Consumer Health Technologies: an Industry Roadmap

As older people begin to make up an increasing percentage of the world's population, caring for them is becoming more and more challenging. With the so-called Baby Boom generation fast approaching retirement age, experts fear that the global healthcare system, already over-burdened, will be unable to deal with the increase of potential patients.

The statistics certainly highlight the challenge ahead: in the year 2000 there were 606 million people worldwide aged over 60, and by 2050 this figure is set to increase to 1.9 billion. Nowadays, people in this demographic are generally more active and in better health than were previous generations of older people, and as a consequence they are demanding a better quality of life and want to live more independent lives. However, an unwelcome companion of old age is often reduced capacity and, in many cases, ill health. This poses problems for older people who are eager to age with dignity in their own homes.

"How can we use technology to help older people age-in-place?" That's the question that was set by Enterprise Ireland at its most recent "Technology Roadmap Seminar," sponsored by the Irish Innovation Relay Centre and held in Dublin's Alexander Hotel on 24 June.

From mainframe to personal health

"[Healthcare] is the largest segment of the economy in the US, and…..it is becoming too expensive to deliver. We're still living in the "mainframe" era of healthcare..[W]e can't, as a society, afford to devote any more of our economy to it….[W]hat we need is...the healthcare equivalent of the low-cost PC."

-Andy Grove, Fortune Interview[1]

Keynote speaker Eric Dishman, of Intel's Personal Health Platform division, pointed to the required paradigm shift from mainframe healthcare to personal healthcare. "The current global healthcare system cannot scale effectively," said Dishman. "We need to make the move to home- and community-based care."

As technology becomes ubiquitous and more advanced, it can be applied to a number of problems, not least the issue of providing adequate healthcare to older people in familiar surroundings. "In this situation, it is not technology that is the problem; it's a lack of business strategies and imagination," said Dishman. "We need to take existing technology and devices and re-think their deployment in order to create the healthcare system of the future."

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[1] B. Schlender, "Intel's Andy Grove: The Next Battles in Tech," *Fortune*, 12 May 2003, pp. 80-81.

Ordinary devices doing extraordinary things

Televisions and phones can be transformed into effective communication and information devices, which can help older people and indeed their care-givers to feel more connected, according to Dishman. For its part, Intel is trialling various solutions involving everyday appliances such as lights, televisions and telephones. One such application uses the phone to aid Alzheimer's sufferers; the system helps patients to recognise callers by displaying an image of the caller, their name and information about the caller's relationship with the patient.

In order for this particular system to fulfil its potential, both the older person and friends and family need to regularly input information into a database. Accessing the database on a home PC, the patient can verify that they are keeping in touch with their network of friends and make sure they are not calling the same person numerous times a day. In addition, the system can be used to keep a record of conversation topics from previous phone calls.

Far from being daunted by the prospect of using technology, older people have generally been enthusiastic about the idea, according to the speakers at the event, who found that once older people knew what technology could do for them, they were eager to try it out. "Creating a demo environment can help to show patients and care-givers the possibilities," said Rodd Bond, who works in the area of Nestling Technology at the Dundalk Institute of Technology.

Dishman recommended designing healthcare systems *with* older people, rather than for them, as has been the case up until now. "Healthcare needs to be a personalised experience, not an unnatural act," said Dishman, who suggested the idea of customising a pill-taking reminder system for older people so they could choose how to be alerted to take their medication -- whether through a relative's voice issuing a reminder via the television set, or through a wristband signalling that it's time for medication.

Sensing change

Sensor technology, too, was cited as a way to help older people age safely in their home environment, according to Bond. "Creating aware homes can help with the 'ageing-in-place' ideal," he said. Simple things like placing a sensor in an older person's favourite chair, which activates a light in a remote location when pressure is applied, could help reassure family and friends that their older relative is at home safely sitting in their chair.

Syncrophi

Sensing technology looks set to play a vital role in the move towards home-based healthcare, according to Des Chambers of

Syncrophi, who said that the growing significance of home networking and automation has triggered the need for short-range, low power technology for wireless sensing and control, such as Zigbee™. Some examples of early adoptions of wireless sensing technology include military applications, home automation and industry controls, and Chambers said he expects ambulatory biomedical monitoring to be the next area to deploy the technology.

Chambers outlined a number of potential applications for wireless sensing technologies in the home. These include using SpO2 sensors to monitor pulse and oxygen levels in a patient, motion sensors to detect and record physical activity, and movement and weight sensors to monitor weight changes in underweight patients.

Monitoring health and wellness, not just illness

As well as helping older people to deal with illness, technology can be used effectively to identify warning signs that could indicate the early stages of certain diseases. Technology can be used to collect, annotate and interrogate real-world data which can accurately detect warning signs for conditions such as Parkinson's and Alzheimer's.

The development of more user-friendly systems for detecting early warning signals for ailments such as cardiovascular disease and cancer features high on the priority list of the National Centre for Sensor Research (NCSR) in Ireland. The centre specialises in diagnostic devices for use in the home by individuals themselves. "Our devices encourage people to self-manage their health," said Professor Brian MacCraith of NCSR. "These kinds of devices mean that every house can become a setting for preventing or managing diseases."

Certainly, advances in the diagnostic market have seen a range of technologies become available, both wearable and in-vivo (inside the body). Professor MacCraith points to the use of smart watches and smart clothing, as well as cameras that can be swallowed in pill format. "The diagnostic market is a USD25 billion global market and is growing all the time," said Professor MacCraith. "In Ireland the market is growing too, and the country is well-positioned to benefit both socially and economically from this opportunity."

Minimising the barriers to adoption of these technologies could help to identify diseases such as colon cancer -- the second-biggest killer in Ireland -- early enough to allow for effective treatment. Professor MacCraith suggested that rolling out diagnostic technologies in Ireland could greatly reduce demand for hospitals, as some elements of the diagnosis and care function moves to the home.

As well as using technology to detect early signs of potentially fatal diseases, Richard Reilly of University College Dublin outlined ways in which audio-based voice diagnostic technologies can be used to detect voice disorders and other disorders that have an auditory component such as asthma and aphasia. "Some 5 percent of the global population suffer from voice problems, while 40 percent of all head and neck cancers can affect the voice," said Reilly, whose

telephone system can be used as a pre-screening diagnosis for voice disorders. Users of the system can partake in remote vocal exercises, the results of which can be collated and transferred to a website accessible by healthcare professionals. This can speed up the process of diagnosis and can ensure that patients are referred directly to consultants that deal with their particular problem, thus reducing unnecessary demand on consultants and hospitals.

Reducing the demand on hospitals is something that IT firm Dabl is currently doing in pilot tests in Dublin. Dabl's solution is based on a database that enables health centres and clinics to share a common standardised system for the management of patients. Working off Dabl's centralised database, nurse-led clinics are able to refer to real-time patient records, increasing efficiency and reducing the inconvenience for patients of waiting in hospital waiting rooms.

The success of the Dabl system in pilots is certainly noteworthy; public waiting lists during the trial were reduced by 50 percent in 18 months, while patient-waiting times were reduced to just 20 minutes. In addition, the system enabled the medical team to improve the standard and efficiency of management, increase patient compliance and improve the delivery of clinic services, shared systems and databases among the medical team. "We want the Dabl system to become an Irish solution to an international problem," said Bill Rickard, managing director, Dabl.

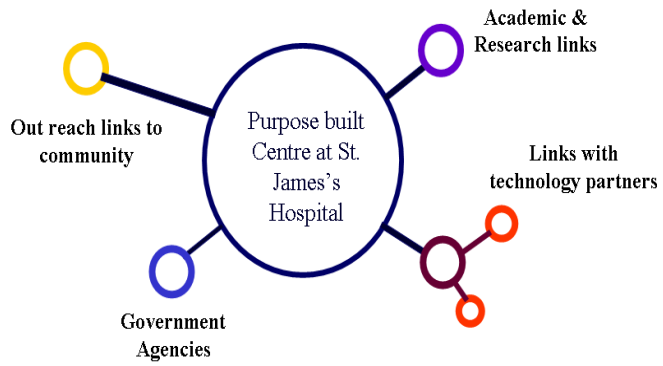
Collaboration is key to success

Speakers at the event agreed that these life-changing solutions should be introduced incrementally rather than with a bang. Patients and care-givers will be the main instruments of the change from a centralised, mainframe system to a decentralised, home-based system, and speakers suggest putting the technology in their hands.

A key factor for success mentioned in all of the presentations at the event was collaboration. Due to the inter-disciplinerary nature of consumer health technologies, collaboration is necessary to ensure the products make it to market. This collaboration needs to involve technology firms, research centres, healthcare professionals, healthcare insurers, consultants and the patients themselves.

While in the US there has been some resistance from the mainstream health system in implementing these home-based solutions, Dishman commented on the "collaborative atmosphere" in Ireland and suggested that Ireland could become a leader in this particular area.

Structure of the Centre of Excellence



The Centre of Excellence for Successful Ageing at St. James' Hospital in Dublin aims to build on its long history of activity related to ageing to become a modern 'hub' for activity relating to the promotion of successful and healthy ageing. Collaboration plays an important role in the

centre's success, according to Davis Coakley of the centre, noting that it has formed links with academia and researchers, technology partners, government agencies and the community.

All in all, speakers at the event concluded that there are particular demographic trends in play in Ireland that create an opportunity for Ireland in this area. It will require the successful mobilisation and co-ordination of the appropriate agency, research, investor, regulatory and societal stakeholders for Ireland to take a lead in the development, trialling and deployment of ageing in place technologies. Through targeted funding, co-operation, co-ordination and vision, Ireland can confidently move towards providing a brighter tomorrow for older people and their families, speakers agreed.

Relevant Weblinks:

http://www.intel.com/research/university/aim/health.htm

http://www.dkit.ie/

http://www.ncsr.ie/index_home.html

http://www.dabl.ie/

http://www.ucd.ie

http://www.tcd.ie/Research/ageingconsortium/projects/

http://www.enterprise-ireland.com

http://www.irc-ireland.ie/

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Web: www.irc-ireland.ie

Email: irc@enterprise-ireland.com

Tel : 01 808 2449