



Vodafone mHealth Solutions

# Evaluating mHealth Adoption Barriers: Politics and Economics

Insights Guide

*power to you*



# Welcome

Welcome to the second Vodafone mHealth Solutions Insights Guide, part of our Health Debate publication series.

We live in a time of huge change. Technology, and increasingly mobile technology, is changing every aspect of our lives, from business to politics, and increasingly, healthcare.

It is always best to start with the people issues, and our previous guide, the first in the series, looked at the mHealth adoption barriers presented by human behaviour: the ingrained habits and cultures of doctors, patients and healthcare commissioners who face the prospect of major changes to the way they work, and challenges to the way they think.

In this report, we look to government.

Around the world, governments are realising that a key part of healthcare reform to meet the challenges of the modern world – from economic austerity to ageing populations – is ensuring the conditions are right for new technologies like mHealth to flourish. But this is not as easy as it sounds. How to scale up pilots to regional and national level, within existing well-established structures of healthcare provision? How to change funding incentives, so mHealth allows everyone from healthcare organisations, pharmaceutical companies, doctors and technology companies to be properly rewarded for their part in what is a new model? In other words who will pay, and how?

These are big challenges – but policymakers should not feel that they are facing them alone.

Governments are realising that healthcare providers and players in all parts of the healthcare value chain are facing the same issues, and this means we should be able to analyse what these issues are; what the

main approaches are to tackling them; what works, and what questions therefore need to be asked now to set people onto the right track within their own national context.

How can mHealth policy be developed in your country, to ensure innovation can be successfully implemented to improve patient outcomes and quality of life? And how can systems be put in place to ensure the investment gets to the right places; the savings are made whilst health outcomes are improved and the financial incentives are put in the right place for organisations and individuals to ensure that the all-important money issues do not slow progress towards this success?

The opinions expressed in this document are not ours but they are those of independent experts whose views we respect – even if we don't always agree with them. I thank them for the time and effort they have invested in exploring this topic. We hope this document can offer you some insights that will provide the impetus to generate positive change and we look forward to hearing your response to these ideas in the months to come.

**Axel Nemetz**

Head of Vodafone mHealth Solutions

The Vodafone Health Debate series is part of our continuing commitment to thought leadership in healthcare. It brings together senior pharma, public and private health stakeholders to learn, share and debate on issues and new thinking brought forward by renowned thought leaders and industry experts.

In addition, get involved in lively and topical mHealth discussions – join the LinkedIn Health Debate. [mhealth.vodafone.com/linkedin](https://mhealth.vodafone.com/linkedin)

# Executive summary

## A changing world

Across the world, the mobile communications sector continues to enjoy huge growth, and one phenomenon is driving an increasing amount of growth and buzz: mHealth.

mHealth is proving valuable both to optimise the efficiencies of health organisations' internal processes and to enhance the delivery of healthcare. Its emergence comes at a time when global healthcare systems are challenged with significant budgetary pressures as a result of an ageing population, the burden of chronic disease and increasingly technically-savvy patients demanding high-quality, personalised care.

However, there are both policy and funding barriers to mHealth implementation, including a lack of investment funds caused by the global economic crisis; and the misalignment of funding incentives in many healthcare systems in such a way as to block the development of decentralised, patient-focused healthcare.

It is vital therefore that governments are aware of the nature and size of these barriers, as they build mHealth policies in their own national contexts, and attempt to move from the rigid, top-down sorts of healthcare systems we currently see in most countries to more flexible, adaptable systems.

More localised control of healthcare purchasing and delivery, for example by region instead of nationally – which is characterising the reform of healthcare systems in many parts of the world.

## The pillars of mHealth policy

Only a quarter of countries worldwide have drawn up a national telemedicine policy or strategy.

World Health Organization (WHO) research suggests mHealth could follow the adoption patterns of mobile phones and mobile banking in developing countries, where people who have never had a telephone or bank account leapfrog traditional technology systems and go straight to mobile. Policymakers in those countries are having to respond accordingly, and develop a healthcare infrastructure along a very different path to that taken by more established economies.

In higher income countries, policymakers are serving populations that are both ageing and demanding more from healthcare, against a tight economic background. They are therefore tending to align mHealth development with cutting costs through monitoring, prevention, and the shifting of greater responsibility to the patient.

Overall, there are three major policy themes emerging that affect the development of mHealth worldwide: infrastructure building; patient empowerment; and the drive to localisation.

When it comes to building infrastructure, some studies have shown that many developing country governments are failing to understand and capture the potential of mHealth technologies. Policies are needed to co-ordinate the objectives of mHealth initiatives with nationally defined goals and objectives.

In the field of patient empowerment, mHealth can enable a shift from the traditional doctor-patient healthcare model to one in which the patient takes more responsibility for their own health through monitoring and disease prevention.

With the localisation policy, the art is striking the right balance. A centralised infrastructure for healthcare ICT may benefit from economies of scale and interoperability; however, local development of health technology can help technology development to arise from real local need, and creates pilots and projects of a more manageable scope.

Nevertheless, localised development may not scale; there may be no mechanism for sharing development countrywide and ensuring consistency and interoperability. The danger is therefore that while local innovation can flourish, the same development effort and cost is replicated region by region.

#### Key points:

- **Globally, telemedicine and mHealth policy is still in its infancy**
- **In developing countries, infrastructure is the key, but it must be co-ordinated nationally**
- **For patients, mHealth can allow people to take more responsibility for their own health**
- **A balance must be struck between centralised infrastructure and local or regional innovation.**

## Funding incentives and disincentives

Alongside the potential for mHealth to improve the quality of care for patients, there is a big opportunity for it to make healthcare systems more efficient.

Before it can do this, however, mHealth must be properly funded and incentivised.

One prevailing global trend in healthcare over the past few years has been the decentralisation of purchasing organisations, as countries move away from a national single payer-purchaser model. However, this has led to some problems in sustaining a coherent value chain in healthcare, that in turn has a knock-on effect for mHealth projects.

In some countries, hospitals face a 'double whammy' when implementing telemedicine. Not only can they experience challenges in getting reimbursement for their investment in mHealth, but they can also lose revenues through its implementation, for example through reduced emergency department visits and admissions.

To fix this problem, some policymakers are now advocating the idea of basing healthcare remuneration in general on outcomes, rather than on a per-patient or a service-fee basis. Reimbursement based on an outcome such as the minimal mortality or readmission rate for the minimal expenditure could also open the door for reimbursements regardless of whether a patient is seen on-site or off-site.

Another funding challenge for mHealth implementers is getting projects to scale. Project scale is a crucial issue when planning for long-term project sustainability, and mHealth solutions that balance scale and impact are the most likely to succeed.

For all new incentive ideas to work, however, mHealth projects require a more joined-up approach than healthcare advocates may be used to. This challenge, coupled with the complexity and diversity of value chains in different healthcare systems, and the rapidly changing technological landscape, mean stakeholders in mHealth must be uncharacteristically agile and adventurous as they navigate this new and exciting space.

### Key points:

- mHealth must be properly incentivised – and this will mean changes to funding systems
- One option might be remuneration based on outcomes
- However, for new incentive schemes to work, a more joined-up approach must be taken through the healthcare value chain.

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# Scope and definitions

This guide will focus on evaluating healthcare policy and economics across a number of mature and emerging markets.

First, we examine three major themes of healthcare policy pursued by governments and international bodies, which are having or could have a major effect on the development of mHealth: infrastructure building; patient empowerment; and the drive to localisation.

Next, we follow the money, taking a closer look at the financial implications of various types of mHealth policy including how some systems for reimbursement of healthcare providers and clinicians may act as an incentive for mHealth development, while others might stifle it.

Finally, we offer a number of considerations to healthcare players, from governments to technology companies, on where to focus their attention in the years to come.

**The guide will maintain the following definitions throughout the report:**

*(based on WHO and Vodafone definitions)*

**eHealth:** health care management and delivery by electronic means. This includes both the delivery of health information, education and training for health professionals and health consumers, through the Internet and telecommunications; and the use of e-commerce and e-business practices in health systems management.

**mHealth:** sub-set of eHealth relating to the application of mobile communications and network technologies for healthcare, to optimise the efficiencies of health organisations' internal processes and enhance the delivery of healthcare.

**Telehealth:** the use of telecommunications supported by ICT for health monitoring, treatment, promotion, training and education.

**Telemedicine, teleconsultation:** sub-set of telehealth relating to the use of telecommunications supported by ICT to link clinicians to patients for diagnosis and treatment.

**Telecare:** A wider field than telehealth, including the use of telecommunications supported by ICT for social care and independent assisted living for elderly and disabled people.

# A changing world

**Dan Jellinek** is a writer, editor and publisher specialising in technology and social issues including e-government and e-health. He is founder of e-democracy publishing pioneer Headstar.

Experts interviewed:

- Patty Mechael, Executive Director, mHealth Alliance
- Guy Smallman, Commercial Development Director, Health Design & Technology Institute (HDTI), Coventry University

We are becoming used to reading astonishing figures about the rise of mobile communications. Across the world, the rates of growth for mobile connections of all kinds remain huge and show little sign of slowing.

In the Asia Pacific region as a whole, for example, there are already 3 billion connections to mobile services, meaning market penetration – connections per head of population – has reached 77.8% in the fourth quarter of 2011, up from just under 10% only a decade earlier. By 2015, it is predicted to break the 100% barrier across the region as a whole<sup>[1]</sup>.

Within this explosion of activity, one phenomenon is driving an increasing amount of growth and buzz: mHealth.

mHealth – the use of mobile communications and network technologies within healthcare systems (see definitions list, page 7) – is proving valuable both to optimise the efficiencies of health organisations'

internal processes and to enhance the delivery of healthcare. Its emergence comes at a time when global healthcare systems are challenged with significant budgetary pressures as a result of an ageing population, the burden of chronic disease and increasingly technically-savvy patients demanding high-quality, personalised care.

mHealth is ideally positioned to enable stakeholders to adapt to these challenges and although people within the healthcare world have been excited about the possibilities for some time, awareness is only now spreading to the wider worlds of technology, government, business and the public at large.

"A perfect storm of factors is coming together to ensure that mHealth explodes into mainstream consciousness by the end of 2012," James Monaghan of mobile solutions provider OpenMarket wrote recently in an article for the Healthcare Information and Management Systems Society<sup>[2]</sup>.

Live mobile access to clinical appointment calendars; text alerts for appointment and other healthcare reminders; interaction with cloud-based electronic medical record platforms; mobile identification and payment systems and other expanding technologies - even mobile gaming techniques to play a part in boosting healthy behaviour - are among innovations seizing the imagination and realising improvements in health and health economic outcomes.

Referring to the US, but in a point which could equally apply to any healthcare system, Monaghan says the amounts of money spent on healthcare mean that even a small incremental efficiency in this market could yield tremendous opportunity for governments and businesses. "With revenue models and venture capital in place, we can expect a slew of exciting announcements and product launches this year."

Some new technologies can be introduced slowly and incrementally within existing systems, but some occur too quickly for that and will inevitably have a disruptive effect on processes and cultures. In many cases, mHealth is appearing as a rapid change, and is therefore disrupting or is set to disrupt existing ways of working, which is the root cause of all the barriers facing its development.

Amongst the barriers are a lack of investment funds caused by the global economic crisis; and the misalignment of funding incentives in many healthcare systems in a way that blocks moves towards decentralised, patient-focused healthcare.

It is vital therefore that all governments are aware of the nature and size of all these barriers, as they build mHealth policies in their own national contexts.

A perfect storm of factors is coming together to ensure that mHealth explodes into mainstream consciousness by the end of 2012.

**James Monaghan, OpenMarket**

[2]



Where people are starting to get stuck is in the transition from strategy to operation.

**Patty Mechael, executive director at the mHealth Alliance**

“We are at a critical juncture”, says Patty Mechael, executive director at the mHealth Alliance, an advocacy and support group for international mHealth development co-founded by the UN and Vodafone.

“A number of developing countries have mHealth in their top five priorities, mostly because of the ability to improve access to services for hard to reach populations and also to improve quality of care with a very decentralised workforce,” Mechael says. “The mHealth Alliance has been working with a number of countries to... strengthen their capacity in areas they have identified such as aligning mHealth with national health priorities, evaluation of the health outcomes and costs, [and] the development and use of standards.”

Developing the right policies is one imperative: implementing them properly another, she says. “Where people are starting to get stuck is in the transition from strategy to operation.”

One problem with this transition process is the need for countries to integrate mHealth into existing large-scale healthcare systems which often have long-established structures and operating methods and cultures.

“Applications that require relatively little infrastructure investment yet must be integrated with a country’s healthcare systems... run the risk of being deployed on a small scale only, in pilot schemes and trials, but then failing to achieve their full potential,” according to a 2011 study of global mHealth policy issues by the University of Cambridge with China Mobile<sup>[5]</sup>.

“This applies just as much in countries with highly developed healthcare systems (where the complexity of integration is highest) as in those where the healthcare system is less well developed”, the report says. “The challenge for mHealth developers and enablers in such situations is to ensure that trials are designed to prove the right things, and that issues of integration and scale are considered at the earliest opportunity.”

So integration is one key issue; funding another.

In early 2012, the UK government – as we examine in section two – has passed a controversial Health and Social Care Act restructuring how the country’s healthcare is commissioned, with potentially significant implications for the funding of innovative new services like mHealth.

As part of the changes a new competition regulator for healthcare, Monitor, will look to ensure the market for healthcare devices and technologies is as free and competitive as possible.

For mHealth, this is particularly important if cost efficiencies are to be realised, according to Guy Smallman, commercial development director at the Health Design & Technology Institute (HDTI) at Coventry University in the UK, which recently launched a design and testing service for mHealth apps.

Smallman says mHealth offers huge potential to save on communication costs between healthcare providers, carers and patients and between medical devices, and improve quality of care at the same time, through its ability to adapt flexibly to user requirements.

“There is a new personalisation agenda for healthcare services and products that treats the patient or user as an informed consumer,” he says. “There would still be a health and social care assessment, but instead of saying you have these conditions and needs, here is ‘x’ piece of equipment, you could say here is £2,000 with which you can go out and buy what you think you need.”

The use of mobile apps running on mainstream devices could play a revolutionary role in allowing this flexibility, saving health authorities significant amounts of money in the process, Smallman says. Add in user choice, and major savings could be generated. “Savings are generated from making the right intervention, with the users doing it themselves. If you put in the wrong device and the patient doesn’t use it, you’ve wasted the money once, and secondly you’ve got to do something else, provide a different product or spend more time training or persuading people to use it. You could be doubling or tripling the amount of work.”

How to move from the rigid, top-down sorts of healthcare systems we currently see in most countries to more flexible, adaptable healthcare systems of the future?

As the most recent WHO report (2010) on the topic makes clear (see section two), it is still early days: most countries have yet to develop any clear national policies in the mHealth arena.

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**Integration is one key issue;  
funding another.**

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# The three pillars of mHealth policy

**Tracey Caldwell** is a business technology writer with UK national press experience including *The Guardian* and *Telegraph Business Technology*.

**Interviewees:**

- Dr Krishnan Ganapathy, President, Apollo Telemedicine Networking Foundation (ATNF)
- Duilio Coratella, Top Clients and Public Sector Marketing – Vertical Solutions, Telecom Italia
- Sally Chisholm, Chief Executive, NHS Technology Adoption Centre Dr Yogesan Kanagasalingam, Research Director, Australian e-Health Research Centre (AEHRC)

To date, only a quarter of countries worldwide have drawn up a national telemedicine policy or strategy, according to the most recent WHO review (2010)<sup>[4]</sup>.

A similar number of countries reported having a national agency for the development and promotion of telemedicine – including mHealth technologies – with low and middle income countries appearing as likely to have an agency as high income countries.

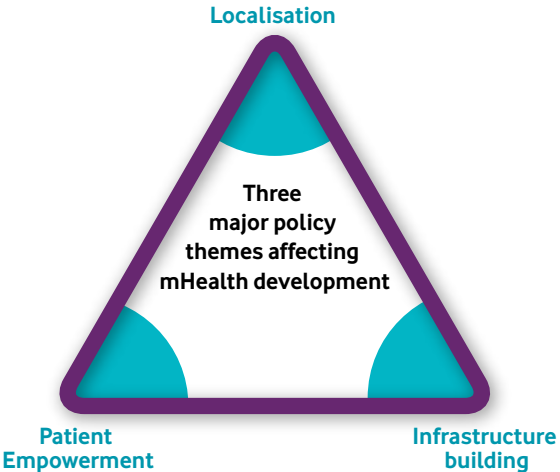
Overall, these findings suggest that mHealth, of which telemedicine is a sub-set, of telemedicine, is a new and underdeveloped policy field for governments everywhere. On the other hand, the lack of a wealth gap in the WHO survey might suggest mHealth could follow the adoption patterns of mobile phones and mobile banking in developing countries, where people who have never had a telephone or bank account leapfrog traditional technology systems and go straight to mobile. Policymakers in those countries are having to respond accordingly, and develop a healthcare infrastructure along a very different path to that taken by more established economies.

Policymakers in higher income countries are serving populations that are both ageing and demanding more from healthcare, against a background of economic austerity. They are therefore tending to align mHealth development with policies that aim (at least partly) to cut costs, by emphasising monitoring, prevention, and the shifting of greater health responsibility to the patient.

Typically, these countries are developing their healthcare policy to achieve the best balance between localised delivery targeted closely at local needs, and a supportive national infrastructure.

Taking all the above into account, we detect three major policy themes emerging that affect the development of mHealth worldwide: infrastructure building; patient empowerment; and the drive to localisation.

Of course there are other issues at play such as funding – dealt with in detail in the next chapter – but these three themes are central pillars of mHealth development anywhere in the world. In the rest of this section we will look at each in turn and look at some examples of how they can be built to be strong and sustainable.



## Building the infrastructure platform

Policy makers in developing countries face very different mHealth challenges from those in developed countries, and chief among these is development of a sound technology infrastructure.

This work takes place against a challenging healthcare background: developing countries still face a high and often rising incidence of chronic diseases and communicable diseases. There are also serious funding challenges, and developing countries are starting from a lower base of health service development. The report 'Touching lives through mobile health'<sup>[5]</sup>, published in February 2012 by mobile operators' association GSMA with consultants PwC, finds that developing countries have significantly fewer hospital beds, physicians, nurses, and midwives per 10,000 people compared with developed markets. The number of physicians per 10,000 people in Africa and Southeast Asia was 2.3 and 5.4 respectively in 2010, for example: in contrast, the corresponding figure was 33.3 for Europe and 22.5 for America.

The report finds that some of these gaps might be able to be filled at least partially by government policies allowing wider access to mobile health devices and mHealth solutions.

Policy makers in larger developing economies also have the opportunity to drive mHealth solutions to provide access to healthcare where there was none before, either to dispersed rural communities or healthcare specialisms.

At the same time, the rapid adoption of mobile devices by developing countries may make it possible for countries to leapfrog some of the stages of evolution towards the use of mHealth as part of the healthcare provision mix that we have seen in the developed world. According to mobile market analysts Wireless Intelligence, mobile penetration in Africa, Asia Pacific and Latin America is expected to reach 75%, 94% and 120% respectively in 2014 (subscriber connections per head of population)<sup>[6]</sup>.

WHO has detected an increase in policy development projected to 2013 in the African, Eastern Mediterranean and South East Asian regions to boost implementation of telemedicine.

While the data shows few countries have dedicated telemedicine policies, the WHO believes this could actually represent a potential opportunity: health authorities could integrate telemedicine into national health and mHealth strategies from the outset. This is beginning to happen where mHealth applications are used to prevent illness and disease through remote patient monitoring.

However, some other studies have shown that many developing country governments are failing to understand and capture the potential of mHealth technologies as they develop health policy. Researchers at The Earth Institute at Columbia University have found there are few national health information systems policies that take into account the increasing access to telecommunications infrastructure and availability of mHealth solutions in low and middle income countries, for example.

"Practitioners feel that the pace and demand of mHealth on the ground is not being met by enabling policy, funding, and regulations at national and institutional levels. The more typical approach by governments in the developing world is to believe that they must wait for the delivery of broadband before major health benefits can follow," the institute found<sup>[7]</sup>.

The researchers believe this creates an enormous investment barrier to the deployment of mHealth that is unnecessary given the widespread and rapid deployment of commercial wireless networks. To help build mHealth initiatives across developing countries, they conclude that policies are needed to co-ordinate the objectives of mHealth initiatives with nationally defined goals and objectives, and that the absence of such policies hampers mHealth scale and sustainability.

To look at one example within a fast-developing economy, Brazil's healthcare structure suffers from underfunding that has been a barrier to the development of healthcare ICT policy. Since 1988 its national health policy has been delivered through the Unified Health System (Sistema Único de Saúde, or SUS). Policy is based on national four-year plans and currently centres on reduction of child mortality and reorganisation of healthcare systems to improve the capacity of the SUS<sup>[8]</sup>.

Brazilian government policy has a policy of regionalisation to shift responsibility for administration of the SUS to municipal governments, with technical and financial co-operation from the federal government and states. With a \$600 million (450 million euro) loan from the World Bank, there is now better funding to improve the quality of state healthcare.

Efforts to improve healthcare from the ground up have driven mHealth development. The GSMA reports that significant mobile health deployments have taken place in Brazil with solutions primarily aimed at supporting community healthcare workers in collecting and reporting data. This is characteristic of a country whose healthcare delivery is at the infrastructure building stage and where evidence is still being gathered to inform policy making.

The rapid adoption of mobile devices by developing countries may make it possible for countries to leapfrog some of the stages of evolution towards the use of mHealth.

Practitioners feel that the pace and demand of mHealth on the ground is not being met by enabling policy, funding, and regulations at national and institutional levels.

Patricia Mechael, The Earth Institute, Columbia University

[7]

# Case study: Infrastructure building, India



Progress towards widespread use of mHealth technologies in India has been slow, and the answer lies in more consistent work by the government to raise awareness of the possibilities, according to one analyst.

A recent study by Raja Bollineni of the Indian School of Business in Hyderabad of initiatives undertaken by the Apollo Telemedicine Networking Foundation (ATNF)<sup>[9]</sup>, found the Indian government had subsidised the network infrastructure but progress “has been excruciatingly slow due to a paucity of capital infrastructure or perhaps more importantly the lack of commitment and involvement, and a refusal to change the traditional mindset”.

In 2006, the Indian government did produce national policies for e-government, e-health and ICT procurement for the health sector. The WHO described all policies as “partly implemented” in a 2011 survey<sup>[10]</sup>.

However, the Indian government has not yet reached the stage of thinking about a national mHealth policy, according to Dr Krishnan Ganapathy, one of the architects of Apollo Telemedicine Networking Foundation (ATNF).

Ganapathy highlights the massive adoption of mobile phones that is likely to drive mHealth. “There are 915 million mobile phones in use in India according to the 2011 census released in March 2012, a 76% penetration of the population. In rural India there is more access to mobile phones than there is access to clean drinking water or even toilets,” he says.

In rural India there is more access to mobile phones than there is access to clean drinking water or even toilets.

**Dr Krishnan Ganapathy, Apollo Telemedicine Networking Foundation**

He points out that mBanking is growing exponentially: "There are at least 70 million people, mostly urban educated Indians, who now use their mobile phone to carry out banking transactions... [and yet] the mobile phone is being used for healthcare in bits and pieces, pilot projects here and there, proof of concept studies have been carried out but we are nowhere near escalating it, scaling it up and making it a part of the healthcare delivery system," he says. At the moment mHealth is being used predominantly in public health, such as SMS to pregnant women to remind them of appointments. Automated SMS is also being used to provide information on where healthcare is available.

Apollo Hospitals now has a 24/7 medical response centre that uses a UK NHS approved system called Clinical Solutions to field 5,000-6,000 calls a day: "We have 'tele-triage' where using the mobile phone anyone can call and for less than one US Dollar the caller will get authenticated healthcare advice", Ganapathy says. "We are doing very small pilot projects on diabetes. We have developed our own software and for about 800 people glycosylated haemoglobin has significantly come down after using the mobile phone solution."

"We think within the next three years mobile health will become a part of our healthcare delivery system." However he says there is a mountain to climb to drive awareness of the benefits and he is not expecting government policymakers to take the lead, believing that on the whole, international agencies and mobile network operators will drive mHealth.

## Patient empowerment: helping people help themselves

An increasing prevalence of chronic conditions, an ageing demographic profile, and ever increasing expectations of all public services in developed economies means demand is rarely being met even by high levels of spending and use of technology. Policymakers are increasingly looking at promoting patient empowerment through increased health monitoring and health education to put more focus onto prevention, saving on unplanned treatment costs and meeting some of the demands for improved care quality by helping patients remain at home to lead independent lives.

mHealth delivery fits this pattern by enabling a shift from the traditional doctor-patient healthcare model to one in which the patient takes more responsibility for their own health through monitoring and disease prevention.

Juniper Research’s latest report on the mHealth sector<sup>[1]</sup> predicts the number of patients monitored by mobile networks will rise to three million globally by 2016. The majority of these are in the North America region thanks to insurance reimbursement, and most are for cardiac outpatient monitoring rather than monitoring for chronic diseases.

Typically, Juniper is talking about monitoring hardware such as a glucometer, pulse oximeter, blood pressure cuffs, links through to a hub which relays the information to the mobile networks using local wireless technology such as Bluetooth. The mobile networks transfer the information through to doctors records or specific establishments that analyse the data and check for anomalies.

The report says the management of diabetes, COPD (Chronic Obstructive Pulmonary Disorder) and other chronic diseases will also play an important role in the rise of mobile healthcare and predicts that medical app downloads will reach 44 million in 2012, rising to 142 million in 2016.

In the UK, government policy is encouraging a paradigm shift in the provision of clinical care to give patients more choice including the choice to be treated at home.

The UK’s first e-government policy was developed before 2000 and in 2002 its first national e-health policy and ICT procurement policy for the e-health sector were implemented. There is also a national telemedicine policy. The WHO reports that the UK does not perceive any lack of a policy framework or lack of legal policies and regulation to be barriers to mHealth adoption.

However, the independent think-tank 2020health is demanding urgent UK government support to facilitate the use of the remote capture and relay of health information from the home for clinical review and early intervention for those with long-term conditions (LTCs)<sup>[11]</sup>. Julia Manning, the think-tank’s director, says: “Properly implemented this is a prescription for the next generation and would easily save the National Health Service (NHS) up to £1 billion [1.2 billion euros].”

“If things are left as they are now, however, the pressure that the LTCs put on the NHS and social care could overwhelm it. Doing nothing is not an option. Government needs to grasp this nettle and make enabling telehealth a national priority now.”

To help provide an evidence base for setting further policy in this field, the Department of Health has set up a “Whole System Demonstrator” (WSD) programme to show how telehealth can help people live independently and assume greater responsibility for their own health and care.

In what was claimed to be the largest randomised control trial of telehealth and telecare in the world, the programme was launched in May 2008 involving around 6,200 patients and 238 GP practices.

Early indications from WSD<sup>[12]</sup> show that if used correctly, telehealth can deliver a 15% reduction in A&E visits, a 20% reduction in emergency admissions, a 14% reduction in elective admissions, a 14% reduction in bed days and an 8% reduction in tariff costs. They also demonstrate a 45% reduction in mortality rates.

[12]

- 15%** reduction in A&E visits
- 20%** reduction in emergency admissions
- 14%** reduction in elective admissions
- 14%** reduction in bed days
- 8%** reduction in tariff costs.

[11]

## Medical app downloads will reach 44 million in 2012, rising to 142 million in 2016.

In late 2011 the NHS carried out an Innovation Review and asked for comment on how innovations such as mHealth can be spread through the UK. Sally Chisholm, chief executive of the NHS Technology Adoption Centre which helps implement national technology strategy and has worked closely with the WSD project, said the policy background for innovation is positive, but too complex.

“The Innovation Review<sup>[13]</sup> recognises at the highest level that the innovation landscape is overly crowded and overly complicated in that there are a lot of different organisations participating in the development of new products”, Chisholm said. “There have been many attempts to tackle these issues, but the system hasn’t been working together or as fast as it should.”

The UK’s newly passed (and hotly-debated) UK Health and Social Care Act<sup>[14]</sup> aims to create the environment to boost innovation including telehealth services, through the introduction of a competition regulator for healthcare called Monitor. Monitor will seek to prevent potentially anti-competitive behavior, and license providers. However, the UK currently still lacks a nationwide strategy to scale up pilot projects, and media reports suggest responsibility for NHS IT strategy looks set to shift again in 2013, when the NHS Commissioning Board is set to replace the current body for NHS informatics, NHS Connecting for Health.

Another nation often viewed as a leader in mobile technology innovation is Japan, so it is instructive to examine how this filters through to the country’s healthcare system. With a population with the longest life expectancy in the world, the country’s health system is facing increasing pressures. In 2011, the Japanese Health Policy Bureau<sup>[15]</sup> said: “Problems including a shortage of doctors have come to the surface in recent years and rebuilding a medical care provision system using limited resources has become the key issue.”

Japan’s national strategy for healthcare IT to 2011<sup>[16]</sup> aimed to support individuals’ self-management of their health conditions and efforts to maintain and enhance health as well as promote the use of telemedicine to reduce imbalances in the level of healthcare among different regions.

Lifestyle-related diseases including cancer, heart diseases, stroke, and diabetes cause approximately 60% of deaths in Japan. A campaign ‘Healthy Japan 21’ will start in 2013 promoting disease prevention and this could drive mHealth adoption in a receptive population.

The Japanese market for telehealth is in its infancy, but it has seen rapid adoption and interest in healthcare-related products such as devices for the home, alarm monitoring systems, and video conferencing, according to iData Research ‘Asia Pacific Markets for Patient Monitoring Devices 2011’<sup>[17]</sup>. Japanese household electric appliance manufacturers develop many of these devices. It is estimated that 90,000 people in Japan were using telecare alarm systems in 2010.

One key development factor for Japan is the fact that the nation, to a greater degree than most other developed countries, is an early adopter when it comes to mobile technology. Sophisticated mobile payments are well established and wellness apps on smartphones are heavily subscribed to and supported by a robust network infrastructure.

DoCoMo, a major mobile network operator in the region that has driven mobile payments, launched its own mHealth service at the close of 2011 and said it intended to work with health authorities to promote mHealth. A survey of public opinion on healthcare policy by the Health Policy Institute, Japan found around 40% of respondents were interested in receiving remote medical care.

Yet not all the background is positive: privacy (covered in the next Vodafone mHealth Solutions Insights Guide) is an overriding concern of the Japanese people and the country lags behind others such as the US in integrating electronic health records throughout its national health care system. This demonstrates the wide range of issues that policies to boost mHealth need to address in the developed world.<sup>[1]</sup>

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**It is estimated that 90,000 people in Japan were using telecare alarm systems in 2010.**

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## Case study: Patient empowerment, Australia

Like most developed nations, Australia has an ageing population and a population demanding ever more from its health service. Its central health authority reflects this in its name: the Department of Health and Ageing.

Australia began work on e-health policy in 2008. It has outlined a detailed vision of interoperability and secure information sharing to help it offer citizens electronic access to the information needed to manage their health and enable electronic access to appropriate health care services for people living in remote, rural and disadvantaged communities.

That is the vision: although the Department of Health and Ageing's assessment of eHealth usage in 2011 found that the technology was mainly being used for communication between practitioners and government bodies despite a strong desire among practitioners to expand the use of telemedicine for patient-centred care.

The Australian e-Health Research Centre (AEHRC)<sup>[18]</sup> is the main national research facility applying ICT to improve health services and clinical treatment for Australians.

The centre's Western Australia node conducts research projects investigating the use of ocular imaging and telemedicine in disease early detection and monitoring. The current focus is the development of telemedicine technologies to prevent blindness using non-invasive ocular imaging techniques to help people manage their own conditions.

At first the project connected remote hospitals with city specialists but more recently patients can attend high street opticians to access the service.

Dr Yogesan Kanagasingam, AEHRC research director and acting leader of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) e-health research theme, says funding is available for video conferencing technologies but not for the transfer of images. This means the centre has been forced to develop the technology around a video conferencing technology delivered on tablet computers and other devices – an example of how central policies can affect technologies selected on the ground.

Kanagasingam is currently writing a proposal to the Department of Health and Ageing to roll out the system throughout Australia and is already working with authorities in the state of Queensland to introduce it there.



## Localisation: striking the right balance

For decades, the debate over the right balance to strike between localisation and centralisation of healthcare has rumbled on among health policymakers worldwide, and the same debate is echoed in healthcare ICT.

A centralised infrastructure for healthcare ICT may benefit from economies of scale and interoperability. This was the thinking behind the development of the (now mostly abandoned) £12.7 billion (15.3 billion euro) National Programme for IT in the UK, for example, and has driven EU-wide initiatives in mHealth and even international co-operation. At the international level, Europe and the US have signed a Memorandum of Understanding to promote a common approach on the interoperability of electronic health records and on education programmes for information technology and health professionals.

The European Commission (EC) is preparing a second eHealth Action Plan (eHAP) for 2012-20<sup>[19]</sup>. In 2008, it unveiled plans to make eHealth one of the EU's strategic priorities. The potential size of the market and its scope for innovation were cited as principal reasons for eHealth's selection as a priority. It acknowledges, however, that there are currently national differences, saying: "Telemedicine is regionally applied at a pilot level with an emphasis in the Nordic countries".

Europe will become the largest mHealth region in the world by 2017 with revenues of \$6.9 billion (5.2 billion euros) according to the GSMA/PwC<sup>[5]</sup>.

The first EC action plan in 2004 pledged to assess the possibility of adopting a legal framework for eHealth and telemedicine. It also noted the need for common standards and the importance of interoperability. That first action plan was, the EC concedes, overly ambitious, covering everything from electronic prescriptions and health cards to new information systems.

By contrast eHAP 2012-2020 will set out the more general outline of a new healthcare delivery model, based on preventative and person-centred health systems, "which can only be achieved through proper use of ICT". The policy is that continuity of care will be assured at all points of need, facilitated by the deployment of interoperable mHealth services across Europe, which would enable access to a patient's medical history and data from any location.

The policy will be to offer central support innovation and research in mHealth to European countries that might often otherwise have a strong regional focus.

Centralisation, however, is not always seen as a good thing in the development of mHealth innovation, and a frequently-justified perception of centralised structures as monolithic, expensive and unwieldy has often driven countries in the opposite direction, towards policies of localisation, regionalisation or devolution.

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Telemedicine is regionally applied at a pilot level with an emphasis in the Nordic countries<sup>[19]</sup>.

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[5]  
**Europe will become the largest mHealth region in the world by 2017 with revenues of \$6.9 billion (5.2 billion euros).**

Some countries have a strong regional focus historically and a policy focused on the local development of health technology. Proponents argue that this enables technology development to arise from real local need, and creates pilots and projects of a more manageable scope.

One issue raised in relation to policies of regionalisation, however, is that development may not scale; there may be no mechanism for sharing development countrywide and ensuring consistency and interoperability. Strong local mHealth development might take place in each region resulting in a plethora of robust systems that do not work together.

A further issue is that expertise and resources in one area may result in strong mHealth development and all its resultant benefits. Another area of the same country may not have that expertise or resources and may not be in a position to reap the benefits of mHealth, resulting in health inequity.

France has been the first major European country to launch a national electronic health record, the DMP (Dossier Médical Personnel)<sup>[20]</sup>, which its policy makers have said will provide the framework for health technology development, including mHealth.

The setting up of the DMP and its initial issues of interoperability led to the creation of the Health ASIP, the agency for shared health information systems, to formulate policy that would create favourable conditions for the deployment of shared information systems.

France has faced challenges in balancing its policies of centralisation and regionalisation. The DMP vision is that owners of regional information systems, supported by the Regional Health Agencies (ARS), are encouraged to provide the systems to enable them to deploy this first version of DMP. It calls for regional piloting of specialised services based on a national infrastructure to act as a catalyst for health technology development.

Accordingly, the 2002 Patients' Rights and Quality of Care Act combined diverse health service networks in France under umbrella health networks, which in 2009 were placed under the responsibility of regional health authorities. At the same time the government attempted to improve access to care in deprived areas by creating disincentives for practitioners who set up practices in areas of oversupply. However, opposition from unions led to the withdrawal of this measure<sup>[21]</sup>.

At the same time, there are calls for a centralisation of control over healthcare technology development. The General Inspectorate for Social Affairs has recommended the creation of both a high-level government committee to govern the DMP project and a government agency in charge of IT.

The French Ministry of Health has set five priority areas for the deployment of eHealth in 2011, selected on the basis of impact by size of population; equal access; and provision of patient information.

The first three priorities focus on relative mature technologies such as medical imaging with the stated objective being "to shape eHealth applications so as to make them fully widespread". The remaining two priorities are focused on less mature technologies; for each region it proposes to focus efforts on one chronic disease. Remote monitoring and teleconsultation will be encouraged including healthcare in the home.

These objectives would seem to make sensible yardsticks for the development of mHealth initiatives anywhere in the world.

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**A frequently-justified perception of centralised structures as monolithic, expensive and unwieldy has often driven countries towards policies of localisation.**

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# Case study: Localisation, Italy



“The biggest problem for telemedicine in Italy is that it is spread over 20 regions and each region manages mHealth itself. Each region decides how to spend money and makes its own laws. At a national level there are only guidelines and at the moment we do not have national guidelines for telemedicine,” says Duilio Coratella, Telecom Italia<sup>[22]</sup>.

This may be changing. In March 2012 the new government proposed legislation to simplify bureaucracy in the health system, with specific reference to health and there are to be guidelines as to the process for adopting telemedicine.

The Italian health service, the Servizio Sanitario Nazionale (SSN), was reformed at the turn of the millennium to transform the centralised healthcare system through regionalisation. A national healthcare structure has been set up to support the regions but a policy of regionalisation is predominant and the 20 regions of Italy are each responsible for their own health services and set their own laws relating to healthcare delivery. As a result mHealth development happens at regional rather than national level, with some regions more advanced than others.

One locally-developed system is the Nuvola It Home Doctor system developed by Telecom Italia in the Piedmont region, enabling chronic patients who are being treated at the Molinette Hospital in the region’s capital Turin to monitor their physiological parameters via mobile phone from their own homes.

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The danger is therefore that while local innovation can flourish, the same development effort and cost is replicated region by region.

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The Piedmont region plans to extend the service to cover large sections of its population, “as part of a policy to bring the health service closer to the community”. The solution is expected to be taken up by other hospitals in the region to monitor as many as 5,000 patients from their own homes in the next three years. Patients, many with chronic disease such as diabetes or heart conditions, monitor certain biological parameters at home using traditional electromedical devices and send them in to the Telecom Italia data centre using a dedicated mobile phone provided by the hospital. Home-based care is estimated to cost 180 euros a day compared to 700-1,000 euros in hospital.

This deployment appears typical of both the driver and barriers of a policy of regional healthcare delivery. The specialist knowledge built up in this region, together with the ability to set up a policy that can scale usefully to the region as a whole has been a clear driver for mHealth development. This particular system is cloud-based, so would lend itself to operate nationally but there has been little political will to do this as national health policy acts only as a guideline and is interpreted into law region by region.

The danger is therefore that while local innovation can flourish, the same development effort and cost is replicated region by region.

# Following the money: funding incentives and disincentives

**Danny Bradbury** is a Canada-based technology journalist, film-maker and writing coach working internationally.

Interviewees:

- Dr Adesina Iluyemi, Vice-President, MoDise
- Dane Stout, Executive Director, Connected Health Practice, Anson Group LLC

Alongside the potential for mHealth to improve the quality of care for patients, there is a big opportunity for it to make healthcare systems more efficient. This is a critical issue as health funding varies enormously between countries, with developing countries only receiving 12% of global health spending. And yet these countries carry 90% of the global disease burden<sup>[23]</sup>.

Furthermore, healthcare efficiency (which can be measured in a plethora of ways) is not guaranteed even in countries that spend large amounts on care. For example, the National Bureau of Economic Research has found that a small group of mature economies has spent increasing amounts of GDP on healthcare over the last few decades, topped by the US, which now spends well over 12% of its GDP on the issue. However these countries do not rate highly for healthcare efficiency, and the US in particular, while outspending all other nations on healthcare, is often found to have the lowest efficiency ratings of all.

Before mHealth can generate cost efficiencies throughout the healthcare system, however, mHealth itself must be properly funded and incentivised. And current evidence suggests that we could do better in this vital area.

The starting point for discussion of funding, remuneration, and incentives for mHealth is an examination of the value chain.

A value chain is a collaborative economic partnership between organisations which focuses on understanding what the customer wants, and responding to that demand, while ensuring that all members of the value chain are adequately rewarded. It is different from a supply chain, which primarily looks at how products are moved from one place to another, with less of an emphasis on adding value<sup>[24]</sup>.

Reimbursement and remuneration is a key part in any value chain. However the healthcare industry has developed in complicated ways over the past few decades, arriving at models that are not always the best at adding value.

One prevailing global trend in healthcare over the past few years has been the decentralisation of purchasing organisations, as countries increasingly move away from a national single payer-purchaser model. Initially, many purchasers had a passive role in the value chain, merely passing money between the payer and the healthcare provider. Purchasers and healthcare providers were often part of the same state-owned organisation. However, over the past two decades, purchasers have been increasingly split from providers, and have taken on a more active role in the contracting of healthcare from providers. They have been given more autonomy in contracting out healthcare services from multiple providers.

This has led to some problems in sustaining a coherent value chain in healthcare, that in turn has a knock-on effect for mHealth projects.

One example is in the trust relationships between different stakeholders in the value chain. Trust between different stakeholders reduces the need for contractual enforcement, encourages the exchange of information, and can even in some cases contribute to investment in each others' productivity and efficiency to contribute to the overall health of the value chain. But as payers, purchasers and providers become more distant from each other, trust relationships can suffer.

Wharton Business School of the University of Pennsylvania has suggested that information on the cost and value incurred at each level of the chain is missing, to the extent that meaningful knowledge sharing is impossible. This creates adverse conditions for the success of mHealth projects, both at the early pilot stages, and subsequently<sup>[25]</sup>.

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The healthcare industry has developed in complicated ways over the past few decades, arriving at models that are not always the best at adding value<sup>[24]</sup>.

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**Patient**

The patient seeks improved health outcomes and quality of life, lower costs, and increased convenience.

**Non-governmental organisation (NGO)**

The NGO is often an international funding body, driven by a developmental mission such as attaining Millennium Development Goals. It is in the NGO's interests to report success on a project, to attract more funding.

**Government**

Government bodies seek to provide healthcare more efficiently, by improving patient outcomes while lowering the cost to the public sector.

**Service provider**

The service provider provides the mobile communications services used by the equipment to transfer data between different stakeholders. They are driven by service revenues and subscriber numbers.

# Unravelling the value chain, and

There are a variety of stakeholders that participate in the mHealth value chain.

**Healthcare provider**

The provider wants to offer healthcare services as efficiently as possible with the biggest impact, as measured by parameters including mortality rate and readmission numbers.

**Project manager**

The organisation tasked with overseeing the mHealth project from beginning to end and ensuring that it succeeds. They are responsible for the business model (including staffing and budgeting), and project design and implementation.

**Equipment provider**

The company that produces the equipment used in mHealth applications, including mobile communications equipment, home monitoring base stations, sensors, and PDAs, tablets, or laptop computers. This stakeholder has a vested interest in equipment sales as a source of revenue.

**Content manager**

In some more sophisticated mHealth applications, content including electronic medical records and potentially 'big data' from centre monitoring must be managed and secured. This stakeholder is responsible for the content, including generic healthcare information, along with other content such as generic healthcare information. Content managers can also include content aggregators, who bring original content together from multiple sources as a resource for the project.

# who pays

**Application developer**

The developer generates the software applications used by other stakeholders including the patient, and back-end stakeholders such as the healthcare provider.

**Platform provider**

This organisation provides the technical infrastructure on which the applications and communications infrastructure sit. Their revenue is driven by sales, either per user or metred by usage.

Payers collect money according to four major models<sup>[26]</sup>.

**1) The Beveridge Model**

Named after the founder of the UK National Health Service, this is also known as the single-payer system, because a single, state-owned payer pays for services from providers. The payer collects funds via public taxation. The payment made via a single national purchaser can be made to state-owned healthcare facilities and staff, effectively meaning that the state uses the public's insurance money to buy healthcare services from itself.

**2) National Health Insurance**

Alternatively, the state-based single-payer system may choose to purchase private healthcare services from third parties, which is the basis for the national health insurance model. Under this model, everyone pays into a government-operated insurance program, which is then able to purchase goods and services from private sector providers, negotiating low costs. Canada's healthcare system is based on this model.

**3) Out of pocket**

In this healthcare model, individuals do not contribute to a national insurance system, but rather pay for healthcare on a per-transaction basis as and when they need it.

**4) The Bismarck Model**

The Bismarck Model uses insurance payments made by employers and employees to finance 'sickness funds', which are then used to provide healthcare.

Use of Bismarck varies across countries, with varying implications for reimbursement and other incentives.

Under a multiple-payer system, different insurance funds cover a population together. They can insure the population in a competitive or a non-competitive way. In non-competitive multi-payer coverage, insurance funds cover different populations divided by geographical regions or other demographic parameters. In competitive coverage, they can cover the same population and compete for clients on price or features.

The US, for example, relies on private insurance conducted for-profit, making it slightly different to Bismarck, which is traditionally non-profit. However, its Medicaid system is also financed using public taxation.

Bismarck-based single-payer systems may be complemented by privately-financed insurance using voluntary contributions.

Although patients may participate in a national insurance model, they may also sometimes share the cost of care, by paying for all or part of particular services such as specialist visits and prescribed pharmaceuticals, themselves.

## mHealth funding challenges

There is no single clear model or set of guidelines followed internationally for how to fund mHealth projects<sup>[27]</sup>. This situation stems in part from the complexity of the mHealth landscape. The types of application and the target audience vary, which affects funding and reimbursement parameters.

Health applications can target a number of audiences. Some, for example, directly target patients, and are designed to offer them direct health benefits, such as monitoring their activity and making suggestions about their exercise levels or dietary intake. Those may involve some financial outlay on the part of the patient, even if that stops at running an mHealth app on their own mobile platform and using their own data plan for data communications.

Others target clinicians, and require different types of equipment. A hospital or clinic might require a mobile microscope for an mHealth application designed for use by a clinician, but the patient would not be motivated to finance that. Such investment may come from the provider or the purchaser, but then, how will they be reimbursed for that investment?

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**Hospitals face a 'double whammy' when implementing telemedicine<sup>[28]</sup>. Not only can they experience challenges in getting reimbursement for their investment, but they can also lose revenues.**

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In some jurisdictions such as France and parts of the US, doctors must be present with a patient when treatment is taking place to get reimbursed. Moreover, US doctors are paid for each physically-present test or office visit that they provide. With the exception of a few specialties, doctors won't be paid for monitoring data that has been remotely gathered.

Hospitals face a 'double whammy' when implementing telemedicine<sup>[28]</sup>. Not only can they experience challenges in getting reimbursement for their investment in mHealth, but they can also lose revenues through its implementation. They will experience reduced emergency department visits and admissions thanks to an increase in care quality, and the use of remote monitoring.

Another challenge for mHealth implementers is getting projects to scale. Project scale is a crucial issue when planning for long-term project sustainability, and mHealth solutions that balance scale and impact are the most likely to succeed<sup>[29]</sup>.

Scalability is a factor of mHealth funding, since most projects look to maintain a goal of economic self-sufficiency. Particular attention must be given to reimbursing the back-end communications and platform providers in mHealth trials, who may find themselves having to cover the costs of development and customisation. This makes scalability particularly important, so that any initial costs they incur in this area can be recovered later on, once the project becomes large enough.



mHealth applications that use two-way communications are likely to be Internet-based, requiring more expenditure on communications infrastructure than a simpler one-way data application (such as a text-enabled solution, for example), and mobile data carriers will also need to be reimbursed for this service.

However, the greater margins inherent in two-way data connections may lessen the scale needed to generate sufficient return on investment, shifting the balance slightly from scale to impact.

There are also technical challenges involved with mHealth, which providers will not have dealt with before. One such challenge is the sheer volume of data that must be processed in some applications.

For example, an mHealth app that takes critical blood sugar readings may be distributed to a thousand patients. The physician will not want to see eight blood readings per patient per day. The workload would simply be too great. Instead, such data must be analysed algorithmically, potentially with some human intervention to interpret filtered data. While this could clearly have regulatory implications, it will also have economic ones that need to be considered too. Analytics and the use of 'big data' is an additional service that would not have been needed previously. It must be budgeted for, and factored into the equation - and this is where technological hurdles create new challenges and opportunities at the business level.

Finally, there are structural and procedural obstacles. Many implementers may focus on the technological costs of designing and deploying an mHealth solution, but may ignore subtler cost areas, such as staffing and education.

Staff must be geared up for the inevitable change in working patterns associated with the introduction of a new system. Job descriptions and roles may change, and they may be forced to acquire new skills in areas that they have not explored before, including not just technology, but also the management processes associated with introducing an mHealth system (Note – this topic was covered in detail in the previous Vodafone mHealth Solutions Insights Guide, Evaluating mHealth Adoption Barriers: Human Behaviour).

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# Case study: From pilot to sustainable business – Cell Life, South Africa

Cell–Life is a South African mHealth project that made the transition from pilot to sustainable business by adapting itself as a social enterprise. As such, it managed to successfully solve one of the biggest funding problems facing mHealth products in developing countries.

mHealth projects generally break down into two unique funding cycles: start-up (pilot) funding, and the transition to ongoing sustained operation. In developing markets, a high percentage of funding sources come from outside the countries where the mHealth solution is to be applied. Many financiers are non-governmental organisations, with a developmental agenda.

The majority of mHealth education initiatives in developing countries are funded exclusively by donors, followed closely by a combination of donor and corporate sources. A small percentage is funded by the users themselves, while government funding is minimal. For example, in a survey of mHealth education projects across developing countries, nine projects were found to be entirely donor-funded, with a further eight funded by donors in conjunction with corporate funding. Donors collaborated with academic institutions for a further two projects, and with governments for another project. Only three projects had no donor input<sup>[30]</sup>.

While these sources can be useful when starting up mHealth projects, research indicates that many such projects are abandoned because there is no follow-through by funders and hence no sustainability.

The high percentage of long-term failures in mHealth projects in emerging markets underlines a need for longer term, more sustainable funding models to help these seed projects take root and grow into something more fruitful. Cell-Life met that challenge by changing its mandate and structure.

The NGO uses mobile solutions to manage HIV and AIDS in the region, along with other infectious diseases such as tuberculosis. It began as a research project in 2001 at the University of Cape Town, producing 'Aftercare', a mobile phone-based system linking nurses and home based carers treating HIV positive patients. This soon evolved into other products such as Capture, a mobile data collection system allowing fieldworkers to fill in forms on their mobile phones enabling data to be analysed immediately.



Other products include iDART, a dispensing system that can be used to help remote clinics manage supplies of antiretroviral drugs, along with drug collection by patients. And Communicate, a product that developed out of its mobile phones for HIV programme, is an open source mobile platform developed to increase access to information, and facilitate two-way communication between citizens at risk of HIV, and service providers. It is a simple program used for disseminating and reinforcing messages around safe sex and patient adherence to antiretroviral drugs. The software can be used to manage communication campaigns, broadcast text messages to large groups, and operate interactive menu-driven services with custom content for end users, accessed via an IVR system.

**As of 2009, iDART was in over 20 clinics across South Africa, administering drugs to more than 45,000 patients.**

[30]

Cell-Life made the transition to a longer-term pilot, funded by end-user foundations, by turning itself into a not-for-profit company and establishing a commercial division. Although much of its product is free, it offers implementation services for clients, ploughing the profit back into the organisation. As a result, its projects have seen considerable successes. For example, as of 2009, iDART was in over 20 clinics across South Africa, administering drugs to more than 45,000 patients.

Cell-Life made the transition to a longer-term pilot, funded by end-user foundations, by turning itself into a not-for-profit company and establishing a commercial division.

## Ways forward – shifting the incentives

There are several ways to help stimulate the funding opportunities for mHealth and to create appropriate incentives for all players. However, it requires some top-down thinking, and in some cases, a rethinking of current regulations and legislative approaches.

Modifying the incentive structure for healthcare so that everyone benefits is a primary goal, and so it is important to understand the nature of these incentives.

Incentives for the implementation of mHealth projects fall into three broad categories: cost savings, improved operational effectiveness, and revenue generation.

Revenue is generally a product of scale, and as a general rule, those stakeholders in the value chain who are furthest away from the patient are considered the most likely to benefit from scale. These include the equipment vendor, the application developer, and the platform operator.

Even cost savings and improved operational effectiveness are linked to project scale, because one generally benefits from the other, and it will become far easier for stakeholders to experience these benefits when the volume of patients using a service increases.

Given healthcare providers' specific problems relating to incentives (or disincentives), special focus should be given to their remuneration. They should be reimbursed for the revenues that they lose due to decreased emergency visits, while also being given incentives for the investment that they make in preparing for and deploying mHealth systems.

Incentive systems will vary according to the structure of the healthcare system that the provider is working in, but one potential solution is to capitalise on the nascent nature of the mHealth industry. Many solutions are relatively unproven, meaning that data must be gathered. Analysts have suggested paying healthcare providers for the data collected during these mHealth trials.

One way that this could be handled in the US is via the Center for Medicare and Medicaid Services' Coverage with Evidence Development initiative<sup>[7]</sup>. This reimburses providers for the use of cutting-edge services and devices, in return for data that CMS can use in its own policy development.

Another option to incentivise the healthcare provider is to move to an outcomes-based incentive arrangement.

Remuneration for the healthcare provider has been generally either based on a per-case structure, or by the services delivered (fee-per-service). In many cases, providers are now paid based on a combination of these systems, enabling them to mix the relative benefits of each.

However, some are now advocating the idea of basing remuneration on outcomes, rather than on a per-patient or a service-fee basis. Reimbursement based on an outcome such as the minimal mortality or readmission rate for the minimal expenditure would be a refreshing way for hospitals to be paid, and would also open the door for reimbursements regardless of whether a patient is seen on-site or off-site.

There are already signs of a shift to this model, evident in the introduction of Accountable Care Organizations (ACOs) in the US. ACOs are consortia of healthcare providers that agree to be paid based on quality metrics<sup>[31]</sup>.

In fact, mHealth solutions could create a positive feedback loop when outcomes-based solutions are married with managed care, in which all aspects of a patient's healthcare are overseen by a single organisation, rather than being managed by a fragmented, siloed set of players. ACOs depend on the exchange of accurate electronic data between partnering institutions, so that a patient's healthcare data can be effectively shared. Accurate monitoring and reporting is a key benefit for many mHealth projects, making the concept very powerful for ACOs.

For many incentive ideas to work, mHealth projects require a more joined-up approach than healthcare advocates may be used to. This is particularly the case when managing these projects.

Senior management in mHealth projects must be more than mere project managers. They must be able to ensure that a project is properly funded, both through its start-up phase and then on an ongoing basis. Management must be able to cut across the fragmented, siloed community inherent in many healthcare projects, and work to unite the various stakeholders. mHealth projects therefore require particularly strong management players.

This is particularly true the more complex an mHealth project becomes, because the number of stakeholders involved increases.

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mHealth solutions could create a positive feedback loop in which all aspects of a patient's healthcare are overseen by a single organisation, rather than being managed by a fragmented, siloed set of players<sup>[31]</sup>.

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## Case study: Supported model – Oxford, UK

For funders, it is important to understand that mHealth projects are not just about technology – if the promised land of improved healthcare with reduced costs is to be reached, a balance of services must be funded combining technology with clinician support and intervention in new models, in turn supported by the traditional clinic and hospital care system.

One early study still points the way to powerful future healthcare models combining automation, patient self-monitoring and remote specialist support.

In 2004 the Vodafone Foundation conducted a nine-month trial of young adults with type 1 diabetes to determine whether self-monitoring with telemedicine support – access to nurse help-desk advice – could improve the control of blood glucose levels.

The patients – from the Pediatric Transition Clinic and the Young Adult Diabetes Clinic in Oxford, UK – were given a blood glucose monitor and a data-enabled mobile phone to record not only glucose levels but also insulin dose, food intake, and activity levels in an electronic patient diary. The phone transmitted the data automatically to a remote server that compiled the information onto a private, secure website that was accessible both by the patient, and by a diabetes specialist nurse.

The patients were divided into two groups; an intervention group, and a control group. The intervention group was given full access to the collected data, and a high degree of interactivity with the nurse. The mHealth system provided colour-coded data indicating the patient's adherence to target ranges during the previous two weeks, enabling them to monitor their own behaviour and conformance with medical advice. The data was used during telephone conversations with the nurse, who would help the patient to develop an action plan based on the information collected.

Conversely, the control group was given minimal information. Results from the mobile collection system were not given to the nurse, and only minimal feedback was provided to the patient.

Researchers measured levels of HbA1C, which is glucose attached to haemoglobin, and also examined levels of patient adherence to the monitoring regime.

The results were significant: both levels of HbA1C control, and levels of patient adherence to the care regime, were much higher in the intervention group. Notably, almost 40% more blood glucose results were transmitted by patients participating in the intervention group than in the control group. This suggests that patients are more engaged when they are given feedback from the system and encouraged to take action on it.

This test, which was the largest randomised mHealth trial among adults with type 1 diabetes, demonstrated significant benefits for both patients and healthcare providers. Patient stakeholders felt safe and supported by the mHealth system, which also bought them into closer communication with the nurses. They tended to comply with treatment regimes more readily than those not using telemedicine, and were able to catch any potential escalations in glucose levels by monitoring their behaviour.

Health care providers also benefited from the trial, by helping to ensure quality of life for patients, and by managing large populations of patients.

# Case study: Breaking through the silos – Welldoc, US



In developed countries with highly competitive multi-payer systems, the parameters for funding mHealth projects can be fragmented. In the US for example, many players in the healthcare value chain are walled inside their own separate financial silos. This makes the path for mHealth equipment and service vendors particularly difficult to navigate, but it can be done.

In 2010, the Maryland-based chronic disease technology solution provider WellDoc obtained approval from the US medical regulator the FDA (Food and Drug Administration) for its DiabetesManager system, which captures, stores, and transmit blood glucose data in real-time.

The company has since been conducting clinical trials with the system, which uses a Bluetooth-enabled device to send readings to a mobile phone application, which in turn integrates with an electronic medical record. It records medication use and diet in addition to blood sugar readings, and the smart phone app uses a 'virtual coach' to analyse the data and intervene with real-time suggestions on patient behaviour.

A medical trial conducted over one year called DC HealthConnect used WellDoc's system. It showed a 58% reduction in hospital stays and emergency admissions over the year.

Buoyed by such impressive results, smartphone mHealth applications are expected to generate \$23 billion (17.5 billion euros) in revenues globally by 2017<sup>[5]</sup>. This explosion is expected to be driven by individuals using the apps to improve their daily lives, and hence to be consumer-funded.

To make the model sustainable, sale of the apps is backed up with a supporting subscription service: WellDoc, for example, charges a monthly licence fee per patient.

Some challenges remain, however. Only half of the 32 patients originally recruited stayed in the WellDoc trial programme for the full duration, and 60% of those who remained reportedly required help to pay for text messaging using their own mobile phones<sup>[52]</sup>. Finding motivated patients who can afford to participate can be an issue – but somebody has to pay.

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[5]

## Future-proofing mHealth

The fragmented nature of the healthcare value chain, especially in competitive multi-payer systems, can lead to a confusion of incentives and reimbursement policies. One way to mitigate this problem is to begin extending the scope of an organisation so that it takes on more roles, integrating the supply chain and creating the conditions to turn it into a value chain. We are already seeing some organisations combining roles such as provider and purchaser, or relationships in which payers and providers join forces.

This approach offers a variety of benefits. First, it makes it possible to offer discounts and other incentives for nascent mHealth projects that may not deliver appropriate rewards for some time. Companies straddling different roles in the value chain may be able to justify expenditures for a longer term gain because they can justify it as an internal long-term investment. It is easier to do this than to justify a greater investment with little short-term reward to a third party company.

Second, it can help to align the goals and business drivers of various stakeholders in the value chain if one organisation fulfils multiple roles. Thus, a payer may be more willing to shift to an outcome-based reimbursement model if they are within the same organisation as the provider.

mHealth stakeholders must also think outside the box when developing business models to support their projects. Innovation is the key here. New, unexplored incentive mechanisms may be the difference between a pilot that sputters and dies, and a long-term sustainable programme. Many of these innovations are, by their nature, not yet identified. But there are some promising examples.

Financial incentives could be created using the mobile platforms themselves. Especially in developing countries where many do not have bank accounts, Mobile money services could be used to complement mHealth services, making it easier for stakeholders to pay each other. For example, in Kenya, Safaricom offers a mobile money service called M-PESA<sup>[33]</sup>.

Stakeholders further up the value chain, such as payers, could create incentives for patients to lead healthier lives by rewarding them when their real-time data indicates that they are living healthier lifestyles. And the patients themselves may be incentivised to purchase monitoring equipment delivered in consumer form, such as the FitBit sensor, or the Internet-connected bathroom scale. This monitoring equipment, linked to a smartphone app, can in turn generate more revenue opportunities via service and subscription-based models. While money may not be made easily from a smartphone app, a company could generate revenues from a monthly data collection and analysis service that used the app as a collection and reporting tool for the user<sup>[34]</sup>.

mHealth projects can succeed when they are pushed beyond the limits of existing healthcare problems to bring new, unexpected functionality to the table and solve new problems, bringing great value into the equation.

One of the most promising tactics for mHealth leaders involves thinking ahead in relation to service delivery and health outcomes. While it may be appropriate for a project to begin with a focus on making interesting health processes more efficient, project designers should also keep one eye on moving beyond today's health needs and anticipating future problems that can be solved using mHealth technology.

One example could be using an mHealth system designed for patient monitoring as an epidemiological tool when it begins to scale. The application of 'big data' techniques to large amounts of clinical data could yield rewards in everything from emergency response and disaster prevention through to public policy planning - assuming, of course, that a customer for such data can be found.

This approach builds further potential future incentives into the mHealth project for the various stakeholders, helping to sustain their interest.

Finally, one clear challenge is the sheer range of potential business models for mHealth. This is caused not only by the complexity and diversity of value chains in different healthcare systems, but also by the rapidly changing technological landscape, in which mobile device technology and communications systems change almost on a quarterly basis. Stakeholders in mHealth must therefore be uncharacteristically agile and adventurous as they navigate this new and exciting space.

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# Conclusion

As this report has made clear, the potential reward for successful implementation of mHealth projects on all scales is high, but the barriers to overcome are also significant.

Work has begun at all levels of the healthcare value chain, from international bodies through national governments to healthcare funders, providers, medical device manufacturers, pharmaceutical companies, voluntary groups, charities and NGOs to begin to unpick the implications of what it will mean to add “mobile” to the delivery of healthcare.

Of course, a great deal of healthcare already takes place out in the field, from ambulance services using secure telecommunications and mapping systems, clinicians and carers on home visits, and even people looking up information about their own health online.

But as mobile access begins to be the rule rather than the exception, with more and more clinicians accessing patient data on the move, even within a hospital environment, the need for strong policies tying all these kinds of activities together to avoid duplication of effort and interoperability is becoming ever more urgent.

Beyond the formulation of policy, there is a great deal of work to be done too in moving beyond strategy and policy on paper to operational activity, and here again the exchange of ideas and information is key, as well as strong management to ensure coherent action by the bewildering array of stakeholders in a modern, ICT-enable healthcare system.

Change is needed from the top downwards: most existing national healthcare systems embed systems of funding and incentives for their players that are strongly geared towards preventing new models of delivery. For this reason, this is a matter not just for healthcare experts and professionals, but for politicians at the very top level, who shape our health systems.

Nevertheless, it is crucial for all stakeholders to adapt and collaborate to allow for innovative technologies like mHealth to transform our health systems to meet the healthcare needs of a growing, ageing, and more demanding world population in a sustainable way. To this end, we have outlined a number of considerations for each stakeholder group that could be taken to allow the industry to collectively tackle the barriers described in this guide.



## Healthcare funding bodies\*

Healthcare providers should be reimbursed for any revenues they may lose due to decreased in-hospital care and (emergency) visits, while also being given incentives for the investment that they make in preparing for and deploying mHealth systems.

One option might be to move towards more outcomes-based reimbursement for healthcare providers and clinicians such payment for readmission rate, rather than on a per-patient or a service-fee basis; another might be to pay healthcare providers for anonymised, aggregated data collected during mHealth trials, which will have a high value in such a new field.

As well as the obvious costs of technology, funding bodies must be careful not to ignore or underfund related costs such as education and training connected with successful execution of trials and project in all new areas of innovation such as mHealth.

Funders must ensure strong management arrangements are in place for mHealth projects to cut across the fragmented, siloed community inherent in many healthcare projects, and work to align the goals and business drivers of various stakeholders in the value chain.

The goals of mHealth projects should be aligned where possible to broader government goals for citizen health and healthcare, to boost sustainability.

\* National health authorities or other bodies that commission and fund healthcare

## National governments

Strengthen eHealth policy to include mHealth policy development, to be driven through by an action plan led by a relevant agency.

In developing policy to boost infrastructure for telecommunications and broadband internet, governments should take into account the potential needs of mHealth projects, for example ensuring electronic access to appropriate health care services to people living in remote, rural and disadvantaged communities.

Any national eHealth plans should consider interoperability and mHealth from the outset.

Plans for electronic health records and electronic care records should include plans for mobile access.

Efforts to increase localisation or regionalisation of healthcare delivery should be supported by systems helping areas to share knowledge about innovations such as mHealth and scale successful projects nationally, ensuring consistency and interoperability and avoiding duplicated effort.

Governments' healthcare policy should include a focus on patient empowerment through use of mHealth for increased health monitoring and education to put more focus onto prevention, helping patients remain at home, manage their own conditions and lead independent lives.

## International bodies\*

One of the keys to maximising the value of mHealth projects is ensuring interoperability between as many projects as possible. This could be achieved by prioritising the strengthening of mHealth interoperability and standards in all areas from ICT standards to electronic prescription and health record formats.

As well as technical standards, legal frameworks on issues such as data protection should be examined to see if greater harmonisation is possible.

Adoption would be benefitted by stepping up activities aimed at helping nations to share best practice in all other areas covered below in our considerations for national governments, such as the creation of policy and infrastructure to support mHealth development.

\* International bodies and umbrella groups such as the WHO, the Digital Health Initiative, the mHealth Alliance, IHE - Integrating the Healthcare Enterprise, and technology standards bodies.

### Pharmaceutical and medical device industries

- ▶ The industry needs to recognise that drug and product pricing models need to be more flexible than in the past.
- ▶ More outcomes-based pricing models can be agreed with governments to support market access for new products. In addition, this could directly boost the adoption of mHealth services as data required to assess product outcomes can be obtained through the application of mHealth remote monitoring services. Such data may also be used to support any post-marketing trial requirements.
- ▶ mHealth technologies can differentiate product brands through “beyond the pill” propositions where patients are supported to use mHealth to better manage their condition. This may also achieve subsequent improvements in adherence to treatments.
- ▶ mHealth can be leveraged to support new ways of working of field-based staff by, for instance, mobilising access to CRM (Customer Relationship Management) and ERP (Enterprise Resource Planning) systems.
- ▶ The drugs and medical device industries could also look to play a role in helping to develop national policies in this field.

### Technology and telecoms companies

- ▶ Telecommunications companies and mobile networks need to ensure the infrastructure they are developing is appropriate for the delivery of mHealth and may need to adapt their business models to provision mHealth type services in a sustainable way.
- ▶ Networks should help facilitate the development of healthcare and health-focused app and device usage, with dedicated mHealth awareness programmes and marketplaces, and the development of mobile payment services for healthcare providers.
- ▶ Companies involved in the provision of mobile technologies should also look to play a part in the gathering and analysis of health data, to help others create a clear, simple evidence base for setting policy in this field and to help emergency response and disaster prevention.

These considerations are offered not as simple or easy answers but as a blueprint of areas where further discussion and debate is required to adapt action plans to local circumstances.

Most of these recommendations are not new areas of work for the various players, but rather a call for a shift of focus or emphasis that might be happening in some places, but not in others; and for more urgent addressing of key issues to prioritise a mobile revolution that is set to move healthcare forwards into the 21st century in a sustainable way.

The time to act is now, to ensure development globally and within countries is as widespread and evenly balanced as possible.

Just as technology standards must join up to allow governments, companies and healthcare systems to work together, so the flow of ideas and information must join up, to create a global network for mHealth development and innovation that will benefit as many people – and patients – as possible.

# Vodafone mHealth Solutions

This Insights Guide has been commissioned  
by Vodafone mHealth Solutions

The mHealth Solutions team is a business unit within Vodafone that looks after the Global Healthcare industry. Our mission is to improve healthcare outcomes and quality of life by giving patients and healthcare professionals increased flexibility and freedom, for example, by more effective remote monitoring of patients, the provision and exchange of health related information or improved stock management for pharmaceutical drugs.

Vodafone mHealth Solutions leverages today's omnipresent mobile connectivity to implement quickly deployable solutions which are appreciated by multiple stakeholders. Our services are used by patients, health authorities, pharmaceutical and medical device companies and health insurance providers.

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## The debate continues

- Apply to join The Health Debate, a LinkedIn group.
- This Insights Guide will form the core of live Vodafone Health Debate sessions in Brussels and Amsterdam (May, 2012), with follow up reports published shortly after.
- Over the course of 2012, a number of additional case studies on the topic of mHealth politics & economics will be released as part of our regular publications of Insights Articles.



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## Following the money: funding incentives and disincentives

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