

AT in integration requirements assessment

Abstract. Information is the precondition of all health care delivery. At present, software interoperability does not meet the users' nor the customers' needs. Numerous existing software applications have to be integrated, and the solutions should be as open as possible. It is argued that new methods for integration requirements assessment are needed. Activity theory provides a good context-sensitive framework for this goal. In this paper I present a proposition for a rapid integration requirement assessment method applied in Finnish maternity clinics' work.

Introduction

In health care, electronic information systems have been in use for more than three decades and still a considerable part of the information that is needed in clinical work is transferred on paper or telephone. False or inadequate information, as well as lack or delay of information may harm customers in many ways (e.g. Lederman & Morrison, 2002; Bates et al, 2001). Therefore, in their present form, information systems do not support the mission of health and social care. A context-sensitive and holistic approach is important when knowledge work – such as health care – is analysed. Activity theory is a logical choice for theoretical framework in systems development for many reasons. It provides a framework for describing human activities and phenomena at various levels. It deals with activities that include individuals, the environment and the social context. Like health and social work, it is also multidisciplinary by its nature. (Kuutti 1994.)

IS's in health care – need for integration

There is an increasing amount of software applications in social and health care. Without integration separate applications increase the professionals' workload and even hinder their work. Primary and secondary health care providers use different kind of electronic patient records, legacy systems are maintained and new specialized applications are created. Data that have already been collected by one organisation are rarely available in other parts of the service chain. During one customer appointment, 3–5 clinical and administrative software applications may be used simultaneously, each with their own access codes, patient files and code sets. Data often have to be transferred manually from one part of the system to another. Information is also transferred in meetings, over the telephone, by fax and by postal services.

Integration begins with analysis of the present state. The first and most important step of application integration is finding out the existing functionality of the system and the users' requirements. As a result of this, a definition of the integration points in the workflow can be acquired. Only after determining the generic, non-technical aspects of the work domain one can continue with technical specifications: how the integration can be implemented and what tools and standards can be utilised (Mykkänen et al, 2002).

Activity-theoretical approach in IS integration

An activity is a mediated, collective and systemic entity that has an object and a desired outcome. It is a mutual enterprise comprised of several individuals carrying out various actions, not necessarily conscious of each other's roles. All activities are systems: they interact within their environments (networks) by receiving e.g. rules and objects from other activity systems and producing outcomes for other activity systems for further processing. (Engeström 1999.)

With the activity-theoretical approach it is possible to depict the various roles of information system within a work activity. Information systems are used as means of mutual coordination and communication as well as actual instruments, means of work. The rules of society are represented in every information system: e.g. professional secrecy and data protection legislation.

Observed needs and small alterations constantly transform the activity system, creating needs for further alteration. However small a change is, it may function as a catalyst for further changes in the system. Therefore indicating shortcomings in the subsystems, such as delays or limitations in the information flow, creates steps towards a more functional information system. Increased co-operation between the various actors and institutions is essential in achieving this aim.

The elements of a work activity, derived and elaborated by Korpela et al from Engeström's model, are illustrated in Figure 1.

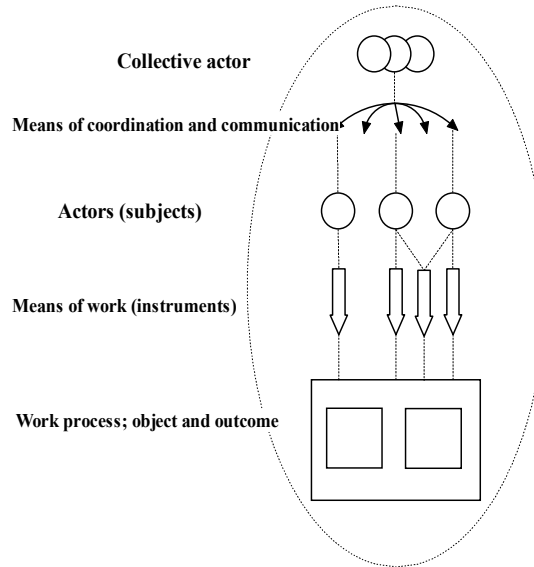


Figure 1. Elements of work activity (Korpela et al, 2002)

An iterative design and evaluation process where system designers work in collaboration with the users has become more popular. However, it may be a very arduous method (e.g. Beuscart-Zéphir et al, 2001; Carroll et al, 2002). An extensive knowledge and experience of the domain area is demanded specially when iterative design is done with a multi-professional group.

Soft systems methodology (Checkland & Scholes 1990; Checkland & Holwell 1998) can be considered a time-consuming method and hence not widely applicable. Business process re-engineering, having its roots in corporate management and economics, emphasizes too much efficiency and productivity and not enough the human elements. Over the time, various forms of ethnomethodology and participatory design have been used in developing work activities. Developmental work research and its modifications, e.g. the activity analysis, usually consist of observation and video taping of work, and several group meeting sessions during which the history and present situation of the organization – or neighbouring organizations – are discussed in detail (e.g. Engeström 1999).

All of the above-mentioned methodologies are found too laboured and/or slow for situations where

(a) a variety of existing software applications and institution-specific manual information processing methods are integrated (as opposed to creating entirely new application),

(b) human resources for R&D are scarce in both domain area and software company and

(c) next to no time can be allocated from the health service provider's side.

As these circumstances are almost always present in social and health care setting, it is my opinion that a rapid method for integration requirements assessment is needed. The method should offer an easily understandable and applicable framework and also, if possible, offer some tools for post-

implementation evaluation. No specific professional training (in either systems development or health care domain) or vast experience of participatory methods should be required.

Maternity care in Finland

In Finland, public health care, including maternity and child health services, is the responsibility of municipal health centres. A total of 10-15 check-ups are carried out during a regular pregnancy. Most of these appointments are with a public health nurse or midwife, and a physician examines the mother usually two or three times during the pregnancy. Several physiological parameters of both the mother and the foetus are monitored during the regular check-up visits. In addition, maternity clinic provides health education, prenatal training, psychological and psychosocial support, and guidance in family planning,

The clinics work in relationship with social services, obstetrical and/or gynaecological units, occupational health clinics, laboratories etc. Other network companions (stakeholders, Figure 2) are e.g. governmental actors, like the national Social Insurance Institution.

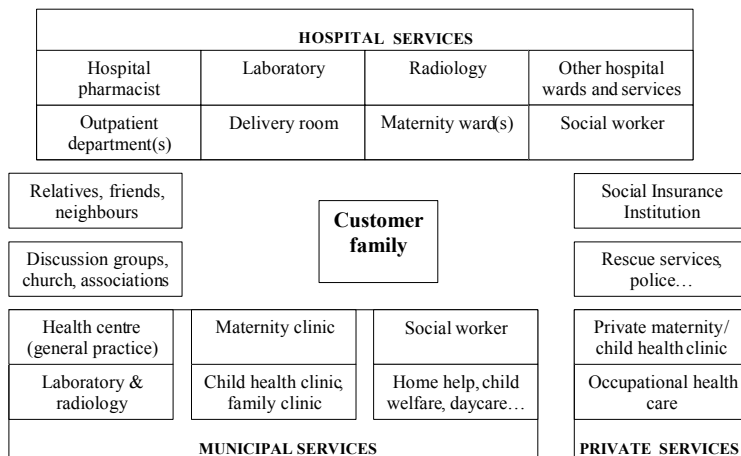


Figure 2. Collaboration network during maternity care (Silvennoinen, 2001)

In Finland, childbirth usually takes place in a public maternity hospital. Depending on the child's and mother's condition and mother's experience approximately 2-5 days are spent in the hospital. After the child-birth a public health nurse or a midwife from the maternity clinic visits the family at their home. The nurse needs the information from maternity hospital and vice versa. The pregnant mother's role in information process is significant: quite often she has the responsibility of carrying important information from one health and social care actor to another.

Information moves in various forms: verbally, on paper or ultrasound pictures. It is transferred through electronic systems, over the telephone, fax, and by postal services. Due to this, overlapping data are often collected.

Soon the child and mother become customers of a child health clinic and general health care (or her occupational health clinic), respectively. Unfortunately little of the data collected during pregnancy and childbirth are transferred to long-term medical records. Often the best source of information regarding previous pregnancies is an appointment card, kept by the mother between pregnancies.

Research method

My goal is to investigate how to reveal, describe and prioritise integration needs (information bottlenecks) for further utilisation in a given setting of co-operative and collaborative work. The aim in this particular case is to find out the generic integration needs for software applications that are already used in - or will later be designed for - maternity clinics. This is done by developing, testing and describing a rapid assessment method for integration requirements. An empirical study with the objective to investigate information systems and their use in three maternity clinics is in progress.

The research sites are three Finnish maternity clinics in three municipalities. The chosen clinics represent different environments and information system settings. Two group discussion sessions, each lasting for 2-3 hours are arranged in each research site. All sessions are either filmed or audio taped. The participants represent various professions: medical, nursing and social services, totalling 4-6 persons.

During the first session the participants are asked to tell with whom they need to exchange information about the customers and discuss the problems they have experienced regarding information flow. The participants are asked to describe the problems, lack of system interoperability, with clear examples. During the conversation, a “map” of stakeholders, used means of information sharing and its obstacles is drawn. The problematic points, as well as those functioning well at their present, are marked on the map with symbols.

Before the second session a summary of the findings will be sent to the participants. They are asked to check them for any misunderstandings. During the second session participants can also add new items on the list. The main task during the second session is to discuss how the group prioritises the problems and what they propose as solutions. After the second meeting, the participants are also given a questionnaire.

With this study we seek answers to the following questions:

- who are the actors (subjects) in this work activity?
- what instruments does the maternity clinic’s IS consist of (IS as means of communication/collaboration and means of work)?
- what is the present state of information flow (how easily is the desired outcome achieved)?

- what are the needs for integration and how are they prioritised (where could the work process be enhanced)?
- what kind of solutions does the group bring forward (ways to enhance the work process)?
- can the users' integration needs be defined and, furthermore, utilised when developing open application interfaces (can the results be generalised to similar collective actors)?

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