Aggregating Community Resources of Care and Assistance Services for the Elderly Population

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Abstract
Changes in population age structure are a major concern and represent a priority in the agendas and policies of the developed world, which are demanding for renewed models of social and healthcare as well as assistance services to the elderly population. Studies indicate that as far as possible these types of services should desirably be provided at the user’s home, and that ICT-based solutions can have tremendous impact on the delivery of new services. This paper highlight and discusses some of the main results of a project undertaken in a Portuguese Municipality that demonstrates the potential contribution of an e-Marketplace of care and assistance services to the well-being of elderly people. Studies undertaken allowed identifying the main services that should be provided by such e-Marketplace (termed GuiMarket), the relevance that the population grant to this platform and, conversely, the fact that the Digital Divide phenomena influences the potential utilization of this project (and alike projects). The findings support that there is a strong relation between age and qualifications, and between access to ICT and the intended use of GuiMarket.

Keywords: electronic marketplace, health care, social care, care services, assistance services, elderly.
1 Introduction

According to the “Ageing Report” (European_Commission, 2012a), by 2060 one in three Europeans will be over 65; the population aged 65 will almost double, and the number of people in the 80-and-over age group is projected to almost triple from 2010 to 2060.

Changes in population age structure, consequence of declining fertility rates in recent decades, together with recent increases in life expectancy, may exert a significant influence on economic growth (Bloom, Canning, & Fink, 2008). This demographic trend has led to increased health care spending and a higher demand for care and assistance services, threatening existing public health and welfare systems (OECD 2008).

Several studies indicate that as far as possible health care and social care services should desirably be provided at the user’s home (Kaye, LaPlante, & Harrington, 2009; Makai, Brouwer, Koopmanschap, Stolk, & Nieboer, 2014; Tang & Venables, 2000; United_Nations, 2009). It is argued that the existence of a network of health care, social care and professional services providers, working articulately with an underlying effective management and intermediation service can be a powerful tool and result in improving the quality of life for people with special needs (elderly and permanently or temporarily disabled people) and to the population in general (Tanner, 2005).

Literature and official documents evidence that Internet, telecommunications technologies and infrastructures may contribute significantly to health care system performance (Babulak, 2006; European-Commission, 2007; Kerzman, Janssen, & Ruster, 2003; Séror, 2002; Smits & Janssen, 2008). Literature indicates that Assistive Technologies and Information and Communication Technologies (ICT) may improve quality of life, extend length of community residence, improve physical and mental health status, delay the onset of serious health problems and reduce family and caregiver burden (for example Blaschke, Freedolino, & Mullen, 2009; Doukas et al., 2011; Magnusson, Hanson, & Borg, 2004; Muncert et al., 2012). The Digital Agenda for Europe 2010 suggests ICT-based actions to support ‘independent living’ (European_Commission, 2010a).

In this framework, the authors were invited in 2010 to study, in a Portuguese Municipality, the development of an ICT-based solution for improving well-being of elderly people and people with special needs staying at home,. The authors suggested an electronic marketplace (e-Marketplace) for care and assistance services, to support the above-mentioned network of health care, social care and professional services providers (GuiMarket).

This paper presents a compilation and discussion of several results achieved in several studies undertaken within the project during the last four years, and presents briefly the developed prototype.

The paper is structured as follows. Section two introduces some challenges for ageing and new ICT-based proposals, including information services, electronic marketplaces and social networks. Section three introduces the authors’ proposal and the prototype, section four presents results of several wide studies undertaken and section five discusses the impact of digital divide, also based on the results of the study. Limitations of the study and some concluding remarks are presented in sections six and seven.

2 Ageing: new challenges and new responses

In the 21st Century economy sectors like health and social services have a tendency to grow, in GDP percentage as well as in creating employment (European_Commission, 2013).
2.1 New challenges
The demographic effect of changes in population age structure will lead to greater demand for elderly care. Although this brings some challenging demands to the different systems of care, it is well known that enabling elderly to stay at home as long as possible can help to improve their quality of life and is an important mechanism in meeting rising demands (OECD, 2008, 2013; Palm, 2014).

These growing demands on welfare services due to an ageing population is leading policy makers to suggest the use of ICT as a support to a cost-effective delivery of social and health care (European_Commission, 2010a). Industry for ageing well must invest and innovate at a European level and scale – in close cooperation with users and consumers (European_Commission, 2012a). And all of us must feel empowered to integrate ICT-products and services for ageing well in our private lives and professional practice.

Over 50% of Europeans use the internet daily – but 30% have never used it at all (European_Commission, 2010b)! This disadvantaged social group, largely made up of people aged 65 or more, can hamper the digital society, and may contribute to the health and well-being divide across the EU region (European_Commission, 2013). Moreover, disabled persons face particular difficulties in benefiting fully from new electronic content and services. As ever more daily tasks are carried out online, everyone needs enhanced digital skills to participate fully in society (European_Commission, 2012b).

2.2 And new responses
Xie et al. (2012) presented a survey made across several local health agencies in the UK, in order to determine the level of personalization in social care services for elders. Among the factors studied, the survey identified that people are making use of a range of community services beyond typical health care. Among the services that are receiving more interest from older people are shopping, housework, leisure activities support, and gardening. These services are growing in demand from local management centers but also from older people that are gaining independence from institutional social services and want to contract these services themselves (Xie et al., 2012).

The rising demand for care services is stimulating a new offer of services and ininnicatives of Ambient Assisted Living (Rashidi & Mihailidis, 2013; Venkatesh, Vaithyanathan, Kumar, & Raj, 2012).

E-Marketplaces implement the concept of ‘market’ and were developed to bring together large numbers of buyers and sellers expanding the choices available to buyers, and giving sellers new opportunities and access to new customers (buyers), simultaneously reducing transaction costs for all participants (Cunha & Putnik, 2006; Kaplan & Sawhney, 2000).

We are currently witnessing an attempt to use in the health and social care sectors some solutions already in use by the business sector, to optimize processes of product sourcing and supply chain improvement, such as the several well-succeeded “last generation” e-Marketplaces (e.g. www.broadlane.com, www.Med2med.com, www.labx.com, www.saniline.com), and many others referred by directories like eMarketServices, available online at http://www.emarketservices.com (Cunha, 2003; Cunha, Putnik, Gunasekaran, & Avila, 2005; eMarketServices, 2007; Putnik, Gonçalves, Sluga, & Cunha, 2008; Zallah, 2005).

A few examples exist of Internet-based services and markets between users of care and providers of care, such as “CareAuction.nl”, a new intermediary on the market for maternity care in the Netherlands (Smits & Janssen, 2008).
3 GuiMarket - Aggregating Community Resources

The authors' objective was to test if a network of health care, social care and professional services providers, working articulately with an underlying effective management and intermediation service, based on an e-Marketplace, could be a powerful tool and contribute to the well-being of people with special needs, namely elderly people, and simultaneously to support their caregivers.

3.1 The motivations

Some of the motivations for the development of GuiMarket were:

- The isolation of the elderly;
- The distance of residence to centers/facilities that provide various forms of social support or personal services;
- The lack of resources in families to assist their elderly;
- The difficult access to several services that would make their life more comfortable and independent day-to-day (home care, primary health care, social care services, specific or not, hygiene, feeding, monitoring, housekeeping, etc.)

For this purpose, the authors developed a prototype to demonstrate the potential of an e-Marketplace as an aggregator of healthcare and assistance services providers.

3.2 The proposal

The eMarketplace for healthcare and social care services is an environment to coordinate and manage the match between the offer of healthcare and social care services and the individuals (users or patients).

The offer and demand side is represented as follows:

- **Offer or services providers** can be (a) entities providers of services in the covered domains of health or social care or assistance services and (b) individuals and enterprises providers of special services, that use the e-Marketplace to make available information about their products and services.

- **Demand** consist of individuals (elderly, but also individuals with special needs and their caregivers) that use the service to satisfy their needs; currently a large majority of these targeted users cannot access these technologies, but this task can be performed by their caregivers, relatives, neighbors or friends. They can require daily home assistance of hygiene, special care, health care, physiotherapy, care giving, nursing, etc.

Figure 1 represents these classes of participants and their interaction with the e-Marketplace.

3.3 Main activities

The main activities offered by GuiMarket include search and selection of service providers are the following:

- **Request**: Request involves the specification of the required service. This can be done navigating through the market of resources providers (or more narrowed sets of providers), or for complex situations, using a chat facility with the “broker” of the market, when the specification requires “knowledge” about the required service;
• **Search and Selection:** Search, negotiation and selection consist of several steps: the identification of potential providers, separation of eligible resources, negotiation among these to identify the candidate resources (according to availability, price, conditions to provide the service), and finally the selection of the most suitable. Negotiation is a facility that is possible for certain classes of professional services (request for quotations is the most usual). When it is not needed negotiation, selection is made from the services directory or catalogue. For complex situations, the final selection can be controlled by the broker or in interaction with him.

• **Contractualization:** An automated contractualization by which the user and the provider agree on the conditions to be respected in the service to be provided.

**Figure 1:** Interaction between participants in the GuiMarket (Cruz-Cunha, Tavares, Simoes, & Miranda, 2010)

3.4 The prototype

Figure 2 represents the homepage of GuiMarket (the webpage is in Portuguese language).

**Figure 2:** GuiMarket homepage (in Portuguese language)
4 Study on the perceived interest of GuiMarket

The implementation of this service requires the understanding of the needs, expectancies and importance granted by the inhabitants towards the GuiMarket platform.

With this purpose, the authors have undertaken a study (Cruz-Cunha, Miranda, Lopes, & Simoes, 2013) which results allow to understand the viability of the solution and the requirements to the deployment of the pilot experiment, as well as to drive the selection of domains of activities or typology of services to be offered by the platform.

4.1 Methodology and sample

The methodology consisted of gathering information from a stratified random sample of residents of a number of parishes on the perceived interest of the electronic marketplace, its expected use and the services deemed most relevant, together with the demographics of the sample considering age, education, internet access, possession of a computer and internet usage. The information collection was performed at different times of day and different places of each parish, to encompass a high diversity of people and also to fulfill the defined stratification by age. It was used a semi-structured interview based on a questionnaire with open questions and closed questions.

The sample is layered beginning at the age of 18. Of the 333 interviews, 18 could not be considered. Some demographic data of respondents is summarized in Table 1. It should be noted that it was a prerequisite for being respondent, to be currently or have already been a caregiver, or cohabit with people with special needs.

4.2 Discussion of results

From the set of research questions addressed in the study, this section presents the conclusions for these three questions:

1. How important is the existence of an e-Marketplace of social care and assistance services?
2. What is the expected utilization of this platform?
3. What services are more important to be offered via an e-Marketplace?

Importance granted to GuiMarket

Table 2 represents the importance that participants attribute to the existence of an electronic marketplace for social care and assistance services. To 49.2% of the citizens, the service is stated as very important.

Expected frequency of use

Table 3 presents the expected frequency of use of the services provided by GuiMarket. More than a half of the inquired expect to use them several times, and only a few intent to use them frequently (daily or several times per week), what may look contradictory to the importance granted to this platform. However, the authors were able to confirm a strong relation among the recognized importance of the GuiMarket and the intention of use (Cruz-Cunha et al., 2013).
Table 1: Respondent demographics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age groups</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 30 years old</td>
<td>51</td>
<td>16.2</td>
</tr>
<tr>
<td>30 - 39</td>
<td>74</td>
<td>23.5</td>
</tr>
<tr>
<td>40 - 49</td>
<td>59</td>
<td>18.7</td>
</tr>
<tr>
<td>50 - 59</td>
<td>68</td>
<td>21.6</td>
</tr>
<tr>
<td>60 - 69</td>
<td>44</td>
<td>14.0</td>
</tr>
<tr>
<td>70 or more</td>
<td>19</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>315</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>11</td>
<td>3.5</td>
</tr>
<tr>
<td>Incomplete primary education</td>
<td>157</td>
<td>49.8</td>
</tr>
<tr>
<td>Complete primary education</td>
<td>59</td>
<td>18.7</td>
</tr>
<tr>
<td>Secondary education</td>
<td>49</td>
<td>15.6</td>
</tr>
<tr>
<td>Higher education</td>
<td>39</td>
<td>12.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>315</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Owning a computer and Internet access at home</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have a personal computer at home</td>
<td>243</td>
<td>77.1</td>
</tr>
<tr>
<td>Has Internet access</td>
<td>223</td>
<td>70.8</td>
</tr>
<tr>
<td>Does not have Internet access but has someone to help to solve a problem if there is the need of Internet access</td>
<td>31</td>
<td>9.8</td>
</tr>
<tr>
<td><strong>Frequency of Internet utilization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>131</td>
<td>41.6</td>
</tr>
<tr>
<td>Rarely</td>
<td>16</td>
<td>5.1</td>
</tr>
<tr>
<td>Sometimes</td>
<td>49</td>
<td>15.6</td>
</tr>
<tr>
<td>Often</td>
<td>41</td>
<td>13.0</td>
</tr>
<tr>
<td>Everyday</td>
<td>78</td>
<td>24.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>315</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2: Importance granted to GuiMarket (Cruz-Cunha et al., 2013)

<table>
<thead>
<tr>
<th></th>
<th>frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not important / Little importance / Indifferent</td>
<td>14</td>
<td>4.4</td>
</tr>
<tr>
<td>Important</td>
<td>146</td>
<td>46.3</td>
</tr>
<tr>
<td>Very important</td>
<td>155</td>
<td>49.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>315</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 3: Expected frequency of utilization of the e-Marketplace (Cruz-Cunha et al., 2013)

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>15</td>
<td>4.8</td>
</tr>
<tr>
<td>Rarely</td>
<td>101</td>
<td>32.1</td>
</tr>
<tr>
<td>Sometimes</td>
<td>177</td>
<td>56.1</td>
</tr>
<tr>
<td>Frequently (daily or a few times per week)</td>
<td>22</td>
<td>7.0</td>
</tr>
<tr>
<td>Total</td>
<td>315</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Relevant services to be provided by GuiMarket

Services such as information about healthcare services, home monitoring/accompanying services 24 hours per day, and personal hygiene services provided at home are the ones recognized by the inquired citizens as very important to be provided by GuiMarket (Figure 3), and this indicates that the potential users will be mostly people with special needs or their family or caregivers.

![Figure 3: Importance granted to the proposed services to be provided by the platform](image)

5 Digital divide impact

The digital divide refers to the gap between individuals, companies, regions and countries in accessing and using ICT (Bach et al., 2013). The authors analyzed also the extent to which the access and use of ICT affects the project, by finding the dependence of the perceived interest on the platform and the sample characteristics (such as age, educational level, owning a personal computer and Internet access, among other possibilities), as an attempt to identify the impact of digital divide on the potential use of services like GuiMarket.

To evaluate the challenge of digital divide on the recent ICT-based solutions, the authors undertook a study deeply discussed in (Cruz-Cunha, Simoes, Varajão, &
Miranda, 2014; Miranda, Cruz-Cunha, Varajão, & Simoes, 2014), where several hypotheses were formulated and examined:

H1: There is a relationship between demographic characteristics of the sample and the importance granted to GuiMarket;

H2: There is a relationship between demographic characteristics of the sample and the expected use of GuiMarket;

H3: There is a relationship between access to ICT (possession of personal computer, internet access, and be internet user) and the importance recognized to GuiMarket;

H4: There is a relationship between access to ICT (possession of personal computer, internet access, and be internet user) and the expected use of GuiMarket.

Spearman correlation tests were performed and validated the above hypotheses, allowing to conclude that the importance granted to GuiMarket and the intended use of this service increases when the inquired has a computer at home, or Internet access, has a higher rate of Internet utilization or has an Internet user nearby. It is noted also that the inquired people with higher level of education consider making a more frequent use of GuiMarket and those under 40 years old consider using it more frequently (Cruz-Cunha et al., 2014).

6 Limitations and future research

It is certain that at this moment many potential users will be excluded by the digital divide problem, global concern of today. New progresses are being made at this level, and new actions and efforts (such as active ageing and e-inclusion) at the world-wide level policies that will gradually allow going beyond these limitations.

The next step consists on the implementation of the prototype for demonstration and validation in a pilot study with a selected set of citizens in order to perform an adoption study and usability testing. After the adjustments that the adoption study will indicate, the platform will be further developed aiming at the real utilization.

7 Conclusions

The results of the study enabled us to understand the feasibility of the proposed solution and also identifying the types of services to offer. These are two fundamental aspects considering the development of a platform prototype for validating the use of this innovative solution in the field of social assistance in the form of an e-marketplace of social services and health and welfare services.

This platform will foster a local economy of service providers, most who currently have little occupation, on self-employment. Results indicate that such an e-Marketplace is of recognized relevance and that we can expect high involvement of the target population.

If in a Europe increasingly ageing, the importance and the potential of the service industry for ageing well based on ICT is recognized, this study demonstrates that the issue of the digital divide cannot be diverted from the priorities of the European agenda. The expected impact of such products and services on the well-being and quality of life of the population continues to depend of the access to ICT. We believe the current work provides a small but important contribution towards that goal.
References


