

Identifying Key Components of Services in Healthcare in the Context of out-Patient in Norway

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Abstract: This paper discusses components of service in healthcare. Four components of a service (service customer, service worker, service setting and service process) were introduced. Yet these components have not been explored in healthcare cases. We identified the key components through our case study with out-patient histories, involving electronic health record systems. Based on our analysis we propose a set of components to be considered for designing stakeholder-centred services in healthcare. The result of this study might be useful to the health informatics researchers to better understand the service interactions in today's healthcare in a more analytic and holistic way by taking the service engineering perspective, at the same time to the service engineering or design researchers to have a deeper insight of the services in healthcare and the components to be considered when designing the services.

1 INTRODUCTION

The service delivery process in healthcare is complex (Reichert, 2011); designing healthcare services can therefore be challenging. Healthcare services involve many actors, who work with different agendas, have highly specific knowledge, and who have tasks that are intertwined with other organisations. eHealth, a healthcare service that is supported by telecommunications and information technology (Mitchell, 2000), complicates the service delivery process even further. While eHealth technologies break down barriers of time and place, thus bringing people and resources together to provide healthcare services in more efficient ways (Hesse and Shneiderman, 2007), it also generates various interactions between many actors and systems which were absent in conventional health service situations.

Involving eHealth technologies in today's healthcare service is not uncommon. For instance, while a patient has a consultation with his/her general practitioner (GP), the GP looks up the information from the previous consultation(s) through an electronic health record (EHR) system. The use of such technology changes the healthcare practices and consequently can affect patient's life (Rodolfo et al., 2014). Therefore, there is a need to understand the complex service delivery process in

healthcare in an analytic and holistic approach. Such approach might contribute to better assess the existing services in healthcare, which can be a starting point for designing improved services.

Gadrey (2002) introduced three components of a service: service provider, customer/client/user, and transformation of a reality. Fisk et al. (2013) presented and defined four components of service and the definitions are as below.

- Service customer: the recipient of the service
- Service worker: the contributor of the service delivery by interacting with service customer
- Service setting: the environment in which the service is delivered to the customer
- Service process: the sequence of activities essential to deliver the service

Yet these components have not been fully explored in today's complex healthcare settings. Our research question is "What are the key components in out-patient services?"

The rest of this paper is organised as follows: We first describe our research approach, context, methodology, and methods for data collection and analysis in Section 2. In Section 3, we introduce two out-patient histories. We then present the results from our analysis in Section 4 and discuss the results in Section 5. In Section 6, we discuss the limitations of this study. Finally, we conclude our study and suggest future research in Section 7.

2 RESEARCH APPROACH

We applied a qualitative methodology to investigate our research question. We conducted a multiple case study using two out-patient histories in Norway from September-October 2013. Case study is defined as “scholarly inquiry that investigates a contemporary phenomenon within its real-life context (Yin, 1994).” Multiple case study is instrumental study which allows researchers to understand and analyse several cases across settings thus leading better theorising (Stake, 2005; Baxter and Jack, 2008).

Data was collected through conducting document analysis, observations and interviews at a surgical out-patient clinic in a hospital in Norway. Due to ethical consideration, a chief nurse explained two patients’ histories by showing the electronic documents in an EHR system and other relevant paper documents; no direct access to the EHR system was given to the researcher. Semi-structured interviews with the chief nurse followed after the nurse’s explanations. To obtain deeper insight in the histories, we conducted observations and unstructured interviews of a secretary working at the hospital’s post/document centre, a medical doctor (specialist) and a health secretary working at the clinic. During the observations, the researcher took notes and some photos of the documents were taken. All interviews were audio-recorded. Email exchanges and telephone conversations supplemented the data after the interviews.

Document analysis is a systematic method for reviewing or evaluating documents, which is unobtrusive and nonreactive when obtaining empirical data (Bowen, 2009). Observation is a useful data gathering method in naturally occurring settings and it helps the researchers to understand the users’ context, tasks, and goals (Rogers et al., 2011). Unstructured and semi structured interviews can be most suitable when the researchers want to have a deeper insight of a problem domain that is not familiar by giving the participants the chance to educate the researchers. (Lazar et al., 2010). Interviews and/or observation are often used to establish credibility and minimise bias of the data from document analysis, as a means of triangulation (Bowen, 2009). Triangulation is a process of using several sources of evidence to clarify meaning and verify the repeatability of an interpretation (Stake, 2005).

We analysed the collected data of two out-patient histories using qualitative content analysis (Graneheim and Lundman, 2004). Thematic analysis

(Fereday and Muir-Cochrane, 2006) was used to fine-tune the analysis.

3 INSIGHT OF THE PATIENT HISTORIES

In this section, we introduce the patient histories and explain how we analysed our data. First, we briefly describe the two out-patient histories. Second, we present the process of our analysis.

3.1 The Out-patient Histories

The first patient history covered a period of ten and a half months. Different places were involved in this case, including a GP centre and two hospitals. Several stakeholders were involved: a patient, GP, secretary, radiologist, minimum two specialists, health secretaries, and nurses from the hospitals. Three different health information systems were used: a GP’s EHR system, a radiology information system (RIS), and a hospital EHR system. These systems were used to store and share the patient related information. The GP’s EHR system and the RIS could communicate with the hospital EHR system in a limited degree (e.g., sending and receiving electronic referrals or results of computed tomography (CT)).

The second patient history covered a period of two and a half months until the time of the interview and was still ongoing. Different places were involved in this case, including a GP centre and three hospitals. Even more stakeholders were involved: a patient, GP, radiologist, two pathologists, minimum three specialists, secretaries, health secretaries, and nurses from the different hospitals. Four different health information systems were used: a GP’s EHR system, a RIS, and two different types of hospital EHR systems. The GP’s EHR system and the RIS could communicate with a hospital EHR system in a limited degree, like in the first case. However, the other hospital EHR system could not communicate with the three other systems at all. Therefore, more interactions with physical evidence, such as a postal letter, were generated to cover the communication barrier (e.g., a specialist received a referral via postal letter).

Figure 1 shows the communications between the stakeholders in the first out-patient case and Figure 2 shows the communications between the health information systems in the first out-patient case.

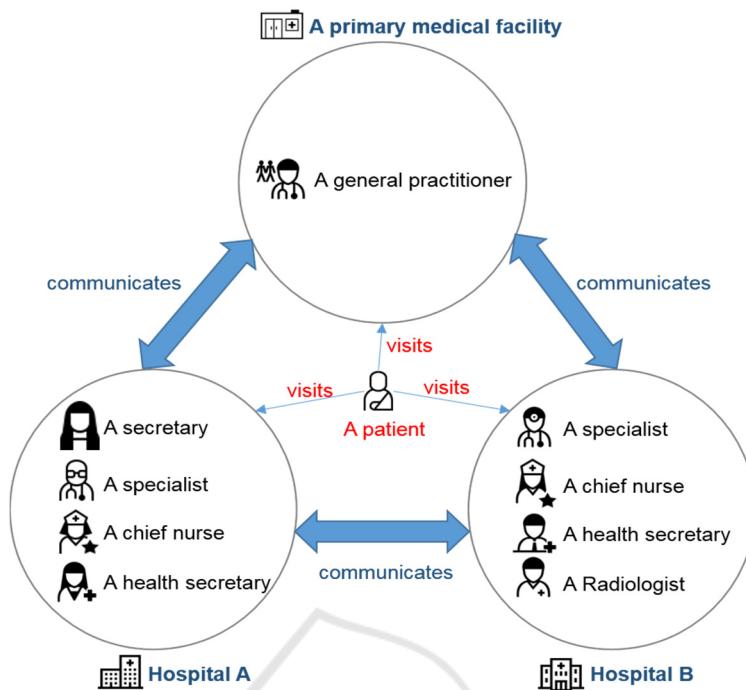


Figure 1: Communications between the stakeholders in the first out-patient case.

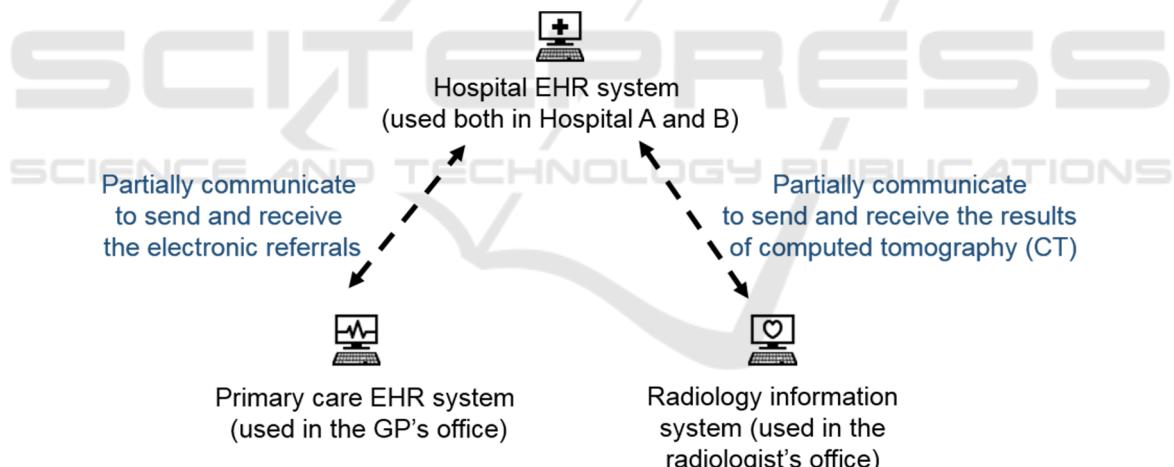


Figure 2: Communications between the health information systems in the first out-patient case.

3.2 Data Analysis Process

Based on the data collected in the researcher's notes, audio files, and photos taken, we constructed each patient's journey using excel spreadsheet. We identified key components of services in healthcare by improving the templates of the journeys in an iterative manner.

We constructed the first version of the journeys using a 'service blueprint (Stickdorn and Schneider, 2010)' method which includes the roles of the

involved stakeholders, the places where the events happened, and the contexts of the events. We found that the stakeholder is either service customer or worker, and that the place is the service setting. We learnt the events can be recognised as small units constituting the entire service provision. Therefore, we call the context of the event as **sub-service provision context** and add it as a key component of services in healthcare.

We then constructed the second version of the journeys by improving the first version. While we

were doing this, we discovered that some events contain a sender, a receiver and an object. We also added the date for each event in the second version. We learnt that the date can be recognised as an indicator in the service process.

Finally, we could develop a systematic template that shows the patients' journeys (third version). We added the overall aim of the service and the identifier for each event. We distinguished the event involving a sender, receiver and object as a *touchpoint* that indicates an interaction between two stakeholders. We also found that each touchpoint contains a communication channel that is used in order to deliver the object to the receiver. We identified the other events as actions when there is no such interaction. We discovered that some touchpoints are electronic-based, occurring in or between the health information systems. For example, an electronic referral was sent from a GP's EHR system to a Hospital A's EHR system. We found that these health information systems can be seen as stakeholders that contribute to out-patient services. In addition, we identified various types of interaction in the patients' histories: human-to-human interaction (face-to-face or via telephone), human-to-physical evidence interaction, and human-to-computer interaction. We call the aim of the service as **service objective** and the type of interaction as **service interaction type** and add these as key components of services in healthcare.

People producing or maintaining an EHR system have influence on the interactions between a healthcare professional and the EHR system. We regard these people as **secondary service workers**. A patient can be affected by an interaction between a healthcare professional and an EHR system. In this context, we regard the patient as a **secondary service customer**.

4 COMPONENTS OF SERVICES IN HEALTHCARE

In this section, we first present the key components of services in healthcare, which we identified during our data analysis. We then present two examples (one for health service and one for eHealth service) of the services according to the key components we analysed from the patient histories.

4.1 Components of Health and eHealth Services in Out-patient Context

The out-patient histories include interactions situated in health service and in eHealth service. Here we define a health service as a conventional medical service not containing any interactions via electronic channels. We define an eHealth service as a service containing interactions via electronic channels. We identified the key components of health service and eHealth service separately.

The objective of the interactions situated in the health services was treatment. Thus, the service customers were the patients and the secondary service customers might be family members of the patients. The service workers were the healthcare professionals from different groups and organisations, like a GP and a nurse. The setting of the interactions situated in the health services were either a medical facility (e.g., a hospital) or a location where the patient has a touchpoint (e.g., a patient reads a postal letter at home or answers a phonecall at work). The processes of the health services were sequences of actions and touchpoints of the patients and the healthcare professionals. We found that the interaction type situated in the health services was either human-to-human interaction (e.g., a GP examines a patient.) or human-to-physical evidence interaction (e.g., a GP reads a postal letter from a hospital.). The health services involved sub-services (smaller units constituting the service) for the service objective (patient treatment). The sub-service provision context of the health services was either a service worker provides a service to a service customer (e.g., a surgeon operates on a patient to treat a disease.) or a service worker provides a service to another service worker (e.g., a health secretary in a hospital sends an out-patient note to a GP via postal letter.).

The objective of the interactions situated in the eHealth services was efficient communication among healthcare professionals. Therefore, the service customers were the healthcare professionals from different groups and organisations, while the patients became the secondary service customers. The service workers of the eHealth were the health information systems such as EHR and RIS, while the secondary service workers might be people producing or maintaining the health information systems. The setting of the interactions situated in eHealth service was the health information system software. The processes of the eHealth services were sequences of touchpoints via the health information systems. We found that the service interaction type

situated in the eHealth services was human-to-computer interaction (e.g., a specialist dictates an out-patient note through an EHR system). The sub-service provision context of the eHealth services was a service worker provides an e-service to a service customer (e.g., a GP's EHR system stores a referral, which can be seen electronically by a secretary in a hospital's post centre.) Table 1 shows the components we identified as the result of our data analysis.

Table 1: Components of health and eHealth services in out-patient context in a hospital in Norway.

Service type Component	Health service	eHealth service
Service objective	Treatment	Efficient communication
Service customer	Patient	Healthcare professional
Secondary service customer	Family member of a patient	Patient
Service worker	Healthcare professional	Health information system
Secondary service worker	None	People producing or maintaining the health information system
Service setting	A medical facility or a location where a patient has a touchpoint	Health information system software
Service process	Sequence of actions and touchpoints of a patient and health professionals	Sequence of touchpoints via health information systems
Service interaction type	Human to human or Human to physical evidence interaction	Human to computer interaction
Sub-service provision context	A service worker provides a service to a service customer or A service worker provides a service to a service worker	A service worker provides an e-service to a service customer

4.2 Examples

In this section, we present two examples of the services according to the key components we identified. First, we show one example for health service and then we show one example for eHealth service.

The following example shows the components we identified using a part of a hypothetical episode, in which a patient visits a specialist in a hospital.

- Service process: A patient comes to a specialist's office room, the specialist talks with the patient about his/her condition, and then the specialist examines the patient using a stethoscope.
- Service customer: The patient
- Secondary service customer: A spouse of the patient who accompanies the patient
- Service worker: The specialist
- Secondary service worker: None
- Service setting: An office room for the specialist at an out-patient clinic in a hospital
- Service interaction type: Human to human (the specialist to the patient) interaction
- Sub-service context: A service worker (the specialist) provides a service (examination with stethoscope) to a service customer (the patient).
- Service objective: Treatment

The following example shows the components we identified using a part of hypothetical episode that a specialist writes an out-patient note.

- Service process: The specialist navigates to a dictation module in a desktop-based EHR system and dictates an out-patient note into the system.
- Service customer: The specialist
- Secondary service customer: The patient
- Service worker: The EHR system the specialist uses
- Secondary service worker: The people who produce and maintain the EHR system
- Service setting: A desktop-based EHR system software
- Service interaction type: Human to computer (the specialist to the EHR software) interaction
- Sub-service context: A service worker (the desktop-based EHR system software) provides an e-service (electronic dictation service) to a service customer (the specialist).
- Service objective: Efficient communication

5 DISCUSSION

In this section, we discuss the above-mentioned results. We especially focus on the additional components we identified in the out-patient services during the iterative process of our analysis.

5.1 Service Type: Service vs. e-Service

Characteristics of e-services are different from the ordinary services since e-services involve interactions via electronic channels. Väänänen-Vainio-Mattila et al. (2009) claim that the characteristics of the service experience (inseparability, variability, perishability, and intangibility) are recognised for ordinary services and do not apply directly to e-services. Therefore, the components affecting ordinary service and e-service experience might be different from each other. We identified components of health service and eHealth service separately. We found that these components are not contradictory each other, but rather complement each other. For example, the eHealth service in the sub-section 4.2 can be followed after the health service in the sub-section 4.2 is done. But, it is also possible that an eHealth service comes before or during a health service. For example, the specialist can check the patient's information via the desktop-based EHR system software (In other words, the desktop-based EHR system software provides an electronic patient information look-up service to the specialist.) before the patient comes into his/her office. We suggest that all of the components should be considered when designing services in healthcare, because today's healthcare involves both health service and eHealth service. Holmlid and Evenson (2008) also argued that identifying clear genres (in this paper, we call these *service type*) and the components offers efficiency in service design.

5.2 Service Objective

In our case study, the purpose of the health service was providing treatment to the patients. However, in the eHealth service perspective, the purpose becomes efficient communication among healthcare professionals. Concerning these service objectives, it might be beneficial to better orchestrate the actions and touchpoints in service experience when designing services in healthcare.

5.3 Secondary Service Customer and Worker

In service dominant logic (Chandler and Vargo, 2011), interactions hidden from customers are not considered in value co-creation (Wetter-Edman et al., 2014). However, those interactions can affect the customers' service experience. For example, a patient's experience can be affected by the interactions between his/her GP and an EHR system. Alsos and Svanæs (2011) introduced the concept of primary and secondary user in eHealth services context. A primary user indicates a person who uses an information system directly, and a secondary user points out a person who relies on the primary user to get information from the system and who is affected by the primary user's experiences with the system (Alsos and Svanæs, 2011). In the eHealth service context, the patient becomes a secondary service customer and people producing/maintaining health information systems become secondary service workers. On the other hand, in a health service context, the family members of a patient become secondary service customers. Holmlid (2007) argued that the customer's customer (secondary service customer) is as important as the customer in service design. We postulate that considering not only secondary service customer, but also secondary service worker when designing a service, might contribute to better understanding the whole service delivery.

5.4 Service Interaction Type

A service consists of different types of interactions. "The service perspectives become a challenge to interaction design, and technology usage becomes a challenge to service design (Holmlid, 2007)." Paying attention on those types and considering them in appropriate manners when evaluating and designing service might be helpful to create consistency in service provision.

5.5 Sub-Service Provision Context

In a broad and holistic perspective, a service can contain several sub-services. For instance, an air travel service consists of sub-services, such as check-in, providing meal on the plane etc. In healthcare, many actors are connected to each other to solve specific tasks and eventually pursuit the ultimate goal: maximising health of the population in the society (Coast, 2004). Considering such sub-service provision types, it would be helpful to better

coordinate various interactions between different actors and systems in services in healthcare. In our case, no ubiquitous computing or pervasive technology originated sub-service was found. However, it might appear more and more in future services as the technology advances. Since the interactions originated from ubiquitous computing or pervasive technology happen without the customer's direct control (Cellary, 2015), it can be more challenging for us to well integrate them in service delivery.

6 LIMITATIONS

There are different types of eHealth service depending on who communicates with whom. We conducted our case study with eHealth services where healthcare professionals communicate with each other. Thus, the key components in other types of eHealth service (e.g., telepsychiatry where a psychiatrist communicates with a patient) might be different from what we identified.

Our case study was conducted with desktop-based eHealth services. Conducting a case study with a mobile-based eHealth service might lead to the results that are not the same as what we found from our case study.

7 CONCLUSION

Our research reveals that out-patient care includes interactions situated in both health service and in eHealth service. We found that these two different types of service consist of different components. We expanded the Fisk et al. (2013)'s four components of service (service customer, service worker, service setting, and service process) for services in healthcare by adding five new components: service objective, service interaction type, sub-service provision context, secondary service workers, and secondary service customer. Considering these components when evaluating service experience might support an analytical way of understanding the complexity in service delivery process in healthcare. This understanding might contribute to designing more stakeholder-oriented services in healthcare.

There is a need for a holistic and stakeholder-centred approach in designing and evaluating eHealth services. "the effectiveness of emerging eHealth technologies in improving the processes or outcomes of healthcare is unproven (Pagliari,

2007)." We envision further research in the form of empirical studies that consider the key components of services in healthcare when evaluating or designing services in healthcare. Investigating how to present or document all the actions and touchpoints of a service delivery process in more holistic way might also be interesting. Our research is based on document analysis, observation, and interview because of the challenges in conducting ethnography study with patients due to ethical consideration. Thus, we are also interested in investigating how to collect richer data that can provide a deeper insight of services in healthcare.

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