Mobile Health for Independent Living

Landscape Report

February 2011
“Mobile Health, ranging from phone applications to custom-built devices, provides a huge opportunity to enable seniors to live independently for longer. Such solutions lead to better health outcomes and increased peace of mind for seniors and their care givers while reducing the growing burden on strained healthcare systems around the world. This is a win-win situation for everyone involved.”

– Alex Sinclair, GSMA Chief Strategy and Technology Officer

“In order to meet the continually changing wants and needs of dynamic and diverse consumers, countries need innovative and learning organisations and businesses. We need them to be forward thinking and to see opportunities as they arise. It is the role of government to enable innovation and learning, and at the same time, to safeguard the protections that consumers have come to rely on in the marketplace.”

– A. Barry Rand, CEO, AARP
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EXECUTIVE SUMMARY

Mobile technologies have been gradually penetrating the field of healthcare for several years. Today there is a wide array of devices and systems that rely on mobile networks to deliver health information and services. Telehealth applications enable remote specialists to be present, virtually, at the scene of an injury or operation. Mobile phones are being used for text-message health campaigns. And at least 5,000 health-related smartphone apps are now available, offering all manner of tools to help consumers monitor and maintain their health.

Mobile health, or mHealth, refers to the provision of health services using mobile devices. It is a subset of eHealth, which encompasses all aspects of computing and electronic communications in healthcare. Mobile health can be further segmented into phone-based and embedded mobile solutions.

According to ABI Research (2009), 15 million mHealth sensors and devices will be in use by 2012. That said, the mHealth field is far from hitting its stride. The potential to develop targeted mobile solutions that address real healthcare sector needs is wide open, and this confluence of consumer electronics and healthcare is beginning to gain momentum.

One of the areas of greatest need, and potential for innovation, has to do with the way people manage their care as they age. The promise of mHealth is that it offers new models of care — involving patients, caregivers, doctors and other healthcare professionals — that enable people to receive the right kinds of health services while empowering them to live well and safely outside a residential care facility.

The broader context is that people in all parts of the world are living longer, and with age comes an increased incidence of chronic disease. This is putting immense pressure on already-stretched healthcare systems and insurers. The time is ripe, therefore, for a burst of innovation in mHealth that enhances independence and quality of care for seniors.

Obstacles, however, abound. Among them are uncertainties surrounding regulation and reimbursement, data integration and device interoperability, and the lack of clear evidence that mHealth solutions are viable on a wide scale and can deliver real efficiencies.

This report provides an overview of the mHealth landscape, covering the macroeconomic context, health-related challenges faced by people as they age, and mHealth solutions to enable independent living.

The stakeholders in this field are many — namely healthcare providers, payers, regulators, patient advocates, device manufacturers, mobile operators and healthcare IT specialists. Collaboration and coordination are needed to remove obstacles and create a vibrant environment for mHealth growth and innovation, while safeguarding consumer interests.

Considering the huge potential of mHealth applications for patient health and independence, and the intensifying need for cost control in healthcare, the time has certainly come for swift and deliberate action.
THE AGEING OF GLOBAL POPULATIONS

On average, people all over the world are living longer. Improvements in healthcare and nutrition have led to longer life spans, while falling fertility rates in many countries have resulted in a rapid and ongoing shift in the age distribution of human populations.

According to the UN’s 2009 World Population Ageing report, the number of people aged 60 years or over was 600 million in 2000, triple that of 1950. In 2009, the number of people 60 or older surpassed 700 million, and 12 countries had more than 10 million older people: China (160 million), India (89 million), the United States (56 million), Japan (38 million), the Russian Federation (25 million) and Germany (21 million). By 2050, 2 billion people over 60 are projected to be alive, implying that their number will once again triple over a span of 40 years (UN 2009).

Furthermore, the average age of people over 60 is increasing. While today, worldwide, 1 in 7 people in this age group is 80 or above, by 2050 1 in 5 will be 80 or over (UN 2009).

This unprecedented shift is widespread. While developed countries were first to see the lifespan of their citizens advance, every region of the world is experiencing it today.

As a region, Europe has the highest proportion of older people. According to UN statistics, about 37 per cent of the European population is projected to be 60 or over in 2050, up from 20 per cent in 2000. In contrast, only 10 per cent of the population of Africa is projected to be over 60 in 2050. That said, the growth rate of older people is higher in less-developed regions, as the demographic shift ‘catches up’ with the developed economies. Japan has the highest median age today, at 44 years, and by 2050 the country’s median age is projected to be 55.

In Latin American countries, the average lifespan has increased by 22 years since the 1950s, and fertility has dropped by half (World Bank).

Although the proportion of older people is considerably higher in the more developed regions, the number of older people is increasingly large in less developed regions. By 2050, nearly four-fifths of the world’s older population will be living in less developed regions (UN 2009).

Average annual growth rate of population 60 or over: world and development regions, 1950-2050

Source: (UN, World Population Ageing 1950-2050)

DEMENTIA: AN EPIDEMIC IN THE ASIA-PACIFIC REGION

The number of people with dementia increases with an ageing population. In the Asia-Pacific region, the proportion of people over 60 years of age will increase from less than 10 per cent today to 25 per cent of the total population by 2050. People over 80 years of age will make up 5 per cent of the region’s population, up from 1 per cent today.

As a result, the number of people with dementia will increase in the Asia-Pacific region, from 13.7 million people in 2005 to 64.6 million by 2050, by which time the number of new cases per year will be 19.7 million, regionwide.

The dementias are a group of diseases characterised by loss of short-term memory, other cognitive abilities and daily functioning. Alzheimer’s disease and vascular dementia are the most common types of dementia.

THE RISING COST OF CARE

Upward pressure on healthcare costs is coming from all corners, not least of which is the availability and demand for ever-more-complex and costly procedures. Longevity has much to do with the rising demand for services, and the declining proportion of working-age people is affecting governments’ ability to fund public healthcare systems.

Research supports the connection between longer life and an increased need for health services. Because health typically declines with advancing age, higher numbers of very old people imply a growing demand for long-term care (Pollard, 1995, Crimmins, 1997, as cited in UN 2009).

Furthermore, as people age, they become more susceptible to chronic disease. In high-income countries, where more than two-thirds of people live beyond the age of 70, most die of chronic diseases such as cardiovascular disease, chronic obstructive lung disease, cancer, diabetes or dementia. Lung infection remains the only leading infectious cause of death (WHO). In the US, nearly half the population is living with a chronic disease, and the number is projected to rise to 157 million in 2020. Caring for patients with chronic conditions accounts for more than four-fifths (83 per cent) of all healthcare expenditures in the US, over $1.4 trillion annually (California HealthCare Foundation 2006).

Residential care is a major factor in the rising cost of healthcare. In America, the median annual rate for a private nursing home room in 2005 was $60,225, compared with the 2010 median annual rate of $75,190. This increase represents a 4.5 per cent compound annual growth rate over that period (Genworth 2010).

Exacerbating the issue is the decreasing fertility rate, particularly in developed countries. A lower birth rate translates into fewer relatives on whom people can rely for support as they grow old, especially in less developed regions where social support is usually provided by the immediate family (Hoyert, 1991, and Wolf, 1994, as cited in UN 2009).

Likewise, with a lower proportion of younger, economically active people, governments will be less able to fund healthcare systems as the “tsunami” of population ageing hits in full force. In the European Union, the working age population (15 to 64) is projected to fall by 48 million between 2010 and 2050. Meanwhile, the number of people 65 and over will rise sharply, by 58 million by 2050. Europe will therefore go from having four people of working age for every older citizen to a ratio of 2 to 1 by 2050 (EC 2006).

If the current trends continue, healthcare costs will consume an unsustainable portion of nations’ wealth. In fact, according to McKinsey, healthcare spending has outpaced GDP growth by an average of 2 per cent in the majority of OECD countries over the past 50 years. Under current conditions, developed economies could spend nearly 15 per cent of their GDP on healthcare within the next two decades, and this level could double in the US by 2040, and across OECD countries by 2070.

In developing economies, historically, the cost of caring for seniors has not been as critical an issue. Until recently, average life spans and lifestyles did not lend themselves to a high incidence of chronic disease. High-cost procedures and services were less available. And older people tended to live with their families, obviating the need for full-time residential care. Today, however, chronic disease incidence in developing countries is steadily rising, more costly procedures are available, and declining fertility rates are reducing the number of younger people able to look after their ageing relatives. China, with its one-child-per-family law, is an extreme case of this. So while some of the most startling demographic figures are from Europe and North America, the rest of the world is quickly catching up.
As people age, most want to live at home, in the comfort of familiar surroundings, for as long as they can. Mobile health solutions have the potential to extend the length of time people can safely live without dedicated professional support or placing an undue burden on informal caregivers such as family and friends.

The point at which a person may no longer be able to live wholly independently is when they cannot manage the activities of daily living without help. Activities of daily living, or ADLs, include the ability to get in and out of bed, get dressed, use the toilet, bathe, eat, take medicine — or any number of activities necessary in daily life such as paying bills, filling out medical claims forms, preparing meals, driving or arranging for services from an agency, such as a nurse.

Usually, if only a small number of these ADLs pose a challenge, then measures can be taken to compensate. These could include periodic in-home nursing support or additional help from informal caregivers. But when the amount of support becomes too great — or when living alone poses a real threat to the patient’s health — then residential care is typically the next step.

When managing chronic disease, the health risks for seniors who live alone, or with a partner, are compounded. Forgetfulness, for example, can affect their ability to take medications properly or monitor their condition, as with diabetes. Frailty or impaired mobility can become a danger. One of the most common, and costly, scenarios for older people is being injured from a fall. In Britain, injuries to seniors caused by falls costs the National Health Service £1.7 billion per year, according to Age UK. Neurodegenerative conditions such as Alzheimer’s disease present their own set of challenges, which could include a sufferer becoming confused or lost.

While mobile health technologies cannot solve these problems directly, they can create an environment in which the risks or difficulties are reduced. They can enable periodic support to be provided conveniently and efficiently by formal or informal caregivers. And they can assure caregivers that their patients and loved ones are safe and well cared for when living alone. This, in turn, can delay a transition to residential care, potentially, by years.
THE ROLE OF MHEALTH IN SENIOR CARE

Developments in mHealth are proliferating, with a wide range of products and healthcare programmes using mobile connectivity to enable new health solutions. Analyst firm Kalorama estimates the total worldwide market for handheld medical devices to be $8.8 billion in 2010, and predicts it to grow 26 per cent by 2014. Separately, Juniper Research is predicting that mHealth solutions will save healthcare providers between $1.96 billion and $5.83 billion by 2014.

While many mHealth solutions have yet to reach maturity, they promise to deliver a wide range of benefits for independent living, including the following:

- Providing health information, first aid information, and healthcare options to patients, which can advise against costly emergency-room visits for minor health needs.

MEDICATION ADHERENCE

A prominent area of mHealth that touches all age brackets is medication adherence — taking the right medication at the right time and dose. Drug regimens can be quite complex for people dealing with a variety of ailments, and the consequences of poor compliance can be severe.

Only 50 per cent of patients who have a chronic illness in developed countries follow their prescribed treatment regimens, according to the World Health Organization (2003). The problem is even greater in developing countries, where fewer resources are available, generally, for healthcare. One study found that in China, Gambia and the Seychelles, only 43 per cent, 27 per cent and 26 per cent, respectively, of patients with hypertension adhere to their antihypertensive medication regimen.

There are numerous reasons people do not take their medications as prescribed. Forgetfulness accounts for about one in four cases, according to a 2002 survey of 10,000 people in the US (Boston Consulting Group 2003). Other reasons include the desire to save money, negative side effects, or lack of urgency for drugs that don’t relieve immediate symptoms (e.g., medications for osteoporosis or high cholesterol).

Poor adherence to long-term therapies severely compromises the effectiveness of treatment, making this a critical issue both in terms of patient health and the economic impact on healthcare systems. By addressing the problem with mHealth solutions, a significant positive return could be achieved.

Examples of mHealth strategies for supporting medication adherence include mobile-enabled pill bottles and even individual drug capsules that incorporate wireless transmitters to indicate when a patient has taken the medication.

- Vitality GlowCaps attach to regular pill containers, providing an audio-visual reminder for patients to take their medication. The mobile-enabled devices can call the patient’s phone if a dose is missed, receive medication schedule updates, or order more medication when required. User research by Vitality in 2009 revealed an impressive 86 per cent adherence level for patients using GlowCaps.

- An estimated $438 million of counterfeit anti-malarial medications are distributed in West Africa each year (UNODC 2009). In Ghana, mPedigree is developing the use of SMS text messaging to help consumers confirm their medication is genuine and help protect Ghanaians from using ineffective or dangerous counterfeit drugs. The consumer can verify the product by revealing a unique code beneath a scratch-off panel on each medication label and texting the code to a free SMS number. The service then replies within a few seconds to confirm the drug’s origin.

- Proteus Biomedical has developed an ingestible embedded chip small enough to be contained within a pill and swallowed by a patient. Once the chip is inside the human body it transmits a signal to a receiver, signalling that the medication has been taken. This receiver could then transmit the data via an embedded 3G device as part of a remote health monitoring (RHM) system.

VITAL SIGN MONITORING

Whether it’s diabetes, heart disease or another chronic condition that seniors have to manage, numerous consumer-facing devices are available today that measure and record vital signs. The value of these devices is the freedom and convenience of tracking one’s health virtually anywhere, without having to be at home. The long-term effect could be to reduce hospitalisations and clinic visits, while improving patients’ quality of life.
• MyDoctor@Home is a service from Telecom Italia that allows patients suffering from cardiac, diabetic or lung ailments to record their vital signs at home. MyDoctor@Home is equipped with a glucose monitor, electrocardiogram, oximeter, spirometer and more. A web portal allows patients, caregivers or doctors to view a patient’s measurements at any time.

• In Australia, Telstra’s Connected Blood Glucose Meter for diabetes sufferers allows diabetes patients to monitor their blood-sugar level more frequently and maintain more accurate records. The results can then be accessed via mobile phone or online by patients and physicians.

• Telefonica is developing a health monitoring system that allows patients to measure their vital signs and complete questionnaires on their health status from home. The system can be used for medication compliance and also includes videoconferencing functionality for remote consultations with their physician. The device uses Bluetooth to connect to a touchscreen gateway in the patient’s home, which transmits data wirelessly to the patient’s doctor. With this technology, which is planned to be first launched in Spain this year, physicians can track patients’ vital signs remotely, reducing hospital admissions and bed occupancy and freeing up doctors to spend more time with critical patients. Telefonica is also working on mobile monitoring devices that patients can carry with them.

ACTIVITY MONITORING AND ALERT SYSTEMS
Several mHealth products offer one or more features related to motion sensing and location tracking. Motion sensing devices can be used in various ways to alert caregivers when an older person falls or deviates from his or her routine. Activity monitoring can involve a wide range of actions, from the time between refrigerator door openings to ambient room temperature. Fall detectors are small electronic devices with built-in accelerometers. A person with epilepsy, for example, might use such a device, or simply someone who has become weak or frail, but remains able to get by without a great deal of help. Location tracking ensures that people prone to becoming disorientated or confused can be located if they are away from home or wander off.

• In Spain, Telefonica has developed a remote tracking, activity monitoring and emergency system that uses mobile networks to monitor the movement of dependent individuals. The Teleassistance Movil service allows patients to raise an alarm and call either relatives, caregivers or the emergency services, while family members and caregivers can see the location of the patient at anytime. The system will launch in the Czech Republic and UK soon.

• T-Mobile is another mobile network operator that has chosen to move into the healthcare market by introducing a mobile tracking and activity monitoring system. WellCare is a system of connected sensors that sends SMS messages to caregivers, notifying them of their patient’s activity and medication adherence, and reminding patients to take their medication as prescribed.

THE RISK OF FALLING
Falling poses the greatest risk to seniors, and is the greatest cause of injury to people age 60 and over in the European Union.

• Falls are the main cause (29%) of fatal injuries
• Falls account for 58 per cent of all injury-related hospital days (75% for women)
• The average hospital stay increases by one day for every 5-year age increment
• Reported rates of death after a hip fracture range from 12% to 36% within one year
• At least 1 in 5 people still need increased care more than a year after the fracture

(Bauer and Steiner 2009)

PLATFORMS FOR MOBILE HEALTH SOLUTIONS
Mobile phones have become an accessory in the lives of billions of people, enabled by the near ubiquity of mobile networks. As such, and particularly with the proliferation of smartphones, mobile phones are a convenient platform for providing health-related information, services and useful applications.

In developing countries in particular, mobile networks may be the only way to reach people in poor or rural locations with health information and services.

Because of the huge installed base of mobile phone users — as well as the relatively low cost of application development — mHealth apps can automatically reach a high number of seniors, and this is why smartphone apps have excelled in the areas of wellness and health education.

Mobile health applications that support independent living can also be developed on dedicated devices embedded with mobile capability. Such devices, including many of the examples included in this report, can focus on health solutions and be designed with a high degree of simplicity and usability, ensuring people can use them as their bodies and minds become less adroit.
In the UK, Buddi is a commercially available device equipped with GPS and mobile network connectivity. This small, lightweight product is designed to be worn by those who have chronic conditions but live in their own homes. The location data is made available to the patient’s caregivers through a web portal. Buddi is also able to notify caregivers and emergency contacts when a fall is detected or if the wearer passes a preset boundary.

Intel and GE Healthcare have formed a joint venture, targeting the in-home healthcare market. The new company will develop devices focused on chronic disease management, independent living and extended care. Both parent companies have developed products and prototypes using smart sensors that help caregivers determine whether patients are experiencing trouble in their homes, and to help with daily activities, such as remembering to take medication.

LifeComm, a US-based mobile health company, is developing a mobile tracking, fall detection and emergency button device that uses existing mobile phone networks and GPS connectivity to report a user’s location and activity. The device can be worn on the user’s wrist, clipped to a belt or as a lanyard worn around the neck. The device’s data will be accessible to the user, caregiver or physician through a web-based login, but LifeComm also enables two-way voice calls and a digital display to help communicate with the user.

**WELLNESS AND REHABILITATION**

An important category of mHealth solutions comprises services related to exercise, diet and mental acuity. These preventative applications offer tips, tools and education to help people make choices that keep them healthy and out of long-term care as much as possible. Many popular wellness applications take advantage of people’s competitive spirit, challenging them to ‘walk the farthest’ or ‘lose the most weight.’ Similar strategies are being applied to physical and mental rehabilitation. Patients follow prescribed exercises and record their progress, while doctors can view the patient’s records, adjust their routines and consult remotely.

- Telefonica’s tele-rehabilitation solution is designed for patients who are recovering after an injury or operation. Patients are provided with a touchscreen kit in their home and doctors can remotely assign exercises for patients. In some cases of physical rehabilitation, the patient wears a connected brace on the injured area which transmits movement information to the touchscreen gateway. This information is then used to create an avatar of the patient, so they and their carers can view exactly how the joint or area is moving. Pulmonary rehabilitation is that which is done on the go (e.g., walking or running) and in these cases data, such as pulse rate, are gathered using a medical device connected to a mobile phone via Bluetooth. Patients can also input their experiences with the exercises, including the ease with which it was performed, any pain experienced etc. Doctors can view the information via their online portal and alter exercises to match the condition of the patient.

**CAREGIVER SOLUTIONS**

A major growth area in healthcare involves the provision of clinical services in patients’ homes. This is expected to be a key expansion area as hospitals strive to control costs and healthcare systems more actively promote independent living scenarios for seniors. The coordination of in-home care is remarkably unautomated and paper-based. There is a huge potential to create mobile solutions that improve scheduling, to increase the number of patients seen in a day, and enable efficient and computerised documentation. Offline mobile capabilities are essential, so information collected can be synchronised when a network connection is available. Likewise, online mobile support for field-based providers will provide real-time information and a more personalised clinical experience (Gartner 2010).

- The Sero eCare solution is a mobile phone application that allows real-time monitoring of the provision of care. When care workers arrive at a patient’s location, they use the application to retrieve patient information. New data can take the form of images, voice and text, and can be shared with other health professionals such as GPs, at the point of care, reducing the time spent waiting for a consultation.

### TELENOR REMOTE MEDICAL ALERT SYSTEM

For older people and those affected by chronic conditions, the cost of long-term care can be prohibitive and, for many, relocating to a care facility is an unwanted and traumatic experience. Norwegian telecommunications provider Telenor, with The Tromsø Telemedicine Laboratory, has been studying the application of technologies intended to help seniors live at home for longer. Telenor has been testing a variety of sensors, such as motion detectors, moisture sensors for bed linens, door sensors, an epilepsy alarm, pill dispenser detectors and GPS location devices. The sensors are connected via Telenor’s wireless mobile network, and the feedback from participants has so far been positive.

The study is looking into a number of areas that will benefit patients, their families and healthcare providers. Patients are able to live in the comfort of their own home for longer, while families and healthcare providers benefit from the reduced costs of the monitoring system compared to expensive full-time care.

The sensor system is able to make existing care methods more effective and targeted. For example, the sensors can provide a better indication of when a visiting nurse is required. Instead of scheduling visits at the same time every day, the nurse can visit when the system has identified a need, such as when medicine has not been taken or movement has not been detected.
REMOTE CONSULTATION

In a similar vein, there is an increasing interest in using mobile-enabled devices to remotely connect patients with their doctor and other health professionals. The most sophisticated of these are being developed to provide video interactions, a library of health resources, motion-sensing monitors, vital sign measurement and tracking, and more. While initial development in this area gravitated towards fixed-line connectivity, most products in development are moving towards mobile, as a more ‘plug and play’ experience can be created. In addition, fixed-line internet has been leapfrogged in many regions, and is simply not available.

Despite inroads into mobile-enabled devices for remote consultation, the willingness of physicians to use such systems, and how resistance might be overcome, is territory that has not been thoroughly explored.

- The Intel Health Guide is a remote health management solution that includes an in-home patient device and an online interface allowing clinicians to monitor patients and remotely manage care. In the US, Aetna and Intel are using the system in a clinical trial to assess the efficacy of remote health monitoring for heart conditions. Preliminary findings of the trial, involving 315 chronic heart failure patients, indicate that remote health technology can use early warning signs — such as blood pressure and weight changes — to reduce avoidable visits to the hospital.

- In July 2010 Telefónica launched a global e-health unit and strategy for the eHealth sector, and is aspiring to contribute to a “new, sustainable and efficient healthcare model where the patient is the main focus of the system.” The mobile operator is targeting the decentralisation of clinical processes, integrated service networks and ubiquitous and remote access to services. Telefónica is currently participating in over 80 projects in the telemedicine and telecare segment in multiple countries.

ARE SENIORS READY FOR MHEALTH?

Americans aged 50 and over demonstrate low use, but high interest, in mHealth devices and applications. According to a 2011 study by the AARP, 53 per cent of respondents (aged 50 or over) indicated an interest in using mobile technology to support their health, or were already using some form of mHealth application, such as for tracking weight, blood pressure or blood sugar level. Furthermore, nearly four out of five informal caregivers indicated they were interested in tools that could help them with their care giving, including being alerted if there is a change in the routine of the person they care for.

Resistance to mHealth by seniors is attributed to preconceptions about cost, lack of awareness about what is available and caution about sharing personal health information, i.e., data privacy. These are significant issues that must be addressed as mHealth stakeholders aim for wider acceptance of mHealth solutions for independent living.

Such concerns are often overcome when their caregiver has an interest in implementing the solution, and is willing to explain the workings and benefits directly to the patient. This can be an effective channel for mHealth solutions to be introduced to patients.

While mHealth services enable independent living and help make care in the later stages of life more efficient, they have the potential to reduce the amount of personal contact a patient has with his or her caregivers. For many seniors who live alone, isolation can be a serious issue resulting in depression or other mental health issues. On the other hand, it has the capacity to bring more people into a patient’s circle of care, virtually, through teleconferencing or connected communities, or even better-timed visits from family members and care providers. As mHealth scenarios continue to be developed and tested, more information needs to be gathered on the social consequences of these technical tools.

It is also worth noting that in a relatively short period of time, most seniors — particularly in developed economies — will have had experience using smartphones, computers and other sophisticated devices. Therefore, resistance may be lower than anticipated. Nonetheless, in the short term, there is a need to emphasise usability as well as affordability in solution development.

A GROWING MARKET SEGMENT

Increasingly, consumer technologies are being designed specifically for seniors. For example, Japan’s largest mobile carrier, NTT DoCoMo, has introduced the Raku-Raku phone, a mobile phone made specifically for older people. In addition to usability features such as a larger keypad, the Raku-Raku phone enables users to maintain a health record that can be shared with healthcare professionals. Able to detect micro-movements, the phone’s camera can check and record a person’s pulse in real time.
BREAKING DOWN THE BARRIERS

Technologies that support independent living for seniors are rapidly emerging. But clearly there are barriers that hinder innovation, integration and scale. The reason they persist is that they are complex issues that cannot be solved by one stakeholder alone. They can only be addressed through collective action — and with a view to international alignment as much as possible.

INTEROPERABLE SYSTEMS AND TECHNOLOGIES

In its current stage of evolution, mHealth looks like a wide range of stand-alone solutions developed to address a well-defined opportunity in a specific market. This early-stage fragmentation is to be expected. However, consumers cannot be expected to subscribe to multiple systems addressing different concerns — which do not work together. In other words, a more holistic view of independent living needs to be considered, representing a range of health-specific, lifestyle and geographic conditions. Ideally, mHealth will evolve into a flexible range of complementary products and services that offer consumers and providers a range of options and that “play well together.”

The Institute for the Future (2009) describes four sets of technologies that are required to enable a highly functional mHealth ecosystem:

- Powerful, inexpensive mobile devices
- Open wireless networks
- Low-cost, ubiquitous mobile sensors
- Interoperable medical information services

The last of these, perhaps, presents the most daunting challenge, but also a dramatic opportunity. Because mHealth solutions traverse prevention, diagnosis, treatment and monitoring of chronic conditions, it has the potential to be a catalyst for unification of healthcare systems and data. In particular, systems that combine surveillance with point-of-care support tools need to be increasingly deployed and studied (Mechael 2010).

If technical fragmentation persists, it will create a highly inefficient environment for product innovation and a barrier, ultimately, to effectiveness. What’s required is a strong foundation of standards that enables mHealth products to work together while interfacing with related healthcare systems.

One organisation pushing in this direction is the Continua Health Alliance, which is attempting to create standardised certifications for personal telehealth devices. Created in 2006, the group now has more than 230 member companies, and the first Continua-certified products came to market in early 2009. As of Jan 2011, 24 certified products are available with many more in development.

REIMBURSEMENT AND WILLINGNESS TO PAY

While mHealth has huge potential to both improve healthcare delivery and provide revenue for service providers, achieving broad uptake and monetising this will be a challenge. The vast majority of global health spend is incurred in the developed world and is reimbursed by healthcare payers, either public health systems or insurers. If mHealth is to reach its full potential, it will have to move into this environment, as it is unlikely that consumers in established markets will ever be major buyers of anything more than the low-cost mHealth services.

On the other hand, studies have indicated a high willingness to pay for monitoring systems, particularly by caregivers who want to be assured that their family member or patient is well, or that an accident or change in routine has not occurred.

Outside of the major established health systems, the situation varies widely from the poorest countries with only rudimentary health infrastructure to rapidly developing markets that have not yet created mature health systems. There is a clear need for more research into mHealth business models, including consumers’ willingness to pay and reimbursement from health systems and insurers.

EVIDENCE OF MHEALTH BENEFITS

Mobile health products and projects to-date have tended to focus on proof of concept and have been light on measuring impact on health outcomes. More data is needed to demonstrate that mHealth scenarios do, in fact, lead to improved health system performance, improved health status and health-related quality of life for older people. Credible research would be expected to span different types of outcomes including:

- Healthcare process outcomes refer to receiving appropriate treatment. This includes educating seniors on their disease conditions, monitoring their health and ensuring therapeutic adherence at different levels of healthcare utilisation.
- Intermediate health outcomes refer to self-management, health knowledge, and health behaviours. This includes coaching older people on diet or physical activity including self-management, knowledge attainment (programme adherence), and change in health behaviours (from sedentary to daily exercise).
- Relationship-centered outcomes refer to shared decision making or clinician-patient communication. Examples include reducing social isolation of older people, bringing them social support during their most acute moment of stress and improving the level of positive interaction with their health provider.
• Clinical outcomes refer to quality of life. This could include minimising complication of diseases more likely to affect ageing people.
• Economic outcomes refer to cost and access to care. Factors contributing to this measurement include the number of physician visits, the cost of physician visits and prescription medication.

DEVICE AND SYSTEM REGULATION
Adding to the complexity of mHealth is the sometimes blurry line between consumer electronics and medical devices, in terms of healthcare regulation. This line is likely to differ from market to market, and in some cases may not be clearly defined at all. In most markets, medical devices must undergo clinical trials and testing before they can be sold.

The US Food and Drug Administration is arguably the most active healthcare regulator in the world, and often sets the highest bar for product safety and testing. In 2010 the FDA indicated that mobile electronics such as the iPhone can be considered medical devices when used as a platform for health services, but so far it has not chosen to regulate mHealth devices (MobiHealthNews 2010). The key will be to find the appropriate level of oversight that allows innovation to flourish while ensuring that consumers are adequately protected.

NETWORK COVERAGE
Network coverage is sometimes cited as a barrier to widespread adoption of mobile health and needs to be considered during the design of any solution. The impact of network coverage on mobile health differs according to whether the solution in question is real-time and location-critical.

For example, vital sign monitoring solutions can be designed so that even if a patient is temporarily without network coverage, data can be stored in the device and sent once coverage is regained. This would still provide a much more comprehensive picture of the patient’s well-being than is currently possible without remote monitoring in addition to the convenience of patients not having to physically attend a clinic as often.

A different scenario is that of a panic button or fall detection device where time and location are more relevant. Such solutions should not be marketed as never-fail emergency devices. However, it should be noted that mobile coverage is ubiquitous in most major metropolitan areas, particularly in developed countries, and the benefits of having such a device that operates in a majority of locations are significant.

To maximise the benefits possible from mobile health solutions, those that are used for critical applications should monitor and alert the user of connectivity status, and implement application-level mechanisms to maintain the best possible level of service in the event of radio resource scarcity.

TOWARDS A ROBUST MHEALTH SECTOR
The impact of ageing populations on healthcare budgets and systems is becoming more acute by the year, and mHealth solutions offer the potential to enable seniors to live at home longer while maintaining or improving their quality of care. However, considerable uncertainty remains — in regulation, provider adoption, integration with healthcare IT systems, and reimbursement for solution developers.

Given the achievements to-date of early entrants into mHealth and the increasing prominence of mobile solutions in the wider healthcare policy dialogue, the time is right for mHealth stakeholders to tackle the more complex and persistent issues. With progress, these organisations can take mHealth into the mainstream more quickly, and at scale, leading to long-term commercial viability for the sector — while ensuring the highest-quality products for consumers. The mobile industry, through the initiative of the GSMA, has an opportunity to be a catalyst for productive and tangible progress.

Governments and regulators, for their part, have a crucial role to play in creating a policy environment that prompts innovation, removes barriers to entry and enables free and fair competition. Progress in these areas could be achieved through research funding or legislation. Policymakers also have the means to incentivise adoption by care providers and integration of mHealth technologies into healthcare systems and practices. Ultimately, and not to be underemphasised, governments have a responsibility to ensure the availability of safe, secure and high-quality care for consumers.

The mHealth landscape is laid out in front of us, and the obstacles identified. What’s needed next is a unified effort to pull them down while continuing the momentum of invention, investigation and solution development. While governments and businesses have much to gain, the true beneficiaries of this work will be the individuals who gain greater self-determination and improved care in the later stages of their life.
ABOUT THE CONTRIBUTORS

MOBILE HEALTH PROGRAMME AT GSMA

The GSMA represents the interests of the worldwide mobile communications industry. Spanning 219 countries, the GSMA unites nearly 800 of the world’s mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, internet companies, and media and entertainment organisations. The GSMA is focused on innovating, incubating and creating new opportunities for its membership, all with the end goal of driving the growth of the mobile communications industry.

The GSMA Mobile Health initiative is a market development programme designed to accelerate the adoption of wireless connectivity in the healthcare sector by identifying and lowering the main barriers, developing common guideline and driving innovation.

The GSMA supports the development of a mobile ecosystem that enables mHealth products and services. An overarching GSMA objective is to limit fragmentation of technologies and business implementations as the marketplace develops. Areas of focus include:

• Cross-sector understanding. Develop strategic relationships between key industry players that will promote interoperability solutions and enable scale.
• Business models. Showcase and promote the mHealth market opportunity and potential business models.
• Policy and regulations. Address the legal and regulatory challenges that will be faced during the creation of mHealth solutions, and advocate for policies that would support innovation and investment in this area.
• Evidence of solutions and outcomes. Showcase the potential of embedded mHealth by creating a common set of reference points that can be used by industry to develop viable commercial models and technical solutions.

The GSMA has a unique position to lead this cross-industry action and facilitate these mobile-specific enablers, to support the mHealth sector. The project is open to operators, suppliers and health industry representatives to promote a common industrywide solution.

AARP

AARP is a nonprofit, nonpartisan organisation with a membership that helps people 50+ have independence, choice and control in ways that are beneficial and affordable to them and society as a whole. AARP does not endorse candidates for public office or make contributions to either political campaigns or candidates. We produce AARP The Magazine, the definitive voice for 50+ Americans and the world’s largest-circulation magazine with over 35.1 million readers; AARP Bulletin, the go-to news source for AARP’s millions of members and Americans 50+; AARP VIVA, the only bilingual U.S. publication dedicated exclusively to the 50+ Hispanic community; and our website, AARP.org. AARP Foundation is an affiliated charity that provides security, protection, and empowerment to older persons in need with support from thousands of volunteers, donors, and sponsors. We have staffed offices in all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

WAGGENER EDSTROM WORLDWIDE

Waggener Edstrom Worldwide is a global, integrated communications agency. For more than 25 years, the independently owned firm has developed strategic communications programmes for innovative and world-changing clients, working to influence markets, inspire people and improve lives. WE was awarded Best PR Agency in North America by International Business Awards and Top Place to Work in PR by PR News.

The agency has more than 800 employees in 17 offices around the world, and its Global Alliance partners expand the agency’s reach to more than 80 additional international markets. WE has seven global practices: Analyst Relations, Consumer, Corporate, Healthcare, Public Affairs, Technology and WE Social Innovation, along with its WE Studio D™ digital strategies group. To learn more, visit www.WaggenerEdstrom.com.
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