



PLEA 2017 EDINBURGH

Design to Thrive

Elderly Support To Inspired Ageing (ESTIA)

Leonidas Bourikas¹, Nick Allott², AbuBakr Bahaj¹, John Connelly³, Stephanie Gauthier¹, Patrick James¹

¹ Energy and Climate Change Division, Faculty of Engineering and the Environment, University of Southampton, Southampton, UK, L.Bourikas@soton.ac.uk;

² NquiringMinds, Southampton Science Park, Southampton, UK

³ Southampton City Council, Southampton, UK

Abstract: In parallel to major demographic change occurring in societies today, austerity measures in the UK have had a considerable impact on local authority budget including social care for the elderly. This work reports on novel research, which aims to harness the value and the power of sharing economy based on digital platforms augmented by surveys to support elderly people in the UK. The Elderly Support To Inspired Ageing (ESTIA) digital platform aims to help the elderly people achieve independent, comfortable living at their home for longer. The three tools of the project are: (1) A contact/scheduling board where all carers and clinicians can share information; (2) A sensing platform that collects data from the house and the supported person's activity; and (3) An on-demand service through which home care services and training can be commissioned. The ESTIA platform will provide a dynamic, shared-economy (Uber-like) market place for domiciliary care services. In essence, this project aims to provide more efficient care services with less administration cost. Finally, platforms such as ESTIA optimised for individual care, may demonstrate a structured transition from state supported to community supported care. This paper reports on initial analysis and the set-up of the ESTIA digital platform.

Keywords: Elderly support, Sharing economy, Digital platform, Domiciliary care, Independent ageing

Introduction

The EU and the UK are facing a major demographic predicament. The decline in birth rate, changes towards more healthy living (e.g. quit smoking), better working environments and modern medicine have all contributed to an increase in life expectancy (Population Estimates Team, 2016). The inevitable ageing of the current population stirs the discussion about the impact ageing has on different layers of the established social structure and systems.

Older people - persons 60 years or older - have invested a lot of money in their properties and they own a large share of the housing market, accounting for about 50% of the UK projected household growth to 2030 in the UK (Andrews, 2008). It is not a surprise therefore that almost all of them would prefer to stay and age at home instead of moving to care facilities (Barlow & Venables, 2004; Andrews, 2008). For this to happen it is necessary to adapt the current housing stock to the changing needs of their occupants and to also create sustainable communities that will support their well-being (Andrews, 2008). New social housing is typically required to conform to strict "lifetime home standards" but the

housing industry is rather unwilling to voluntarily take on changes to their “business as usual” design and construction practice (Barlow & Venables, 2004).

In the period, 2013-2014, local councils in the UK spent £8.8 billion for the care of people aged 65 and over. 4 million people in this age band have care needs but only 850,000 qualify for formal state support. 1.5 million rely on informal carers to support them (BBC News, 2015). In 2011, 40% of the English population aged between 50 and 64 years old was providing between 1 and 19 hours per week of unpaid care (Figure 1). More importantly, the self-health of unpaid carers was found to deteriorate with the total hours of unpaid care they provided (Census Analysis, 2013). Carer stress is one of the main reasons that older people are moved to formal care institutions (Barlow & Venables, 2004). Informal and privately funded care is often misinterpreted by governments as cost free (Lipszyc et al., 2012). It is to be expected however that these 19 hours per week of unpaid care will eventually shift to formal care. This shift, in a region such as Greater London would cost an additional £16,000 a year for each person eligible for fully funded at home, support. In the case of residential care, the same cost would be even higher reaching up to £39,000 a year (UK Care Guide, 2016). It is likely that an increasing number of the informal carers will require health services from the NHS before the age of the 65 and/or they will end up with increased care needs at some point after this age.

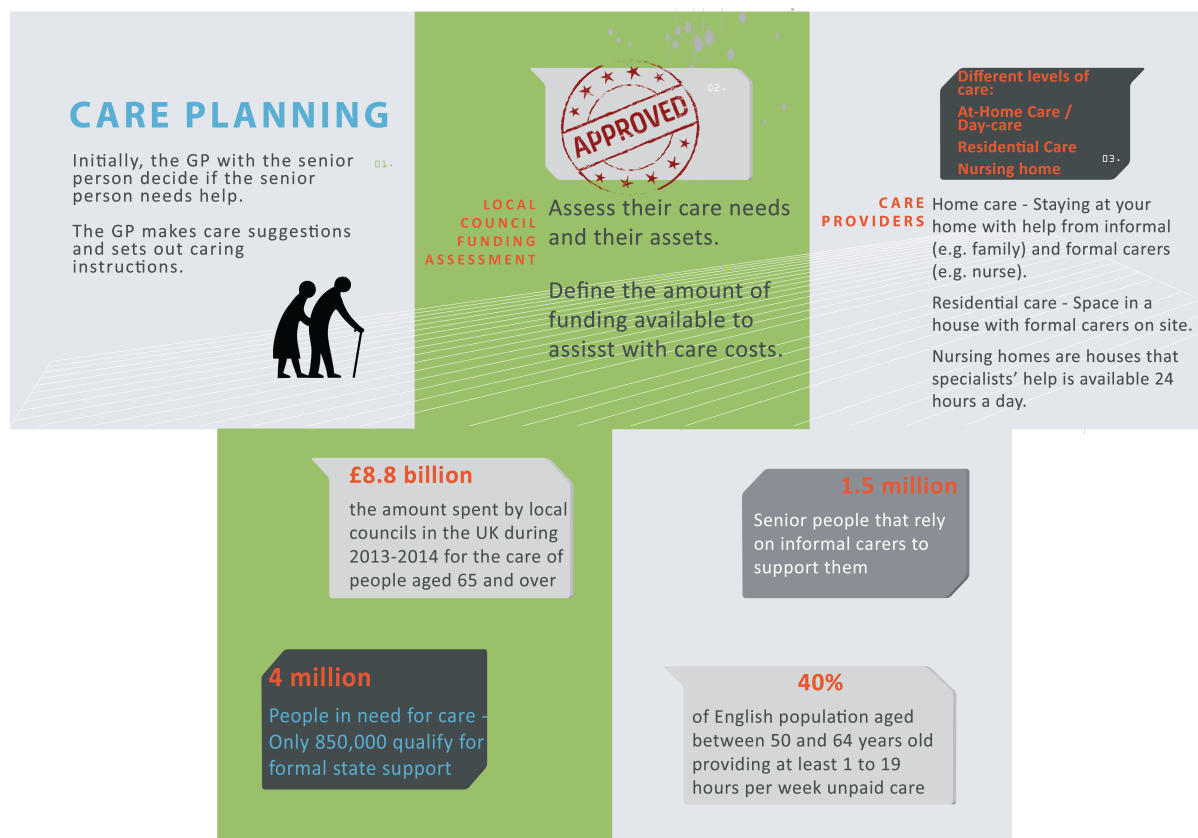


Figure 1. Stages of care planning, cost and market potential in the UK. Data references in text.

In April 2020, a £72,000 cap will be introduced on the lifetime private expenditure for care. In addition, anyone with private assets below £118,500 will be entitled to some sort of care subsidy or funded care from local authorities (AgeUK, 2017). This new policy will give more people access to different levels of formal care (NHS UK, 2015) putting more pressure

on local authorities' social care budgets. This budget is further strained by increases in the fees asked by home care providers. Home care providers usually employ staff on an hourly basis and pay them the minimum wage (Jarrett, 2017). The introduction of the 'national living wage' led to a £0.80 per hour wage increase (from £6.70 in 2015 to £7.50 in 2017 (UK Government Digital Service 2017)) for 40% of the home care employees (Jarrett, 2017). In addition, the profit margins of the care providers are also affected by a nationwide shortage of nurses. To cover their nursing demands, care providers are currently hiring agency staff at much higher pay rates (Jarrett, 2017). The increasing cost of care services, the shift of more people from informal to formal care and the support for the elderly currently in private funded care (they usually pay higher prices than the fees negotiated by councils) will challenge the viability of home care providers. Part of the increases in cost will need to be passed down to the customers; in this case, local councils with budgets already under great strain.

The research questions may be formulated as follows: Can a digital platform based on a sharing economy paradigm extricate elderly care support from rigid, high cost care plans? More importantly, can it promote independent, comfortable living for longer?

This paper argues that the development of a digital care platform can tap the social capital (e.g. neighbours, family) and enable informal carers to integrate their resources to achieve enhanced patient centric care. When it comes to formal care and traditional health providers, digital technology should not be seen as a competitor. It can be a useful tool for physicians and home care providers that will enable cost effective residential care and flexible care plans customised to the real time needs of their "clients".

The Elderly Support To Inspired Ageing (ESTIA) digital platform aims to support and promote independent living for the elderly by integrating three critical features in an easy to manage dynamic care platform:

- (1) A contact/scheduling board where all carers and clinicians can share information, keep notes, raise concerns and create reports about the wellbeing of the supported person;
- (2) A sensing platform that collects data from the house and person's activity and creates profiles of daily routine, alerts and proposals to the person of interest and its carers;
- (3) An on-demand service through which the person and family can seek telehealth services, get advice through physicians or commission home care support services and training.

Approach

Tele-health platforms were the first to set an example of an "Uber" like, health related sharing economy application with real time on-demand services (Miller et al., 2016). The benefits for practitioners are flexible working hours and an increase to their income while people in residential care will pay competitive market prices for personalised advice from the comfort of their homes (Miller et al., 2016). The challenge however is to traditional care providers that need to be proactive and adapt their operations to the emerging telecare market rules (Miller et al., 2016). The first steps toward this direction have been made with care agencies piloting a system that enables them to talk through the television set with the person in need. The new emerging market, if it is properly regulated has the potential to lower the cost of formal ad-hoc residential support services, helps informal carers to cope with their tasks and allows elderly people to live at their houses for longer.

Health care platforms learn from the sharing economy paradigm of telehealth but their main advantage is the full integration and inclusion of the social capital. The success of

such platforms would be to re-enable vulnerable and socially isolated people in need for care to be part of larger community schemes that have access to advice and care services. From a market perspective, care digital platforms such as ESTIA can provide the means to involve charities and volunteers and take some work away from the carers (Figure 2). Informal carers could benefit from having fewer responsibilities, less stress and access to guides and training. Formal carers will have the opportunity to restructure their services and optimise the use of their capacity and income. Most importantly, it is a significant opportunity for social care policies to include non-directly paid services and integrate them with the paid packages to achieve cost-effective, high value care plans.

Several approaches and efforts have been made to facilitate active ageing, promote social inclusion and provide tools for assisted living for the elderly (Grguric et al., 2010). Most of the efforts focus on the development of smart house applications and on house technological-fixes and sensor packages (Rocha et al., 2013) that send alerts, reminders and prompts and track activity profiles (Libal et al., 2009). ESTIA taps on the experience of existing Ambient Assisted Living (AAL) technologies and moves towards transforming the environment of Electronically enhanced Assistive Technology (EAT) (Barlow & Venables, 2004) into a sociable, interactive and dynamic people-centric care platform. The ESTIA digital platform works across different clusters and levels of information from individuals to hospitals and ambulance services. It is designed to introduce innovative ways for the coordination and commissioning of different levels of care services according to the person-specific expectations and requirements for elderly care provision.

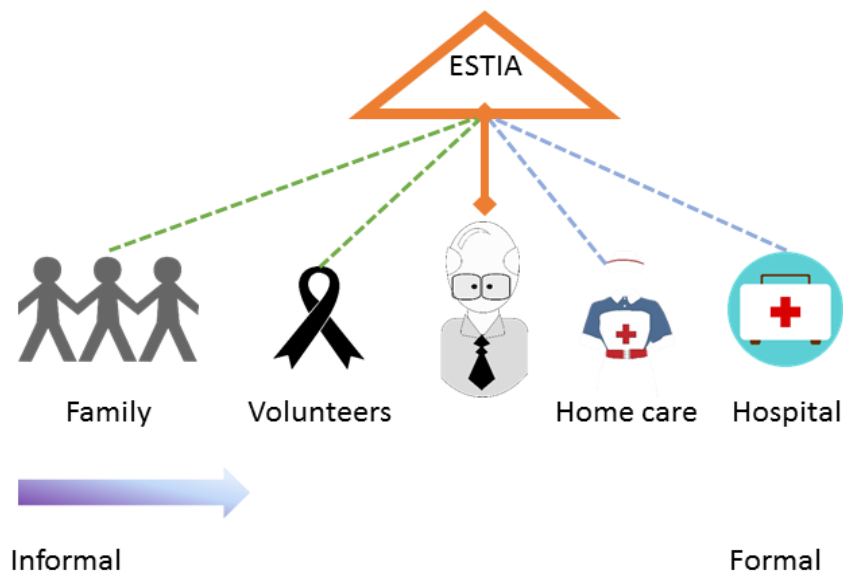


Figure 2. ESTIA platform and its interaction with typical informal and formal stakeholders in the care of elderly people.

The platform has adopted a clustered client based architecture with context aware communications (De Backere et al., 2017) between Communications, Domain and Database cloud servers. It enables multiple implementations of the same simple web interface. The primary objective is to have virtualisations of secure cloud clients running through smart television sets and allow the elderly to browse and access the available services with the remote control of the TV (Figure 3). It has been found however that such web based approaches may result in low response times and loss of services due to incompatible

updates and software (Grguric et al., 2010). In order to ensure the flexibility of the system and uninterrupted and wide spread applicability of the services, a second client (e.g. a tablet PC) that runs a local API, standalone application will be installed in the house and it will periodically connect with the scheme’s cloud servers. Ideally, there will be a small charging station that has an integrated Ethernet and GPRS connection and the tablet PC that will rest on this hub most of the time. The local API client will be open to communicate with a series of well-tested sensor interfaces and extend its capabilities as a traditional assisted living system such as proactive sensing hubs.

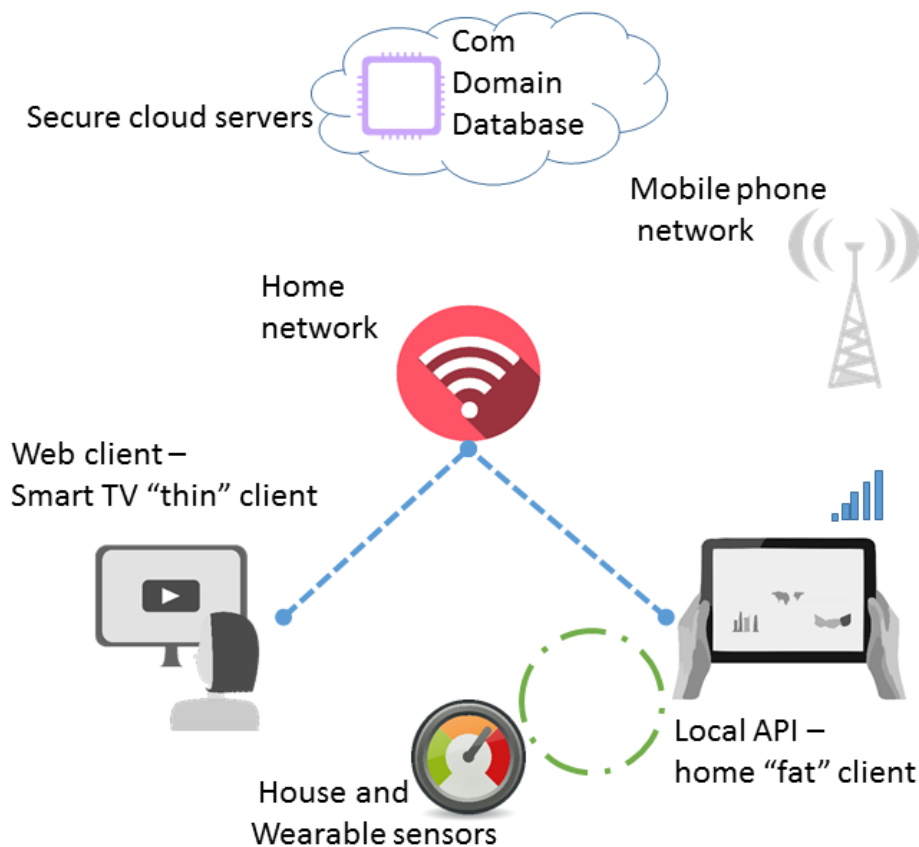


Figure 3. Network layout of the different components and connections of the ESTIA digital platform.

The interface will include three distinct layers of services (Figure 4):

1) The communications board; this board will have menus to access the health records; the care instructions and the care plan details. It will also provide a news feed, reminders about scheduled activities, send message updates to the listed carers and work as a generic chat/forum to share information. The board will support video and sound communications. It could also support video and sound monitoring services (with a function similar to baby monitors) if the people involved consent.

2) The sensing hub; the role of this hub is to allow the integration of passive sensing solutions to trigger “soft” alerts and active sensing to track emergencies and alerts triggered by the person in care. The hub could run from the local client and connect to the GPRS – mobile network. The sensing hub will track the profile of daily and weekly activities and the environmental conditions (e.g. indoor air temperature, carbon dioxide concentrations, etc.) in the house. Any deviations from the representative trend profile of the person in care will

flag events / warnings to the carers listed in this service. The warnings will also appear as prompts in the communications board.

3) The guidance and advice portal; the portal is a third layer of information and training services that can work as an electronic library. The library will contain instructions and advice for the carer and the person in care. Videos and interactive material can be part of the library. The training material can include exercise advice for the elderly and games that can help them stay mentally healthy (e.g. puzzles). This layer will integrate any on request tele-health and tele-care services and it will ideally be activated and navigated with voice commands.



Figure 4. Different layers of services accessible through the ESTIA interface

Challenges and conclusions

One of the biggest challenges of this project is the data governance and the framework for data sharing. This issue needs to be regulated and clearly define the rights and obligations of all digital services and their users. Confidentiality and data protection are paramount. It should be clearly defined who needs the information and what information the different stakeholders require. Different teams and individuals produce and demand different types and levels of data. For example, activity logging may be of value for the family. Medication administration and nurse services are of interest to formal care providers. It is important that all the people involved in the care of a person understand and consent to the use of any available services. The consent of the individuals and confidentiality have a growing importance as people envision and try to move towards smart cities with monitoring of all daily activities, identification of personal behaviours, "detection" of possible emergencies and targeted personal communications (Paolini et al., 2016).

One of the biggest dangers is the replacement of invaluable personal forms of care with impersonal technology features (Barlow & Venables, 2004). The social context and background of a senior person are critical to support his engagement with the community and avoidance of isolation.

Now there are several layers and structure of help from different teams with separate budgets. Community agents and charity organisations can train, coordinate and guide local networks of volunteers. A single point is required to gather information and coordinate the services to tailor help in a "personal sphere" context. This single point -"navigator" will be able to link statutory organisational bodies with private and social organisations.

We believe the biggest barrier to achieve the maximum engagement in the care of the elderly and high-level integration of the social capital resources is personal liability. Informal carers are stressed and they do not want to take responsibility of making decisions for the people they care for. The acuteness of a medical condition is very difficult to be assessed and the "safest response" is to look for health services from hospitals or formal care providers. Digital platforms could have an active role by providing a fast, reliable, first contact point for advice. Emergency tele-health service in combination with sensed data and the help of informal carers could reduce the events when senior people use the ambulance, emergency room or 15 minute response care services. In addition, training material (e.g. videos) and instructions could reduce the carers' stress and make it easier to maintain a healthy, organised daily routine for the senior person. Exercise instructions, diet advice and mental health games can all promote the senior people's wellbeing.

Lastly, the medical background and information about the person who needs care at the moment are segmented pieces of information and data spread across a variety of archives and secured with different levels of access. Formal carers would greatly benefit from having the health records, medication plans, care instructions and the care plan in a single source online repository.

The successful implementation of the ESTIA platform and its longevity are entwined with the macro economy of the emerging market ecosystem. Primary focus is given to addressing problems that can deliver the maximum value. We identify that fast, enhanced communications and information sharing is crucial for the successful development of any care-share application. All the stakeholders have an important role to play but it is the informal carers – the social capital that mainly needs to be engaged, trained and supported in order to be actively involved in peer-to-peer care support. We recognise the monetary but mostly the intangible value of this resource. Lifetime homes, ageing neighbourhoods and cities, social structures and market, all have direct and collateral benefits from caring for the elderly to keeping them healthy, active and happy at home for longer.

Acknowledgement

This work is supported by Innovate UK under Grant TS/P013163/1. The researchers are grateful for this funding and they would especially like to thank the participants of the first "Care-share" workshop in Southampton, UK. Many of the ideas and arguments in this paper have been communicated to the researchers during this workshop.

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