

Collecting data in real time with postcards

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Abstract. The success of information technology (IT) in transforming healthcare is often limited by the lack of clear understanding of the context at which the technology is used. Various methods have been proposed to understand healthcare context better in designing and implementing Health Information Systems. These methods often involve cross-sectional, retrospective data collection. This paper describes the postcard method for prospective real-time data collection, both in paper format and electronic format. This paper then describes the results obtained using postcard techniques in Denmark and Australia. The benefits of this technique are illustrated. There are limitations in using postcard techniques and this paper provides a detail discussion about these limitations. Postcard techniques provide unique advantages in understanding real time healthcare context and it is an important technique to consider in IT design and implementation in healthcare.

Keywords. Health information systems, design principles, research methodology

Introduction

Information Technology (IT) holds great promises to transform the healthcare system [1]. However, the health care system is complex. Thus, methods and techniques, which can support understanding this complexity, are valuable.

While technological development is important for advancing use of eHealth the context at which the technology is in use is equally important. Successes and failures of intervention in healthcare are often not dependent on the technical aspect of the Health Information System (HIS) but the context of implementation and utilization [2]. In this regard, the human factor and usability aspect of the HIS as well as the socio-technical integration play significant roles [2, 3].

In order to achieve better outcomes for IT development and implementation within the healthcare context, various approaches have been used to understand the context at which the HIS is intended for. These approaches, such as human factors engineering [4] and participatory design [5] emphasizes the need to involve users and to understand the requirements from end-users in order to achieve better utilization and integration of the HIS into clinical practice. Various data collection techniques have been used to collect data regarding user requirements. These techniques include classical ethnographic techniques like interviews and observation as well as the more sociologically based questionnaire survey.

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While using these approaches and techniques have met with some successes in improving eHealth adaptation and integration into clinical practice, the question of to which degree these techniques could truly reflect on the context remains. These techniques collect data by questions asked on a retrospective and cross-sectional basis as it takes place away from the use context. Therefore, the outcome depends heavily on participants' memory and recall. The underlying assumption of using these techniques is that the context at which the HIS will be utilized has certain level of stability. Secondly, it is assumed that users when approached are able to recall the context retrospective in a comprehensive manner without being affected by time and recent events.

In this paper, we describe a data collection instrument, which we name the "post-card" technique to collect data - if not in real time then as close as possible to when events take place. This technique has been used both as paper post-card in Denmark and in an electronic post-card form in Australia. The "post-card" technique has been previously mentioned in architecture literature to pursue experimental design in a responsive way [6]. This technique has also been used to evaluate newsletters [7]. Different groups in healthcare have also utilized post-card techniques, to collect data in real time [8, 9]. The postcard technique has been used to understand health and safety issues in mass gathering in Australia [8].

The post-card technique allows collection of data with less recall bias, outcome bias or emotional bias. This paper describes the post-card technique used and results of the pilot studies. It provides a discussion regarding the benefits as well as challenges of using this technique. Finally, the paper suggests areas at which this technique could be useful in eHealth research and suggest further research in these areas.

1. Method

The post-card technique aims at collecting reflective and situated data retrospectively, however as close to real time as possible. This involves participants to agree to describe their thoughts as the event unfolds instead of recalling by memory as in classical interviews. This particular technique makes it possible to do data collection over time and while the respondents remain anonymous if relevant. Because of the longitudinal nature of data collection and the problem of maintaining a direct communication between the researcher and the often large number of participants, the post-card collected data tends to be short in length but rich in contextual insights into the environment, the culture, the context, and sometimes the emotion of participants. The analysis of this particular type of data collection assist in the design of eHealth as it delivers subjective pieces of information from users adding to the understanding of the patchwork of the contextual environment.

1.1. Traditional Paper post-card

The Danish experience was established in the MaXi project – a project designing information services supporting diabetics' self-regulation in their everyday life [10]. The project had a participatory design approach that involved eight families with a total of 30 members aged between five and 66 years. At least one family member had diabetes. The families participated in their spare time and the post-card techniques were, among other reasons, used to maximize the participants' engagement, during the

project while disturbing them as little as possible. After a short visit to the families homes each family member were given seven postcards (one for each day in a week) with a pre-phrased question, “where are you and what would you like to know?”. The ambition was to get data on types of information that was important to the users and the users were to make a post-card whenever they found themselves in a situation where they felt that they needed support or information related to diabetes. A pre-post-card interview was focused on the same issue and the postcards was to continue the data collection process after the interview and to invite participants to reflect on the issues discussed during the visit in their own tempi without time constraints. The postcards were analysed using a grounded theory inspired approach [11].

1.2. Electronic Post-card

In the Australian experience, participants were invited to provide responses in an electronic post-card form. The study was to investigate workplace learning and support for junior doctors during the first few months of their internship. The study aimed to develop decision support and educational support, using IT tools, for junior doctors in order to improve workload and patient outcomes. The data collection process aimed to understand working environment, context as well as knowledge and skills required by medical interns in their first few months.

Participants were sent emails, inviting them to send “electronic post-card” on three questions of “what have you learnt last week?”, “what have you done well in the last week?” and “what did you wish you have learnt from medical school last week?”. Reminder emails were sent on a monthly interval.

The “electronic post-card” was collected anonymously. The data was analysed using grounded theory inspired approach [11]. The grounded theory approach uses inductive reasoning, and data was analysed using open-axial and selective coding method [11].

2. Results

We received 72 paper postcards from the diabetes families, corresponding to a response rate of 40% (excluding the children under the age of 7). The postcards were relevant in relation to collect reflective, additional and situated data but were also complementary to the interviews: they gave the participants a different possibility to communicate and especially teenagers and introvert participants who had been rather short on words during the interviews were the most active when it came to sending postcards. The response rate for the electronic post-card was 25%.

By combing the data from two studies, we found that this data collection technique facilitated an understanding of the contextual environment that IT might be utilized and designed for. The results are further grouped into four different aspects: state of emotions, factual, tactical and growth.

State of emotion: The Australian study provided a sense of participant’s state of emotions. This is demonstrated through letter case and sentence structures. The responses revealed anger via using capital letters for some words as if the participant is shouting. Some responses demonstrated frustration via using exclamation marks multiple times at the end of a sentence. There were however, some responses, which showed satisfaction with their responsibility and role.



Figure 1. Examples of postcards with ideas for design for supporting families with diabetes.

Factual: The results showed that post-card technique allows the collection of real-time factual understanding of the event. This is particularly important in events which might only happen infrequently. In the Danish study, this included insights to everyday situations like biking to and from school, meetings at work, shopping, going to a café or party. In the Australian study, this included areas such as medication administration, procedures and policies as well as practical skills.

Tactical: Post-card technique allows the collection of data enabling subsequent actions - tactical data, which might only be apparent for first time experience. As the data collection techniques allow real time data collection, these data could be captured. In the Australian study, this included areas such as providing a consultation referral to a particular team and requesting a particular test. This data is very helpful in understanding information and decision support that interns might need.

Growth: Finally, as the post-card technique collects data close to or in real time, however retrospective, it provides a conceptual map to understand participant's journey over time. This aspect was significant in the Australian study, where the data showed the growth of an individual into the role and responsibility from student to internship. In the Danish study a pattern evolved of typical situations with need for IT-support during the families' everyday life in a well-defined period of time.

3. Discussion

The post-card technique, either traditional paper post-card or electronic post-card allows the understanding of contextual environment at which HISs might be designed and implemented to support participants in their roles and responsibility over time. While many other techniques, such as interviews and surveys allow collection of contextual insight, this technique has the unique advantage of collecting data in real time. Two important concepts emerge as we consider the data collection in real time: context reflection and context stability.

When using interview or questionnaire techniques, participants are asked to reflect on the context and environment that they work in or their experience through the journey at a fixed time, typically after the outcome of an event is known. It is likely that the data collected will be affected by the outcomes of the event. In our study, it

seems likely that the emotional state of participants at the time of responding to data collection might impact on the data itself. As such, fixed time data collection technique might well introduce recall and reflection bias. The data collected is likely to be confounded by the outcome of the event and the most recent contextual environment. The post-card technique allows the documentation of context over time and the contextual insight is more likely to reflect real-time environment for design.

Our results show that in some situation, an understanding of real time data is important in the design of HIS in healthcare system. In the term of context and environment, it could be argued that the context at which HIS are being used is often assumed to be stable. As such, data techniques that provide a cross-sectional view in time are assumed to reflect the context. In our research, however, we found that the context and environment might change over time. This is evident in our work with junior doctors starting out as interns. Technology might provide significant help to users for the first few times that they need to complete the tactical task. Over time, however, the task becomes part of the norm or users might have developed work-around for the task. This type of data could be collected via the post-card technique and design and development of HIS could adapt to the context stability over time.

Based on our research, we suggest that post-card technique collecting real time data and therefore developing real-time contextual insights is an important technique for designing HISs and their implementation in healthcare. Post-card is especially useful in areas of moving or changing context, such as educational and information support for junior doctors and the private life of patients. It is important to note that our results suggest an important relationship between emotional state of participants and data. As such, to understand the context and environment of a journey, this technique is particularly helpful to provide insights without outcomes of the journey impacting on the data. Many treatment processes in healthcare is a journey and the journey is often as important as the outcome for technology design to support patients and careers. As such, this technique will assist in understanding the context for eHealth technology design and implementation.

The post-card technique allows data collection at the time that the event occurred. As such, it allows documentation of infrequent events through factual understanding of the event as it occurs. This will allow HIS design to provide a more comprehensive content design to support relevant tasks. The post-card technique shows growth of participants over time and therefore the interaction of participants with HIS changes over time. HIS design will need to be dynamic and responsive over time in order to continue its role in supporting and engaging users.

There are challenges faced using this technique. The first challenge is the response rate. This is particularly a problem with electronic format. This could well be due to the fact that physical post-card provided participants with a sense of commitment by the research. The authors are conducting further research in using electronic post-card to understand this problem.

Secondly, the data collection process is a one-way communication. This technique does not allow prompting or clarification. As such the data collection is often less in quantity but rich in quality. The anonymous nature of the data collection process precludes the ability for the researchers to further understand the interaction between context and individual.

Finally, the analysis of the data involves collective analysis and therefore it provides a collective view of the context. It will be difficult to engage users in the design process through the whole journey. This technique therefore dissociates the time

synchronicity between contextual insight and the design process. Pilot testing of HISs within a particular context is a big challenge that is difficult to resolve.

4. Conclusion

In this paper, we describe the post-card data collection technique and its utilization in healthcare and HIS design. We describe both traditional physical post-card and electronic post-card. We provide a framework for data analysis and argue for a need to consider context stability and context reflection in design of HIS. The post-card technique allows real time data collection and therefore the construction of real time contextual insights. This could be used to further develop our understanding in healthcare environment, especially for studies, which involves understanding of a journey of patients living with a chronic diseases or health care professionals engaging in developing and/or using HIS. While there are challenges in using this post-card technique, we show that it is an important data collection technique to be considered in socio-technical approaches to eHealth research.

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