Journal of Biomedical Informatics 56 (2015) 30–41

Contents lists available at ScienceDirect

Journal of Biomedical Informatics

journal homepage: www.elsevier.com/locate/yjbin

Multi-faceted informatics system for digitising and streamlining the reablement care model

Raymond R. Bond [a,*], Maurice D. Mulvenna [a], Dewar D. Finlay [b], Suzanne Martin [c]

[a] School of Computing and Mathematics, University of Ulster, Northern Ireland, UK
[b] School of Engineering, University of Ulster, Northern Ireland, UK
[c] School of Health Sciences, University of Ulster, Northern Ireland, UK

ARTICLE INFO

Article history:
Received 26 November 2014
Revised 1 May 2015
Accepted 12 May 2015
Available online 18 May 2015

Keywords:
Reablement
Restorative care
Health record systems

ABSTRACT

Reablement is new paradigm to increase independence in the home amongst the ageing population. And it remains a challenge to design an optimal electronic system to streamline and integrate reablement into current healthcare infrastructure. Furthermore, given reablement requires collaboration with a range of organisations (including national healthcare institutions and community/voluntary service providers), such a system needs to be co-created with all stakeholders involved. Thus, the purpose of this study is, (1) to bring together stakeholder groups to elicit a comprehensive set of requirements for a digital reablement system, (2) to utilise emerging technologies to implement a system and a data model based on the requirements gathered and (3) to involve user groups in a usability assessment of the system. In this study we employed a mixed qualitative approach that included a series of stakeholder-involved activities. Collectively, 73 subjects were recruited to participate in an ideation event, a quasi-hackathon and a usability study. The study unveiled stakeholder-led requirements, which resulted in a novel cloud-based system that was created using emerging web technologies. The system is driven by a unique data model and includes interactive features that are necessary for streamlining the reablement care model. In summary, this system allows community based interventions (or services) to be prescribed to occupants whilst also monitoring the occupant's progress of independent living.

1. Introduction

The ageing population is projected to more than double by the year 2050 and the number of persons exceeding 85 years of age has almost doubled in the past decade [1,2]. Consequently, there is an escalating burden (both in terms of manpower and economics) on healthcare services to provide quality care for a growing number of elderly patients who have chronic diseases and co-morbidities. This is of concern in the United Kingdom where the National Health Service (NHS) is currently publically funded but may be forced into privatisation due to the expense of treating a large number of chronic illnesses [3]. This problem has been widely documented [2,4], and a number of healthcare models and potential solutions have been proposed. Such models often involve the use of telemedical and telehealth technologies [5], which have recently been branded as 'Connected Health'. According to [6], "*Connected Health is were all stakeholders in the process are 'connected' by means of timely sharing and presentation of accurate and pertinent information regarding patient status through smarter use of data, devices, communication platforms and people*". These models have a common objective, which is to provide high quality healthcare whilst reducing costs. Many models look to reduce costs by promoting the idea of the 'self-management' of disease [7–9]. The postulation is that if people were more informed (by increasing their health literacy) they would be empowered to take more responsibility for their own health, which would reduce the burden on public health services. In addition to these models, 'reablement' also emerged as a model to address these needs. Given this model has been conceived internationally, it has been branded as 'Reablement' in the United Kingdom [1,10,11] however both the United States and Australia have branded this model as 'Restorative Care' [12,13].

According to Francis et al. [11] reablement is a collection of services "...to help people learn or relearn the skills necessary for daily living which may have been lost through deterioration in health". The aim is to keep patients in their own homes by (a) facilitating independent living, (b) preventing deterioration of health and (c) avoiding the need for more expensive services [11]. A unique factor of reablement is that its provision includes the use of Voluntary and Community (VC) services which are managed by non-government agencies. Example VC services include nutritional advice, chauffeur services, domestic cleaning services,

* Corresponding author.
E-mail address: rb.bond@ulster.ac.uk (R.R. Bond).

http://dx.doi.org/10.1016/j.jbi.2015.05.008
1532-0464/

gardening, shopping assistance, social inclusion activities, general physical exercising and wellbeing activities, rehabilitation, risk management in the home and general pastoral care. According to [11], reablement will likely reduce costs within mainstream healthcare by reducing admissions to residential and nursing care. According to Glendinning et al. [14] there is a "high statistical probability that reablement is cost effective". In 2013, an Australian trial [15] found that users of reablement were significantly less likely to utilize mainstream healthcare services when compared to a control group. This study [15] estimated that this would save approximately AU $12,500 per person over a 5 year period. Tinetti et al. [12] also suggest that users of reablement services are less likely to use the emergency hospital. Nevertheless, the service user pathway for reablement has yet to be defined and a universally adopted format does not exist. According to Francis et al. [11] reablement interventions are initiated by a referral via a hospital discharge or from within the VC sector itself. The referral is normally made using basic communications such as email or a telephone call to a specially trained Occupational Therapist (OT). The OT would then undertake an assessment to identify the individual needs of the occupant, which may include an Activities of Daily Living (ADL) assessment, an environmental assessment and a risk assessment. Also, if it were appropriate the OT would refer the occupant to a Community Navigator (CN). A CN is a new role that includes the responsibility of aligning and prescribing VC services to the occupant's needs. The CN would meet the occupant to determine their willingness to engage with the VC sector and if consented the CN would enrol the occupant onto suitable VC services. Subsequently, the CN would continually assess the user at regular intervals and manage which services the user should enrol onto and graduate from.

Given that reablement is a new initiative and no 'gold standard' working models have been established, there remain a number of opportunities for researchers [1]. There is a lack of a unified electronic system for managing and streamlining the reablement care model. And given the importance of paperless patient record systems [16], an electronic system for managing reablement is also imperative. This paper suggests that reablement could be optimized and streamlined if an electronic system was designed using emerging web technologies. However, such a system needs to be stakeholder led given the collaborative nature of the reablement model (stakeholders include OTs, CNs, service users (also referred to as occupants) and representatives from the VC sector). This is important given that Francis et al. [11] observed the need for more research on what implications reablement has on stakeholders. Therefore this work aimed to discover the system requirements from stakeholders for building an electronic reablement system. Furthermore, we sought to build a prototype based on these system requirements and to allow potential system users to evaluate this prototype via a pilot usability assessment.

2. Methods

This work is based on a mixed qualitative methodology that has been reported elsewhere [17]. This work employed stakeholder-involved activities, which were borrowed from the 'living labs' methodology [18,19]. Living labs are "a collection of people, equipment, services and technology to provide a test platform for research and experiments" [20,21]. The rationale for adopting a living labs methodology over other approaches are in its offering for co-creation and ideation phases, which are utilised in this project by the creation of a 'pop-up' living lab at a known hacker space in the UK (called Farset Labs). Farset labs is an independent organization that host a number of hacker events and specializes in coordinating ideation events.

Fig. 1 depicts the various stages of the project. The methodology itself was stakeholder led as the study was coordinated by a

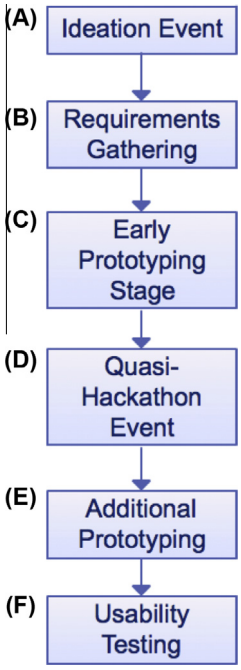

Fig. 1. The five phases of the project, which focuses on stakeholder-involved activities that contribute to requirements gathering and implementation of an electronic reablement system in the form of a prototype.

number of stakeholder organisations (refer to Ardmonagh Family and Community Group [22], Engage with Age [23], Volunteer Now [24], Oasis Caring in Action [25] and Shopmobility [26]). These organizations are members of the national Reablement Stakeholder Network (RSN). To be 'truly' user-centred stakeholders were involved in the design of research methodology, which is a concept from the patient and public involvement (PPI) initiative [27,28].

2.1. Ideation event

The purpose of the ideation [29] event was to provide an open platform for idea generation regarding opportunities for reablement services to be supported by new technologies. The event took place on the 20th May 2013 and was facilitated by Farset Labs [30]. A total of 33 stakeholders (16 female, 17 male) were present (and the organisations represented at the event are presented in Appendix A). We regarded a 'stakeholder' as a person or organisation who is directly involved in the entire reablement process. Hence, this not only includes the system users such as the OT or CN but other stakeholders such as occupants, service providers, policy makers and officials. Thus, we recruited stakeholders from a number of community and voluntary sector groups, charities, hospital trusts, community navigators, members the health board, members of the city council and potential users of reablement interventions. And according to our knowledge no stakeholder group was unrepresented. As criteria, each attendee was required to be a member or connected to the Reablement Stakeholder Network, which was officially setup in 2012. This could be regarded as a convenient purposive sample. However, recruiting 33 representative stakeholders to attend one event for four hours on one date is in itself challenging.

The ideation event involved organizing the stakeholders into five focus groups. As recommended by Krueger and Casey [31], each group consisted of five to eight participants. The rationale for using this approach is the fact that the translation of the reablement model from policy into practice is a complex problem and focus groups allow the researcher to gain a deeper understanding of its intricacies when compared to using other more superficial methods such as surveys. In addition, the event lasted four hours