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Co-Construction of eHealth Services and Technology: Challenges and Solutions

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Abstract

Health care is a challenging context for ICT applications. There is no lack of studies reporting failed projects due to failure to merge professional, bureaucratic and technological missions, interests and focus. How could the experiences of these projects be structured and offered to others to support further health ICT projects? This paper describes a conceptualization of co-construction of a health service and information processing tools as a possible answer. It was created by structuring empirical findings of a case study with help of theoretical concepts. The conceptualization was further applied in two case studies as a framework to generate data for formative evaluation. The conceptualization helped in detecting the questions that the projects were failing to answer during the development. Co-construction requires multidiciplinary knowledge, and networking with experts already in the planning stage is beneficial in order to manage the complex parallel change process of services and ICT.

Keywords:

medical informatics applications, organizational innovation, technology assessment

Introduction

ICT is regarded as the key driver of economic growth in western as well as in transition economies. Due to increases in national spending on health care, the governments in welfare societies have increasingly turned to ICT in search of solutions for meeting the increasing demand without increasing the costs. Evidence supporting positive return on investments or the improved quality of the ICT enhanced health services is, however, shown to be still scarce (1, 2). Studies of eHealth projects report problems in merging technical and service orientations, interests and field-specific tools, finding the common language and tools for collaboration. A misalignment of interests, roles and communication of social and technical partners, poor management of the entity of sociotechnical change and a lack of usability and utility of the implemented technologies are also reported (3-5). The paper is based in a study that asks, how the experiences gained in these projects could be structured and offered for others to support future health ICT projects to develop systems in a more appropriate way? (6).

Methods

In an attempt to answer this question, empirical data was collected from an eHealth project. It was structured with help of three concepts that have been used in activity theoretical analyses of work as well as in the fields of ICT, CSCW and HCI studies (3, 7-10): a model of network of activity systems, the concept of developmental contradiction and a model of cycle of expansive learning (11-13). The model of network of activity systems was used for structuring the social and health care service activity in ex ante and ex post situation. The developmental contradictions were used to structure the needs and possible directions for development. The cycle of expansive learning was used to structure the process of solving the contradictions by generating and implementing a new eService concept in the eHealth project. (6).

This conceptualization was applied as a framework for structuring the results in Case Study I (for details, see 14). The data included statistics, annual reports, documents and interviews of the ex ante situation of the service, project plans and reports, meeting minutes, letters and other documents, and interviews of the stakeholders who had participated in the ICT project. Ethnographic participatory observation, interviews of the service providers and clients and documents of the ex post situation were collected. (6).

The empirical findings from Case I were reflected against theoretical concepts in an academic dissertation in order to create a preliminary, abstracted understanding of the findings. It was then applied in the second Case to study its potential in a context of formative and summative evaluation - providing information about an ongoing case and feeding the results back to the project managers for corrective action (see also 15). The data collected from the project and the service in transition was structured with helps of the conceptualization to study the project process quality. The analyses with conclusions were frequently fed back to the project for corrective action. The approach is likened to that of Constructive Technology Assessment (16). (cf.6).

In Case study III the conceptualization was applied to study, how the lessons learned in the previous cases could be used to support a project from early on. The conceptualization was used to generate questions for the project concerning the information that the project had collected

or planned to collect to extract and solve the developmental contradictions.

Results

Case study I: Elaborating the conceptualization

Case Study (14) structured the co-development of service and its tools in an eHealth project with theoretical concepts described above. The network of activity systems was used as a tool to structure data collection about the service prior to and after the intervention. The concept of contradiction and the model of expansive learning were used in structuring the change of the service. One cycle of expansive learning was not enough to depict the development of the service and ICT designed to support it. These remained as two separate foci of development with separate networks constructing them. Two parallel cycles of development - that of the service and that of the technology - were needed to depict the totality. How these two cycles interacted became the main focus of interest in Case Study I. The resulting conceptualization is presented in Figure 1.

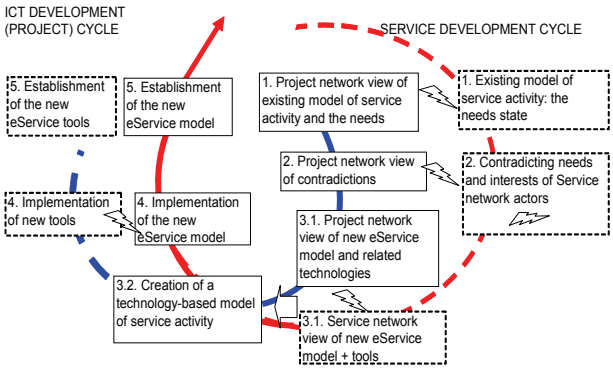

Figure 1 - Case I structured with help of the elaborated conceptual tools depicting the development cycle of the service activity (larger cycle), the development cycle of the ICT tools and the interaction of these two developments (6, 14)

The larger cycle in Figure 1 depicts the phases of service development. The smaller cycle depicts the phases of the ICT development. The cycles start with a conception of the service to be developed. This was different in the two networks. The ICT project view prevailed, leading to generation of an eHealth service concept that could not be implemented. The service concept was redesigned and implemented, but the ICT was not, leading to its abandonment after the pilot. The new eService model remained in use, supported by old technologies (telephone and fax).

Case studies II and II: The conceptualisation as a framework for formative evaluation

The conceptualization was used in consequent two case studies to assess its applicability in the context of formative project evaluation. In Case II, the ex ante and ex post service situation were delineated with help of the network model, the co-evolution of the eService and technology leading from ex ante to ex post situation with the elaborated expansive cycle model. Since the pilot was still ongoing, feedback could be provided to developers of the problems found in defining the developmental contradictions, as well as in the process of solving them. The project had, however, already developed the eService concept and its piloting was about to start when the study began. There was no time to redesign the system to solve the problems. There was a strong political will to get the piloting started quickly.

The implementation was not a great success. Of the four pilot areas, only three implemented the system, two stopped later, and the pilot use was minimal. Information of the ex post situation with unsolved developmental contradictions was collected and mediated to the project, to be used on a basis of preparing a new legislation. Some impact of the results can be seen in the consequent legislation that was issued to regulate the particular eService activity, and the related bill.

In Case Study III, the conceptualization was used to support the project which was in concept creation phase, to define the developmental contradictions and to solve them. The structured analysis of the project and the developmental contradictions, which the project was not addressing, were presented to the project actors. This led the project to go "back to basics", analysing the service activity, detecting bottlenecks and drafting of new eService processes where these would be solved. Information processes related to the service processes were delineated to produce the ICT requirements of different actors in different process phases. The project plans to spread the system to other health centres in the city as soon as the technology is redesigned according to the feedback.

Discussion and conclusions

As part of Case Study III, a workshop was arranged to collect feedback of the relevance of the conceptualization to the project participants. The initial results show that on a scale of 1-3 (1=no significance, 3=major significance), the city as well as the university regarded the support of "major significance" in 3 of 5 phases of development, and of "some significance" in the remaining two phases of development. The three most significant areas where the conceptualisation was regarded as important were: 1) structuring data collection from ex-ante and ex-post service situation 2) managing the co-development of the

service and technology 3) evaluation of the change in order to spread the system.

The results indicate that eHealth projects need better understanding of the multiple foci and objects of development. The two ongoing case studies (II and III) show some evidence of the usefulness of the conceptualisation for helping the future practitioners in the field to understand the challenges in ICT-enhanced service change, and find solutions to them. The network of activity systems proved as a useful concept to structure requirements from the ex ante service activity, and for planning the ex post service activity where the contradictions are solved. The model of expansive learnning with two parallel cycles can help manage the change and to evaluate the change process. The projects need to build a balanced network of actors who have adequate knowledge and the required skills for supporting the project in the required data collection and analysis as well as management of the entity. Further studies are needed for evaluating the impact of the conceptualization.

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