *Information Research 12/3*, 2007. http://informationr.net/ir/

[5] Bødker K, Kensing F and Simonsen J. *Participatory IT design*. The MIT Press, Cambridge, 2004.

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