

Contextualising co-creation of value in electronic personal health records

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Abstract—This conceptual paper is a preliminary part of an ongoing study into take-up of electronic personal health records (ePHRs). The purpose of this work is to contextually ‘operationalise’ Grönroos’ (2012) model of value co-creation in service for ePHRs. Using findings in the extant literature we enhance theoretical and practical understanding of the potential for co-creation of value with ePHRs for relevant stakeholders. The research design focused on the selection and evaluation of relevant literature to include in the discussion. The objective was to demonstrate which articles can be used to ‘contextualise’ the concepts in relation to relevant healthcare providers and patient engagement in the co-creation of value from having shared ePHRs. Starting at the service concept, that is, what the service provider wants to achieve and for whom, there is little doubt that there are recognised benefits that co-create value for both healthcare providers and healthcare consumers (i.e. patients) through shared ePHRs. We further highlight both alignments and misalignments in the resources and activities concepts between stakeholder groups. Examples include the types of functionalities as well as the interactive and peer communication needs perceived as useful for healthcare providers compared to healthcare consumers. The paper has implications for theory and practice and is an original and innovative approach to studying the co-creation of value in eHealth delivery.

Keywords—eHealth; ePHRs; value co-creation, e-service; healthcare providers; healthcare consumers; peer communication

I. INTRODUCTION

This paper focuses on the co-creation of value in electronic healthcare (eHealth) services. Specifically, we focus on electronic personal health records (ePHRs) where information can be shared and updated by both the healthcare consumers, such as clients or patients (termed ‘patients’ for ease of reference in this paper) and his/her healthcare providers to improve patient centred health management [1]. Therefore, we seek to conceptually determine how this e-service can facilitate the co-creation of value for stakeholders using Grönroos’ Model of Value Co-creation in Service [2]. The objective of this paper is to contextually ‘operationalise’ Grönroos’ model from existing literature on ePHRS. Theoretically, therefore, we extend Grönroos’ model to the eHealth service domain to enhance health informatics and technical systems researchers’ understanding of the potential for co-creation of value with ePHRs. From a practical perspective, we offer insights for health service providers and

the technical or systems developers to assist with the design of their eHealth delivery system to improve effectiveness in facilitating value for, and co-creating value with, relevant stakeholders, including patients. Moreover, we provide the foundations for subsequent empirical testing of the Grönroos model in an eHealth context to aid further development and specification. Such an approach to research on ePHRs has yet to emerge in the health informatics literature, where there has been a strong reliance on consumer acceptance theories. Therefore, we regard this conceptual paper as both original and innovative.

II. BACKGROUND TO CO-CREATION OF VALUE AND ePHRS.

A. The Conceptual Model of Value Co-creation in Service

While the *service concept* and the *experienced service* concepts are the start and end points in this model, Grönroos [2] notes that the service is experienced throughout the process, rather than just those two points. In the central part of the model direct interactions take place that reflect value co-creation opportunities. He notes that these interactions should be regarded only as a *platform for co-creation* to be used in ways that positively influence the value-formation process for the parties involved. This metaphorical *co-creation platform* depicts the value co-creating *physical resources* (goods, tangible services) provided for the service that trigger or facilitate the activities of *contact employees, focal customers, and fellow customers*. These *activities* are identified broadly as *Accessibility* (physical, mental and virtual), *Interactive Communication* and *Peer Communication*, as indicated by the arrows in the model shown in Fig 1. Thus the co-creation of value arises from the resources provided and how the stakeholders engage in activities to facilitate such outcomes.

The concept of *accessibility* considers the variability and potential dependence upon the number of personnel available and their skills, as well as the number of consumers, and their degree of knowledge, who are involved in the process [3]. While *peer communication* occurs only between customers, Grönroos [2] states that the actions of fellow customers could impact on the communication between a focal customer and contact employee, highlighting the interrelatedness of the *activities* concepts in the model and the service provider’s need to ensure appropriate *resources* are made available.

IV. RESULTS

A. Contextually operationalising the Grönroos value co-creation model for ePHRs

Starting at the service concept, that is what the service provider wants to achieve and for whom [2], there is little doubt about the overall benefits for both healthcare providers [1, 4-6] and consumers [7-10] through having shared ePHRs. However, whether such an initiative can co-create value between these two parties and overcome the implementation, take-up and meaningful use issues, is open for discussion [1, 5, 7, 8, 11].

Referring back to the model presented in Fig 1, value can be regarded as a customer's realisation of value-in-use in a process where value co-creation is only one of three possible views or sub processes [2, 12]. For example, the value creation process can be one in which: (i) *the firm can act alone as a facilitator* of a customer's creation of value-in-use; or (ii) *the firm and customer can directly interact* in joint activities to co-create value, and that (iii) *the customer can act alone* and create value-in-use without direct interaction with the firm by harnessing resources that are closed-off from the firm [13].

From the studies selected, it is evident that the co-creation of value lies somewhere within these three view points. ePHR adoption by healthcare providers is often for their own value, but with a view to ultimately creating value for the patients [4, 6]. Having ePHRs may result in the co-creation of value formed by the interactions between the healthcare providers and the healthcare consumer in accessing, maintaining and managing the record for mutual value creation [7-10]. In this process, the consumer is considered to be an active partner in the co-creation of value and will be likely to not only access their ePHR, but to add information and manage this information in ways that are beneficial to his/her well-being [1, 7]. However, the literature suggests that the third view may also be in evidence regarding having an ePHR.

To truly co-create value, however, the systems need to include functionalities that support consumers' access to aspects of these documents [1, 10], as well consumers' capacity to manage their clinical documents and other health related information that they may wish to add to their ePHR [8]. Failing to take into account consumers' information needs and the challenges pertaining to engaging with ePHRs may lead to a poor fit [1, 8, 10], resulting in significant reduction of opportunities for any co-creation of value.

Returning to the model - we examined the literature to determine what are the possibilities for the *resource categories* and *activities* within the co-creation platform. In this work, the focus is on digital resources, rather than physical resources in the original model. In terms of *Digital resources* provided through this online environment, once the ePHR system is available, the core functions of this e-record system appears to be the sharing among healthcare providers of related health documents, such as prescribed medications, vaccination records, medical reports and images on clinical conditions, discharge summaries and test reports [1]. Additional functionalities for providers include appointment reminder and recall systems [4, 7, 10].

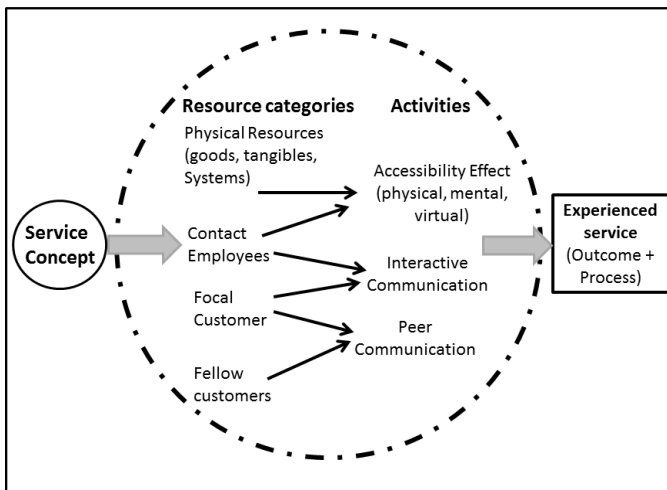


Fig. 1. Conceptual model of value co-creation in service [12].

Depending on how the interactions progress between the customer(s) and the other types of resources available, both the service and value formation takes different forms. Moreover, such 'value (-in-use)' [4] is not determined at the end of the process but can accumulate from past, present and future experiences. It is noted that value co-creation is only part of a customer's value creating process. Thus, the model "connects value co-creation to the customer's independent value creation" [2] meaning that the outcomes of the co-creation activities continue to influence a customer's value formation when they are alone or outside the actual co-creation interactions.

Considering the medical provider/patient engagement with shared ePHRs through Grönroos' conceptual model provides a more holistic view of the necessary interactions involved. In relation to ePHRs, these co-creation processes can be understood from existing studies. They help identify the value co-creation *resources* and *activities* that could be available in the *co-creation platform* and their possible impact on the *experienced service* outcomes and processes between stakeholders. To this end, the paper is structured as follows: First, we discuss the research design. Following this, we operationalise the Grönroos value co-creation model for ePHRs from the extant literature. Discussion and implications sections are provided and the paper closes with the limitations and future research opportunities.

III. RESEARCH DESIGN

Being a conceptual work, the research design focuses on the selection and evaluation of relevant literature to include in the discussion. The objective is to demonstrate how various findings in the articles identified can be used to contextually 'operationalise' the concepts in the co-creation of value model. Once articles were identified as being pertinent, they were assessed for their focus: a) healthcare provider only, b) healthcare consumer only, or c) a combination of both. The primary consideration for use was that they empirically or conceptually explore relevant healthcare providers' and patients' perceptions on their engagement in the co-creation of value from having shared ePHRs.

However, findings in healthcare consumer-centred studies, (i.e. those *focal customers* in a shared ePHR system), show a wider set of functionalities. These consumers believe that these functionalities would provide value for them to manage their health and their ongoing engagement with healthcare providers. In addition to online appointment booking, these include online information on doctors/hospitals, online consultation with practitioner or specialist, list of allergies or intolerances, accounting and fee information, being able to rate physicians, diet counselling or planning [7]. For patients living with chronic illness [10], they indicate a need for: a workspace to manage diet, exercise and illness-related tasks and a diary, together with other wish-list style functions such as an interface to encourage active participation in research, as well as resources to facilitate the ease of filling in required forms for disability and insurance claims, and information of interest to an individual's particular illness. Such additional functionalities demonstrate a number of ways that consumers would be more engaged and interested in managing their health care through a shared ePHR.

Regarding *fellow customers* in the model, Cripps & Standing [4] discuss value created in terms of *goods and tangibles* for *fellow customers* (which, in this instance relates to other healthcare providers or institutional stakeholders, since the case study focuses more on the organisation's needs than the consumer). For example, paper summaries can be printed out from the patient's ePHR for The Royal Flying Doctor Service and visiting medical specialists. Here the value co-creation is indirect as such activities realise better healthcare management for the geographically dispersed patients who may attend different clinics in this remote region. Additionally, there is time and cost saving value from ePHR systems for healthcare providers when collating and printing the reporting documentation required for relevant Health authorities and departments [4]. Again such value is indirect for patients but may relate to more funds available for delivery of care services rather than burgeoning administrative costs.

Moving over to the *Activities* section in the model's co-creation of value platform, Cripps & Standing [4] discuss value in terms the *accessibility effect* reflecting value for the *contact employees* (health and medical staff). The *virtual* system provided more consistent and individualised health care. For example, staff are able to access a patient's record regardless of which of the seven clinics he/she attends across the region. Such access creates a sense of delivering health services 'locally' wherever the patient attends (*mental effect* for *focal customers*), reduces patient's time spent while provider coordinates medical information from diverse sources, as well as providing continuity of prescriptions (*physical effect*). Such activities through *accessibility effects* benefit the indigenous clients (the *focal customers*) for the Ngaanyatjarra Health Service [4] thus providing indirect value co-creation.

On the one hand, studies on patient-users of ePHRs focus on areas such as navigation through the record to locate relevant information, its perceived ease of use, and usefulness, together with issues of perceived risk and trust [8, 9, 14, 15]. Yet, end-user-centered studies predicting take-up and meaningful use of ePHRs are not limited to patients only. For example, staff at the Ngaanyatjarra Health Service regard the ePHR system as intuitive to use as well as highly usable

(*mental effect* for *contact employees*), which is important given the high turnover of staff in remote clinical settings [4]. On the other hand, ancillary healthcare service providers, such as pharmacists who can be anticipated to be one of the stakeholders in shared ePHRs, have other 'user-centered' perceptions. These include needs for staff training and data management impacting time and workflows (*physical effects* for *contact fellow customers*) that may create facilitators or barriers to engagement by these stakeholders [6].

An important aspect of shared ePHRs is that of meaningful use from both a healthcare practitioner perspective [5], and by the patient, who is to be actively engaged in his/her health management [10]. Winkelman et al. [10] raise an important, patient-centered view of this accessibility effect for patients with a chronic illness. For these *focal customers* the *physical* and *mental affect* when managing and adding records to their ePHR may result in different ways of documenting and describing their chronic illness compared to the ways documented by their health providers. Yet such differences may assist patients to more actively engage in owning and managing their illness [10].

The system in the ePHR that assists in recalling patients for ongoing health services such as immunizations, or other medical specialist visits [4] relates to value provided through *interactive communication*. The importance of perceived value through interactive communication is more extensive when driven from the patients' side. In addition to being able to book appointments online, [10] patients would look for other communication opportunities to assist them in meaningful participation when managing their chronic illness. Importantly, patients, as *focal customers*, would seek online consultation services with those health providers involved in their chronic illness, as well as self-referrals to other health professionals (*physical effect*) or communities of support (*mental effect*) on demand. Such interactive communication creates shifts in control over the illness to the patient and how they wish to initiate contact with the medical services involved. These needs clearly change the dynamics in medical practitioner/patient interactions, while redefining the relationship from one of passiveness and dependency to interdependency and shared problem solving [10]. Additionally, such interactive communication would also include providing access authorisation to the ePHR for appropriate healthcare providers, and possibly non-health providers, such as carers or family members (*physical effect* with *fellow customers*).

Peer communication also provides value in the co-creation platform. For the medical service hosting the ePHRs, this is evident through the capacity to share various patients' documents among diverse health related practitioners within a medical system, as shown in Cripps & Standing [4]. For the *focal customers*, peer communication may also take the form of online bulletin boards or other online community support sites available, similar to those that people have become familiar with through e-service websites [16]. With the vast array of social media facilitated health sites, it would be important that the patient can add links to their ePHRs, together (*virtual effect*) with being able to add relevant non-medical resources as documents.

Based on the varying levels of engagement by the stakeholders suggested in the co-creation of value platform in the model, the value created should inform the *experienced service* for the focal customer. In this regard, the service experienced may have a process that facilitates ongoing value creation for stakeholders, as well as desired outcomes [2]. In the scenario conceptualised in this paper, the experienced service based on having a shared ePHR can be one of enhanced value for the patient through better engagement and management of their health related issues. For healthcare providers using ePHRs, there should be greater value created between the providers and their patients [1], as well as the providers and their own institutions in terms of managing costs, while delivering quality health care services [4]. These findings are summarised in Table I.

TABLE I. SUMMARY OF KEY FINDINGS FOR EPHRS WHEN CONTEXTUALLY OPERATIONALISING THE VALUE OF CO-CREATION PLATFORM IN GRONROOS (2012) VALUE CO-CREATION MODEL

| Digital Resources | Activities that create value |
|--|--|
| Basic functionalities: | |
| Value created from EPHRs - patient records | |
| Value created by contact employees | <p>Accessibility</p> <p><i>Virtual effect:</i> Shared records within and between clinical settings, sharing records between various health stakeholders (e.g. specialists) in provision of health service</p> <p><i>Physical effect:</i> Reduces time coordinating medical information, provides continuity of prescriptions.</p> <p><i>Mental effect:</i> System is easy to use - reduces training costs in high staff turnover situations</p> |
| Value created for focal customer | <i>Mental effect:</i> Patients receiving continuity of care in diverse clinical settings. |
| Additional functionalities: | |
| Value created by contact employees | <i>Virtual effect:</i> Appointment reminder and recall systems |
| Additional functionalities (wishlist) | |
| Value sought by focal customers | <i>Virtual effect:</i> Wish list includes Online appointment booking, Diet counselling or planning, accounting and fee information |
| Value sought by focal customers with chronic illness | <p><i>Virtual effect:</i> workspace to manage diet, exercise and illness-related tasks, diary function, resources for filling in forms for disability and insurance claims, information sources of interest to an individual's particular illness, an interface to encourage active participation in research trials.</p> <p><i>Physical and mental affect</i> when managing and adding to their ePHR - different ways of documenting / describing their</p> |

| | |
|----------------------------------|--|
| | chronic illness compared to practitioners. |
| <i>Interactive communication</i> | |
| Contact employees | Providing access authorisation to the ePHR for appropriate healthcare providers |
| Focal customer | Online consultation services with health providers, as well as self-referrals to other health professionals or communities of support. |
| Fellow customers | Providing access authorisation to the ePHR for non-health providers, such as carers or family members. |
| <i>Peer Communications</i> | |
| Contact employees | To share various patients' documents among diverse health related practitioners within a medical system |
| Focal customer | Online bulletin boards or other online community support sites. |

V. DISCUSSION

As with any electronic service available to particular stakeholders, the importance not only of initial engagement to set up the service for use, but ongoing engagement activities to fully achieve the benefits intended, becomes a critical focus [11]. Our work on contextually operationalising Grönroos' (2013) model of value co-creation in service for ePHRs makes both theoretical and practical contributions towards these outcomes.

From a theoretical perspective, our findings, derived from extant healthcare provider and consumer-based studies, focuses attention on what shared value is perceived as achievable from ePHRs. We discuss what type of *resources* and *activities* have been investigated, highlighting both alignments and misalignments between stakeholder groups' needs. Examples include the types of functionalities as well as the interactive and peer communication needs perceived as useful between the healthcare provider groups compared to those of the patient group. Discussion of the model also highlights research gaps in the types of value creating resources provided or the range of value creating activities that should be investigated to further improve the co-creation of value for all stakeholders involved. For example: the potential to investigate the inclusion of more Web 2.0 style communications opportunities for the patients to interact with both healthcare providers and for peer to peer interactions.

Our work also provides practical contributions for people involved in developing and (re)designing healthcare delivery processes. Kim et al. [17] discuss the importance of mapping processes in healthcare delivery in terms of the value chain in the service that drives value for patients. Additionally, the *context* of the service is regarded an active component in the processes of change and innovation in health service delivery [18]. We argue, therefore, that from these two perspectives, a contextually operationalised value co-creation model facilitates ways for practitioners to model such value chain processes (namely resources and activities) in the specific context of the focal health service. More important however, is

that Grönroos' (2013) model of value co-creation in service, has a stronger focus on the co-creation of value, rather than just patient value creation per se. Therefore, the co-creation of value model can be contextually operationalised, to provide guidelines for those tasked with (re)designing an eHealth service delivery to ensure that value is co-created for all stakeholders involved.

For health informatics developers, the model may facilitate further investigation to determine how the configuration, sequence and interdependence of component parts provide value and to whom, as well as how those configurations actually co-create value [2, 17]. Findings highlighted in our work show a range of patient needs that point towards what they perceive will enhance their engagement with the ePHR and which would possibly improve patient centred health management. While not a focus in our work, the model may have utility for health informatics practitioners regarding HL7 to improve the interoperability of the information/data management systems in an e-health service, such as EPHRs.

The conceptual work in this paper is not without its limitations. First we have relied on a subjective selection of studies for this paper and therefore do not claim to have covered the full range of issues relating to co-creation of value in ePHRs. A second limitation is that of transferring a conceptual model and its associated theoretical understandings from the services/marketing literature to an eHealth service domain. Thus, what is understood in services marketing regarding the co-creation of value may require a greater depth of explication in the new domain. Such development is not possible in this paper, but interested parties are encouraged to read the references provided.

In terms of future research into co-creation of value in ePHRs however, we argue that our contextual operationalising of Grönroos' model provides a useful entry point into the eHealth service domain. This work opens avenues for researchers from the health informatics and technical systems community for further empirical research.

For example, qualitative researchers can adapt the model's framework to provide a more nuanced focus of enquiry in terms of value perceptions of a shared health informatics system. Additionally, under the broad concepts provided in the model, emerging themes can be further categorised to enhance the range of resources and activities that providers and consumers view as important.

For quantitative researchers, much of the research into adoption and diffusion of ePHRs, both at healthcare provider and healthcare consumer levels, use technology acceptance models [14, 15, 19]. Researchers can break away from this approach by framing their studies in a critical services logic model that is well grounded in the services literature and provides real opportunities for further development and specification.

Finally, using Grönroos' model of value co-creation provides both qualitative and quantitative researchers with a practical visualisation of their collected data. Thus, they can see what is available in the co-creation platform that facilitates the co-creation of value for identified stakeholders, and what is lacking.

VI. CONCLUSION

In conclusion, the objective of this paper was to contextually 'operationalise' Grönroos' [2] model of value co-creation in service from existing health informatics studies. The insights gained through this work highlights how the stakeholders involved perceive the possible value of having shared records. The work enhances researchers' and practitioners' understanding of the potential for co-creation of value with ePHRs. By so doing, we argue that there are theoretical and practical implications for continuing work on the specification and application of co-creation of value models to investigate eHealth service delivery.

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