

Development and Implementation of IT Require Focus on User Participation, Acceptance and Workflow

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Abstract. The study "Online Care" follows a municipal project "Online Welfare" where a nurse's presence in the citizen's own home was replaced by online communication. The paper is based on a citizen's perspective and seeks to develop meaningful workflow for the benefit of citizens with medical problems. The study examines five citizens' opinions on whether online communication in a meaningful way supports the citizens in what they associate with a good life. In addition, relatives and the citizen's nurse were interviewed individually concerning the same issues as the citizens. The study has been approved by the Danish System of Ethics in Science and is conducted in collaboration with Aalborg University, Aalborg Municipality and DanAge, (NGO). The municipality's goal of efficiency and financial savings regarding "Online Welfare" was not honored due to insufficient network infrastructure and technical problems. An adoption barrier was that the municipality did not determine the efforts and the goal of the project, who could benefit from participating and the requirements of the professionals and the organization including ethical considerations. It was difficult to find citizens who were willing to participate. Citizens, who were included in the study accepted and adopted the technology however, "Online Welfare" could not replace the care they used to receive. Therefore, the offer was perceived as an "appendix" which tended to meaninglessness by some of the citizens. The nurses' perception of nursing care and their limited IT skills was a barrier to acceptance, adoption and development of technology opportunities in nursing. The citizens' disability, the screen appearance, and the technology setup meant that the citizens perceived poor usability of the equipment. The study showed a change in workflow, as the cooperation between the citizen and the professional developed. New roles occurred for the professionals. The citizens had many ideas concerning the development of the technology and the study recommends that users are involved in the development and implementation of welfare technology and telemedicine. The relatively small sample size of the study shows findings that must be clarified by further research.

Keywords. Home Nursing, Home Care, Online Care, Telemedicine, Online Communication, Workflow, Acceptance

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Introduction

“Online Care” was linked to a welfare technology initiative in 2011-2012 “Online Welfare”, which included 4 municipalities in Denmark. A digital platform was developed and tested among 112 citizens in 4 municipalities. In Aalborg, 37 citizens participated and tested the equipment. The test was completed by the end of October 2012.

The technology was based on online synchronous video communication between the citizens and the nurses. The communication took place via the internet; therefore the citizens needed an access to the internet with an acceptable band width. The citizens received a 22 inches touch screen with an integrated computer and web cam. The touch screen was connected to the internet, and by means of an encrypted connection the citizen was able to connect to the computer of the nurse at the office. The connection had to be encrypted as confidential health information was communicated as required by the Danish Data Protection Agency.

Deliberately the setup of touch screen and computer in “Online Welfare” intended to be easy to use for the citizens. There was an “on” and “off” switch which the citizens had to activate. Once the touch screen was activated all operations of the computer were performed by means of icons on the touch screen. The configuration of both the touch screen and the computer was locked. It was possible to connect a camera for close up takes to examine for instance wounds.

It was not possible for the citizens to contact the professionals via the computer. Only the professionals could contact the citizens. The citizens might, however, contact and communicate with their network (family and friends etc.) via the computer and furthermore surf on the internet. The nurses and the citizens made the appointment for the consultations via the phone or via SMS.

“Online Welfare” tested if online communication by means of screen was able to transform the employee’s unproductive transportation time into a virtual and meaningful service for the citizens. Furthermore it was the ambition to improve the citizens’ sense of confidence and at the same time reduce the overall costs. The focus was services within care and rehabilitation. The project was partly financed by the municipals and partly by funding from “The National Foundation of Welfare Technology” [1]. An evaluation report of a Consultant was handed over in November 2012 and it showed that the financial gain was lower than expected, partly because of problems with the technology and partly because of the poor network infrastructure (poor band width). Many other studies indicate technical problems as described by Currell [2, 3].

This study “Online Care” supplements the Spitze & Co report [2] with a qualitative study running from February 2012 – July 2014. The study focuses on and observes what happens with care when a professional’s presence in the citizen’s own home was replaced with online communication through the computer screen.

“Online Welfare” was motivated by the demographic trend towards more senior citizens, who will live longer with chronic diseases; while there will be a shortage of staff and financial resources [1].

The Danish Action Plan of Telemedicine and researchers recommend projects and solutions involving new technology that supports care and the individuals’ self-reliance and opportunities for participation in society [1, 3, 4, 5].

International research indicates that online communication as practiced in "Online Welfare" can support the citizens' well-being of everyday life [6, 7]. The study "Online Care" took up the challenge, as little research is focusing on patients, relatives and professionals' experience of care provided over a screen.

1. Methods

The citizens participating in the study "Online Care" included 3 men and 2 women aged 37-62. Three of them were married, while two lived alone. In total we had 4 contacts with each citizen. The health professionals were 5 nurses / nursing assistants. They were all key personnel in the online contact with the citizens. The data collection took place from August 2012 – November 2012.

The design was based on the project's aims and questions, its methodology and epistemology [3, 8]. The project's foremost perspective was based on the citizens' everyday life, experiences, attitudes and impressions. Consequently, the project was an explorative and qualitative study based on phenomenology in combination with a hermeneutic approach [3,8,9]. According to Kvale and Brinkmann it is recommended to have 10-15 informants in a qualitative study with interviews. However the size of the sample is strictly connected to the questions of the study, the combinations of the methods, and how often the researcher is observing the informants. In a study with the perspective of everyday life it is recommended to use interviews in combination with fieldwork. In such a study sample under 10-15 informants can be used. In addition the size of the sample was chosen to make the size of the empirical data manageable [9].

In relation to understanding the technology we have chosen a socio-technical approach. The technological innovation is a process where both the user and the technology mutually influence each other and lead to changes in technology and in the user's way of working. The socio-technical understanding included four factors: technology, knowledge, organization and product. All four factors are inseparable in each technology. Modification made in one of the factors will influence the other factors [10].

We selected the following methods: The ethnographic method, fieldwork to get an opportunity to have an informal conversation with the citizen in his/her private home, and observe the online contact between the citizen and the professional [11]. With inspiration from Jacob Nielsen's heuristic evaluation the usability of the software and hardware was evaluated by observation in the fieldwork and by interviews [12].

Another ethnographic method, cultural probes as photos was used to get a more thorough understanding of the citizens' everyday life, and at the same time strengthen the relationship between the citizen and the researcher [13,14].

Furthermore we used Face-to-face semi-structured interviews with interview guide. The interviews took place in the citizens' homes, and in the professional's office. Results from a previous similar study carried out in cooperation with the Danish organization DanAge (NGO) qualified along with field studies the interview guide. The objective was to get a balanced picture of the citizen's needs and experiences with "Online Welfare" [9,11]. The usability of the touch screen and computer was examined in relation to the following: sound quality, design, image quality and operation.

The purpose of this mixture of different methods was to achieve a methodological advantage [11].

The field notes were analyzed by means of analytic coding, categorizing and condensation with a focus on the interactions between the citizen and the professional in online communication. The condensed themes of the field notes influenced on the interview guide. The interviews with the citizens, the relatives and professionals were based on a phenomenological approach, an open mind and the interview guide. The data of the interviews were analyzed in the same way as the field notes [9,11].

The study was approved by the Danish Study of Ethics in Science and Data Protection. Ethical concerns are central in the project, because the citizens' everyday life, the professional's work and their integrity were at stake [9,15].

2. Results

2.1. *The organization*

The municipality's goal of "Online Welfare", i.e. improved efficiency and increased confidence of the citizens was not honored due to insufficient network infrastructure and technical problems.

An adoption barrier of the project was that the municipality did not determine the efforts and the goal of the project, who could benefit from participating in the project, and the requirements of the professionals and the organization including ethical considerations.

It was difficult to find citizens who were willing to participate. The use of the technology in the care was based on the conditions of the Municipality of Aalborg, (MAA), leading to a bureaucratization of care. The professional's online calls to the citizens were to fit into a busy and unpredictable working day. This meant a change in workflow of the professionals. The professionals experienced inadequate support concerning the use of the technology when they were unsure of the use of the equipment. The professionals felt that the technology did not provide optimal conditions for their work. They expressed insecurity and felt that it was another way to carry out nursing/care. They felt that they needed introduction and knowledge on how to manage the technology. After some time the professionals developed new ideas, but they never adopted and accepted the online communication as a full substitute for their presence in the citizen's home.

2.2. *The citizens' and the relatives' points of view*

Citizens who previously received "comforting visits" were no longer visited. Instead they were provided with an alarm in case of emergency. The citizens, who had the courage, were able to use IT, and willing to participate in the project were chosen as participants. Thus, participation was not closely linked to the care they received already. Consequently "Online Welfare" seldom replaced the care or rehabilitation, which the citizens already received. The main criticism of the citizens was that they were unable to call the MAA online through the screen.

The citizens experienced that "Online Welfare" could not replace the care they used to receive. Therefore, the offer was perceived as an "appendix" which tended to be meaningless by some of the citizens. However, the citizens and the relatives had many ideas concerning the development of the technology.

2.3. *Care*

Only typical conversations were observed during the field work. They lasted for a few minutes and up to approximately half an hour. The citizens reported that they often had to wait for the conversation, which often took place later than agreed. The professionals set the agenda for the conversations and they initiated and ended them. Clear differences could be observed in relation to how the communication proceeded. Content, tone, appearance, and language reflected whether the citizen knew the professional or not and how their relationship was in general. If a trusting relationship had been established more personal issues were brought up, just as the atmosphere and language had a more informal and often humorous nature. It was also evident that there is a correlation between the citizen's needs and the possibilities of the technology and this was of great importance when estimating the relevance of "Online Welfare". This was pinpointed both by the citizens and the professionals. One of the citizens was able to guide the nurse in using the technology. This meant a change in the relationship and in the role of the professional.

2.4. *Usability*

It was a problem that in some cases the band width was not strong enough to provide good image and sound quality. It was, however, experienced differently. The professionals were not impressed by the image quality. They found that they had difficulties in observing the citizens in a satisfactory way. They were not able to get a special camera for close up takes to function. The citizens experienced that the image quality was good. It was easy for them to see the professionals on the screen. One of the citizens found it weird to watch himself on the screen when communicating with the professional.

The sound quality was also experienced differently. The citizens found it easy to adjust the sound volume, and it was not a problem for the communication that the sound quality differed due to the bad connection. The professionals, however, experienced the sound quality to be a problem when communicating with the citizen. The professionals' communication is based on both verbal and nonverbal communication. They experienced that it was difficult to communicate in cases when both the sound and the image quality was not good enough. One of the professionals had trouble adjusting the volume.

One of the citizens had difficulties in operating the touch screen. She had a rheumatic disease that made it difficult for her to switch on the screen. All the citizens except one switched off the screen when they had finished the dialogue with the professionals. Only one of the citizens was online all the time. The professionals experienced the operation of the computer differently. The experience was closely connected to their experience with operating a computer in general. Some of the professionals had experience with Skype which ensured them an advantage. This was observed by the citizens.

The citizens had different opinions on the design of the screen and the computer. Most of them, especially the women, were not satisfied with the design. It was too big and ugly. They did not like the screen to be placed in the living room, but placed it in a

separate room. For one of the citizens it was difficult to get access to the screen in a small room because of his disability. Some of the citizens draw attention to the fact that if you were bed-bound it would be difficult to place the screen and to operate it from the bed.

3. Discussion

Research points out that it is important to determine the efforts and the goal of a project, who could benefit from participating in the project, and the requirements of the professionals and the organization including ethical considerations [6,15]. Therefore it is essential to involve citizens and professionals in the development of the technology [5, 6,17].

This study confirms these findings. The lack of involvement of the citizens resulted in poor usability. In addition the "Online Welfare" project did not seem to increase the security in everyday life of the citizens. Demiris' research shows that online caring can lead to bureaucratization of caring and medicalization of the citizens' daily life, if it is performed on the institution's conditions [15].

Research claims among other things that lack of human touch is a central ethical issue in telemedicine; however, human touch is not essential for all citizens (ibid).

The professionals in the study had skepticism towards "Online Welfare" because their understanding of good nursing is grounded in a caring paradigm based on Martinsen's caring philosophy, [18]. In this tradition the basis of good nursing is physical presence, human touch, and use of all senses. This understanding is also supported in Delmar's research [19].

Research shows that citizens can benefit from telemedicine when the online communication with the professionals is perceived as meaningful. The citizens can also benefit from fellow patient network if they have an online contact with citizens with similar problems [6,7].

Our study "Online Care" confirms the research of Demiris et al. showing that the citizens perceive the quality of "Online Welfare" individually depending on their needs, personality, and life situation [15].

Our study confirms Demiris' research (ibid), it shows that the citizen's experience of good care is achieved when this is given as a supplement to the care already provided in the home. It is essential that the professional and the citizen already know each other.

Currell et al. concludes that telemedicine has implications for nursing practice, because the communication and the relationship between citizen and professional change [3]. The professionals in our study confirm this research. They expressed that their usual practice and role of safeguarding was challenged. The professionals expressed that they lacked technical support during the workday, and our study shows that the professionals found it difficult to explore the possibilities of the technology in nursing.

Our study shows that there had not been any focus on the organization and the culture when "Online Welfare" was introduced in nursing. It may be a barrier that the technology was not fully adapted and accepted, and our study confirms findings in a study from 2013. This study shows that it can be a problem to introduce new technology in the professional practice if the technology is perceived as being contrary to the current culture which is perceived as the best practices in nursing. If the practice

is achieved through time and there is a consensus in the profession on the values in the practice, it is difficult to change practices. It has become a part of the culture. To change such cultures in a profession requires effort from the management in terms of breaking down the existing culture and build up a new one [20].

The size of the sample in the study has limitations as to make general recommendations. The analysis is focusing on the context of the informants, the interaction, and the technology in order to validate the finding of the study. The finding of the study is based on both fragments and coherent stories told by the informants as it was important to give each informant a voice. Attention has been drawn to the fact that the members of the project group had different pre-understanding. This was discussed and written down. The project group's discussion of all the empirical data has strengthened the validation of the study. The analysis strategy was transparent [9,21].

4. Conclusion

Our Study concludes that an adoption barrier was that the municipality did not determine the efforts and the goal of the project and who could benefit from participating in "Online Welfare". Furthermore the requirements of the professionals' skills and knowledge were not considered, and attention towards the organization including cultural and ethical considerations was not present.

We also conclude that it is essential that citizens and professionals are involved in the development and implementation of welfare technology and telemedicine.

It is also important to facilitate professional and ethical discussions to ensure the ethics and to make it possible to change the organization and workflow.

In addition it is important to offer education and training to the professionals so they are able to develop their practices. In this way they might overcome barriers and adapt the technology.

Furthermore we conclude that there is a need for more research in telemedicine, focusing on the citizen's experience of health in everyday life.

Finally we conclude that the Danish Government should recognize the importance of acceptable band width and sufficient high speed connections to the internet all over the country. This is a prerequisite for implementing of welfare technology and telemedicine.

The conclusions above are not to be generalized because the sample size, but the findings can be used and are already used by the Municipality of Aalborg (MAA) and inspiring for further studies which are initiated already.

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