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Evaluation during design of a regional seamless network of social and health care services - information technology perspective

Pirkko NYKÄNEN *, Erkki KARIMAA +

** National Research and Development Centre for Welfare and Health*
Centre of Excellence for Information and Communication Technologies in Health Care
PO Box 220, FIN-00531 Helsinki, FINLAND
Pirkko.Nykanen@stakes.fi
+ The Association of Finnish Local and Regional Authorities
PO Box 200, FIN-00101 Helsinki, FINLAND
Erkki.Karimaa@kuntaliitto.fi

Abstract. This paper reports results from a constructive evaluation study where design of a reagional social and health care information system was assessed from information technology perspective. We studied the models of social and health care processes, the needs and requirements of the clients and users and the planned information system. Our results envision the importance to focus during the design on the service chain and process models, including strategic processes where the mission, vision and values of the organisation are represented. Also, the stakeholders' needs and requirements for the system need to be explicitly described and included as system functionalities and characteristics. Additionally, theoretical frameworks from health informatics are needed to understand the phenomenon under study, to build a model and to develop implementations and installations of the model in the social and health care organisational context.

1. Introduction

The project under study aimed at developing a regional seamless network of social and health care services using information technology and systems as means for developing new services and for integration of existing ones.

A seamless service chain is understood as a functional model where the client's individual social and health care services form an integrated system. The seamless service chain utilises information technology network to make the client's social and health care information available for use in all service situations and places. The system uses a social insurance card as a guarantee of data security. This kind of network makes it possible to direct and monitor the client's progress along the service chain and to plan the delivery of services. The regional system has a web portal interface that provides access to all users to the whole service system (http://www.makropilotti.fi/english/).

2. Assessment and evaluation study

In this evaluation study we were interested in two basic questions: When an information system is developed, is it performing as it has been planned, and could it be improved?

And, when the developed system in introduced into functioning social and health care organisations, are the effects and impacts achieved those that were planned?

As defined by Friedman and Wyatt there are five major aspects of interest in evaluation of a health or medical information resource (Friedman and Wyatt 1997, p. 42): The clinical need the system is planned to address, the process used to develop it, the system's intrinsic structure, the functions it carries out and its impacts on users, patients and other aspects of the health care environment.

Because the system under study, the regional seamless social and health care information network, is still at the early implementation phase, our results from the evaluation study at this phase are related only to the design phase. We did not have possibilities to assess introduction of the system into social and health care practice. Therefore, we focused on the developed models of social and health care processes, on the collection of needs and requirements of clients and users, and on the planning of the information system - from the information technology perspective. Referring to Friedman's and Wyatt's "list of fives" above we have focused on the need the system is planned to address, on the process to develop it, on the system's intrinsic structure and its planned functions.

Our evaluation study was planned to follow the approach developed in the VATAM - project (EU TAP Programme Project HC1115, http://www-vatam.unimaas.nl). First, we defined the *scope of the evaluation* to be constructive with the purpose to produce information that can be used to support further development and installation phases in the system. Further we defined the *problem orientation* and concluded to avoid technology-orientation, but focus on how the designed information system is planned to improve information delivery and accessability in the the social and health care organisational context. Thus, our *assessment problem* was: How information technology can be used to build a seamleass network of social and health care services. The system under study was at the design and early implementation *stage* and the evaluation results were seen important to support and guide further development decisions. The *stakeholders* in this project were many: Patients and clients of social and health care services, social and health care professionals as system users, decision makers at regional and national level, suppliers of information systems, and local authorities and other funding agencies. Our study focused on the needs and requirements of patients, clients and social and health care authorities.

We used as *evaluation criteria* in this study the following: Suitability and functionality of models and solutions for the purpose, their effectiveness, usability, efficiency, adaptability, conformity with the standards, safety, modifiability, maintainability, openness, scalability and transferability. Additionally, we studied how the decisions and plans made and models built had been documented, how readable and understandable the documentation was and how the selections and decisions made had been justified. From the technology viewpoint, we studied the life cycle and possibilities of the technological choices, safety and security, and management of failures and system misuse.

3. Methods

The methods used in this study were: *Inspections and study* of the project design documentation, and *interviews* of designers, developers, users and decision-makers involved. Because the project was at the design phase we did not have possibilities to test the implemented system with real patients or users. As a *frame of reference* for inspection and interviews we used standards when available, and methods and guidelines for good information system design practices. Additionally, we employed heuristic evaluation

methods for usability testing of the developed webportal in restricted use situation (Nielsen 1993).

As the evaluation study had a constructive nature we have followed the design and development life cycle and produced information for the project team in order to support them in further development. Additionally, this evaluation resulted in information that can be used to allocate resources and to make decisions concerning further research and development activities in health informatics domain.

4. Results

Essential parts of the planned regional social and health care information system would be a strategic model to represent the system's mission and vision and procedures how to implement that strategy, and the regional information model to represent the ontology of the domain including the concepts and their relations. These both would facilitate the interoperability of the planned regional system and the existing legacy systems. The focus in designing this regional social and health care service system has been on integration of the existing systems and services in such a way that information can be delivered and accessed throughtout the network. If the focus would have been on interoperability instead of integration the resulting regional system would represent also a regional information model that would form a basis for understanding and would contribute to harmonisation of concepts and terminology used in the whole reagional system.

Our evaluation study showed also that the design process has been focused on social and health care processes and therefore the supporting and auxiliary processes like management, personnel, economy, materials and information processes are not included. This means that these resources are missing from the social and health processes though they would be needed to implement these processes effectively. Also, when we analysed the service chain models carefully, we encountered problems e.g. with responsibilites of the processes and required resources for the processes. These lackings mean that we could not estimate ex ante resources needed and effects caused. The developed do not differ much from the current situation, rather they present the same functionalities in the same order, and implementation of these models may not cause changes into organisation's functional structures. But, new implementations based on these presented models may give better access to information and provide more information on processes, and thus it may result that service becomes more efficient and the quality of services may improve. And, as these new models aim at presenting a generic service chain model they may result in harmonisation and standards, and through the use cases they serve as a basis for generic IT components and applications.

This kind of regional system has many types of clients, e.g. citizens, health care professionals, decision makers at regional and national levels. Also e.g. information, decision making and service chain processes are clients for the service system. The needs and requirements of all the clients should be explicitly described and mapped on the functional specifications. During design, choices have to be made clearly which and whose needs will be served by the system and which will be left out. This would help to differentiate between the different design levels; document user requirements and expectations, functional specifications and system specifications as separate, comparable documentations.

The target of the project was to develop a regional seamless information systems network. This means that the components of the regional system have to be integrated. The planned infrastructure does not require changes and modifications in the legacy systems, only adapters are needed to integrate them with the regional system. However, in the long

run the aim is to harmonise the components and to make them simpler. This requires that there is a real need to harmonise terminologies, concepts and classifications, and develop systems and servers that maintain and deliver the terminology and information model for all component systems.

The final result of our evaluation study at this phase is that health informatics as a scientific discipline and as a practise to develop information systems has to be a reference model and a theoretical background in this kind of project. Approaches and theories of health informatics and of developmental research are needed to understand the domain and the phenomena, to manage the design and development, to monitor and guide the progress and to support with organisational learning the design and development process.

5. Conclusions and lessons learned

The project aimed at development of a regional, seamless social and health care information system. In this kind of situation we need to harmonise also components and information models in the existing legacy systems. Harmonisation is required to minimise the number of overlapping applications and functionalities and to improve understanding of concepts and terminology. Therefore, in addition to generic service chain models, also a regional information model is required. This model should present definitions of concepts, relations and taxonomies of concepts and as such, this information model would provide possibilities for a regional electronic patient record that would be understandable and manageable by all components in the regional system, also by the existing legacy systems. This electronic patient record and the underlying information model should cover aspects of both social and health care and information systems and applications should make it operable for the users of services.

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