



# THE DIGITAL DIMENSION OF HEALTHCARE

George Halvorson with  
Peter Goldsborough, Simon Kennedy,  
Dr James Kent, Karalee Close  
and Dr Daniel Becker



The Global Health  
Policy Summit

A partnership between

Imperial College  
London



Report of the Digital  
Innovation in Healthcare  
Working Group 2012



---

# The Digital Dimension of Healthcare

Report of the Digital Innovation in Healthcare Working Group 2012

George Halvorson with Peter Goldsborough, Simon Kennedy, Dr James Kent,  
Karalee Close and Dr Daniel Becker



## Contents

---

<b>Foreword</b>	<b>3</b>
<b>Executive Summary</b>	<b>4</b>
<b>The Digital Dimension of Healthcare</b>	<b>6</b>
<b>The Digital World</b>	<b>6</b>
<b>The Fourth Space: The Digital Dimension to Healthcare</b>	<b>7</b>
<b>The Policymakers' Agenda</b>	<b>17</b>
<b>Appendix 1: Acknowledgments, Working Group Members and Methodology</b>	<b>22</b>
<b>Endnotes</b>	<b>23</b>

## Foreword



George Halvorson



Professor the Lord Darzi of Denham

We are living through a time of radical transition in healthcare. In all countries, regardless of wealth, new challenges have arisen related to cost, quality and access, and they are exerting intense pressure for change. The evolution of healthcare models has accelerated accordingly – models in which the care is delivered by teams rather than individuals, is measured on outcomes rather than activity, and is purchased as packages rather than pieces. And in this new setting, digital and social media are becoming an increasingly important source of value.

The entire health and wellbeing landscape is being transformed by disruptive technical innovations. Thanks to digital and social media, connectivity has soared, bringing unprecedented numbers of people into contact, and delivering better health outcomes at lower cost. It is also empowering people to participate more actively in their own health, providing novel tools to manage chronic conditions, and easing the burden on overstretched healthcare systems. And by hugely expanding access to data, the Internet has given rise to continuous learning systems and created feedback loops between medical advances and clinical practice. These changes are opening up opportunities for new entrants – smartphone health apps now number in the tens of thousands, for instance – while presenting both threats and opportunities for incumbents.

The disruptive innovations are both driving and enabling the changes in healthcare. They are creating a vision of the future, and helping to realise that vision. Policymakers, in defining and pursuing that vision, need to keep in mind the primary goal – that of improving health – and take specific actions accordingly. They should target investments on strengthening the infrastructure and supporting nascent technologies to their tipping points. They should adjust regulatory and payment schemes to reflect 21st-century realities. They should set standards for data-sharing, in such a way as to balance the patients' dual rights – to well-informed care providers on the one hand, and to privacy and security on the other.

In this exciting and turbulent time of change for healthcare, digital innovation offers tremendous prospects for addressing some of our toughest challenges. We need to embrace it wholeheartedly.

A handwritten signature of George Halvorson.

**George Halvorson**  
Chair, Digital Innovation Working Group  
and CEO, Kaiser Permanente

A handwritten signature of Professor the Lord Darzi of Denham.

**Professor the Lord Darzi of Denham PC**  
Paul Hamlyn Chair of Surgery and Director  
of the Institute of Global Health Innovation

## Executive Summary

Policymakers are faced with three core challenges in healthcare: growth in costs outpacing growth in GDP; uneven quality in outcomes and patient experience; and inadequate access to care in many regions. Traditional solutions have been insufficient to address these challenges. What is needed is a fundamental re-invention. A key component of that solution is innovation from digital and social media.

The Internet has changed both the way we live and the way that companies operate. By 2016, there will be an estimated three billion Internet users and \$4.2 trillion\* in online sales. As Internet access and usage increase, disruptive transformations are occurring in many sectors. Business models, economics, and industry boundaries are being reshaped through the formation of new delivery channels, the removal of middlemen and a fall in transaction costs. Companies are exploiting an explosion in data, to deliver customised products and services to much larger customer bases. New platforms have harnessed the “power of the crowd” by tapping into a broader base of intellectual capacity. Consumers have been empowered by more information on price and quality, more choices in products and services, and more voice through review sites and online self-help options.

These forces are bound to benefit health greatly, though those benefits are still at an early stage. Where digital and social media have been adopted in healthcare, they have quickly proved their value in addressing cost, quality and access. The innovations occur in three areas:

### Digital Channel for Health

Providers and payers are deploying digital and social media within traditional healthcare systems to improve productivity, deliver new and better services that strengthen patient relationships, and broaden the reach of those services. For example, provider organisations such as Duke University Health System and Kaiser Permanente have begun implementing a range of online initiatives to improve patient experience and outcomes. New methods for remote delivery of care are lowering costs and expanding access, as shown recently by a large-scale Cisco programme of videoconferencing in the Sichuan province of China. When healthcare teams deliver care in packages rather than piecemeal, incentives are more easily aligned across stakeholders, which encourages the adoption of digital innovation, and increases the value that it generates. Finally, making transparent the large-scale aggregation of anonymised clinical data is improving outcomes and facilitating best practices across systems.

### Digital Innovation for Consumers

Digital and social media are spurring the development of new consumer-driven tools for patients and their carers to manage their own health and wellbeing. These innovations are driven primarily by start-ups or by established companies from other sectors such as consumer goods and electronics. This area is marked by experimentation, so business models have not yet solidified. Nevertheless, it is already showing clear potential for improving health outcomes and patient experience. New platforms, such as the online patient community PatientsLikeMe, are engaging and empowering individual patients by means of information and peer support. New products and services, such as the promotion of medication adherence by Proteus’s smart-pill technology, are creating novel ways of managing chronic conditions. Sites such as Patient Opinion are increasing patient voice, and should drive substantive improvements within traditional healthcare systems.

### Digital Initiatives for Social Impact

The new digital and social media are also benefiting broad-based initiatives that promote health and wellbeing. Governments, NGOs and foundations are beginning to incorporate digital technologies into public-health campaigns, using the tools of online advertising such as targeting and customisation in order to communicate with difficult-to-reach populations and to fine-tune messages. Campaigns such as the Let’s Move anti-obesity programme are employing digital and social media across multiple channels, breaking down silos between health and

\*All \$ in this paper are US Dollars

---

adjacent fields such as education. Initiatives such as the Stop Stock-outs Campaign, to reduce shortages of essential medicines in Africa, are using interactive, two-way communication to drive reform.

While digital and social media have the potential to improve health in multiple areas, this potential will be realised only if policymakers both remove barriers to faster adoption and encourage experimentation and development. By focusing on six broad principles, policymakers can lay the groundwork for a more effective and comprehensive healthcare system:

- **Set the direction, and commit to it**

Policymakers should design and communicate a vision that signals to investors and innovators that digital innovation is a priority. The vision must then be supported by targeted investments – investments that foster innovation and experimentation, develop the underlying infrastructure, and establish best practices.

- **Balance patient confidentiality and information-sharing**

The sharing of aggregated, anonymised data will produce great benefits, but will also put patients' privacy at risk. A balance is needed, and to achieve it, policymakers should engage in broader debates on data privacy, including those that go beyond health-specific issues. Policymakers should establish robust standards and protocols for aggregated health data, and should clarify the rights to access and use of that data. The starting assumption should be that every patient's data will be anonymously included, except where an individual patient specifically opts out. Legal protections should be put in place to shield individuals from improper use of de-anonymised health data. Finally, educational campaigns should be conducted, aimed at providers and public alike, to raise awareness of the rights, responsibilities, risks and benefits related to health data.

- **Empower patients**

Many patients would engage more fully in the management of their own health, but they face barriers caused by information asymmetry and a tradition of paternalism in provider-patient relationships. Those barriers must be removed. Patients should gain the right to access their medical records online, to engage their providers via digital channels, and to share their records across their teams of providers. Open platforms that increase patient voice should be encouraged, and data on provider performance should be published.

- **Adapt payment systems**

Digital technologies can productively address issues related to cost, quality and access – unless impeded by various budget and reimbursement mechanisms. To avoid such impediments, economic incentives should be aligned across payers and providers. One way of stimulating the implementation of proven digital innovations is to adopt a system of outcome-based payments.

- **Reduce barriers to regulatory approval and licensing**

Regulatory pathways should be adjusted to reflect different levels of risk from digital innovations. For medical software and mobile apps, regulatory processes should be aligned with iterative software-development cycles, and should focus on approval of development processes rather than examination of software code. Provider-licensing requirements should be clarified, to facilitate remote-care delivery that expands access and to prevent incumbents from using those licensing requirements to block cost-saving digital innovations.

- **Accelerate the healthcare evidence base**

Care procedures that have good proven health outcomes should be standardised. To promote such standardisation, support should be given to the rapid sharing of clinical protocols, best practices and outcomes data. The Swedish quality registries serve as a useful model in this regard.

## The Digital Dimension of Healthcare

Digital and social media have transformed many industries, including music, travel, retail and banking. These transformations have offered tremendous opportunities to consumers and companies able to harness the power of innovation. Digital innovation has the potential to unlock similar value in healthcare. It can expand access to health services and improve their quality and productivity; it can equip patients with the tools to manage their own health and wellbeing; and it can lend new energy to public-health initiatives. To date, however, healthcare has been slow to embrace the technologies that have revolutionised the economics and customer experience of other industries. The result of this inertia is that providers, payers, and patients are all losing out. The challenges of cost, quality, and access continue to exercise healthcare policymakers.

The cost of healthcare is spiralling upwards. Since 1992, healthcare costs in many developed countries have grown faster than GDP – more than twice as fast in the UK and the U.S.

– and that trend shows no signs of abating.<sup>1</sup> Demand is rising, owing to ageing populations and the increase in chronic diseases, while technological advances often increase costs. To sustain the current levels of care in Norway in 2025, apparently, one in three young people will need to enter the healthcare industry.<sup>2</sup>

The quality of care remains very uneven. Patients with similar profiles and conditions have variable outcomes because of the inconsistent application of best-practice care. Patient experience – which would be called customer satisfaction in other industries – also varies greatly, according to the provider, setting, and payer.

Finally, access to care is often limited, especially in middle- and low-income countries, though also in rural and remote parts of high-income countries. In many regions, physicians and nurses are in short supply. Nations such as Brazil, Chile, China, India, South Africa and Turkey have fewer than two doctors per 1,000 people, compared with an average of 3.1 among the OECD nations.<sup>3</sup>

These three challenges are as familiar as they are fundamental. Agriculture faced similar challenges during the 20th century, and its multi-decade transformation serves as a reminder of what can be achieved through innovation. In the early 1900s, families worldwide spent approximately 40% of their budgets on food,<sup>4</sup> and the developed nations devoted about 30% of their workforce to producing it.<sup>5</sup> Today, food represents barely 10% of the typical family budget,<sup>6</sup> and agriculture accounts for just 2% of employment.<sup>7</sup> These changes came about not because countries began rationing food, but rather because the agricultural sector applied technology to re-engineer the production and delivery of food.

The time has come for healthcare to accomplish a similar re-invention. It is not enough to build better medical equipment and develop new therapies. The challenge for the 21st century is to re-engineer the way that healthcare is produced and delivered. Innovation from digital and social media is part of the answer, but there is only so much that innovators, providers and patients can do on their own. Governments and policymakers need to foster the transformation by creating the right conditions, encouraging innovation, empowering patients, reforming payment systems, and removing inappropriate regulatory barriers conceived in a pre-digital era.

## The Digital World

Since the commercialisation of the Internet nearly 20 years ago, the world has embraced digital and social media. By 2016 there will be about three billion Internet users, or 45% of the global population.<sup>8</sup> Nearly 800 million of them will be in China.

Increasingly, the Internet seems to be present everywhere – not just on mobile phones but even through computers integrated in some cars, refrigerators and watches. In low and middle-income countries in particular, most consumers are more familiar with mobile phones than with landline phones. By 2016, mobile devices will account for about 80% of all broadband connections in the G-20 nations.<sup>9</sup>

---

Social media have taken hold very widely, especially in middle-income countries. The country boasting the second highest number of Facebook users is Indonesia. And more than 90% of Internet users in Argentina, Brazil and Mexico participate in social media. Across all nations, social media are responsible for most of the growth in online time, and now account for 22% of the total time spent online.<sup>9</sup>

The digital economy – broadly, the sale of goods and services conducted online – will reach \$4.2 trillion in the G-20 nations by 2016.<sup>8</sup> If the digital economy were classified as a national economy, it would rank among the top five in the world. By 2016, emerging nations will account for about 34% of the G-20's overall digital economy and for 48% of its growth. The number of online shoppers in China, for example, will rise from 150 million in 2010 to 360 million in 2015.<sup>9</sup>

The Internet has fundamentally disrupted industries by reducing transaction costs, lowering barriers to entry, removing intermediates from the supply chain and expanding consumer choices. Amazon.com is probably the best-known example of these forces at work and illustrates how the Internet has liberated companies from the age-old choice between individually tailored products and mass-market reach. By exploiting readily available information about consumers' purchasing patterns and habits, businesses can target individual customers with tailored products and services on a large scale. In effect, the Internet, coupled with massive increases in processing power, enables mass customisation.

Armed with the power of information, consumers too have been major beneficiaries. Through the Internet, they have greater knowledge about price and quality, and more choice of products and services. They can provide instantaneous feedback to companies, through review sites, product ratings, and Twitter. They have numerous self-service options – conducting online banking transactions, for example, and making travel reservations online.

Healthcare, however, has remained largely impervious to these forces. It has not been disrupted by outsiders, in the way that the book-publishing, music and news industries have been. Patients have fewer self-service options than they have in other sectors, and less access to trusted information on the quality of care on offer. Healthcare has only just begun to tap into the power of digital technologies to improve its services. Today's technology readily enables the analysis of quantitative, outcomes-based data across large population groups; it allows online and video consultations; it provides intelligent self-diagnosis and self-management tools, and a wide array of other innovations that could improve cost, quality and access. There have been experiments, pilots, and isolated roll-outs, but not universal adoption.

## The Fourth Space: The Digital Dimension to Healthcare

---

The impact of digital technologies on the healthcare sector, then, has so far been relatively limited. But digital and social media innovation is now taking hold, in three broad areas.

First, healthcare providers and payers are deploying digital and social media within the traditional healthcare system to improve productivity, quality and access to services. This is the *Digital Channel for Health*. Among the common examples are these: follow-up consultations by e-mail; online access to laboratory results; and mobile access to radiology images.

Second, digital and social media provide new and better ways for individual patients (and their carers) to manage their own chronic illnesses and to stay healthy. This is the area of *Digital Innovation for Consumers*. Start-ups and established companies in the technology and consumer-goods sectors are the main developers of these new models. Many of the services are giving patients new tools to understand and manage their own medical conditions and interact with peers. A good example is PatientsLikeMe, an online community of patients united by shared experience.

Finally, organisations from the public and private sectors are using digital innovations to target specific populations, promote broad-based campaigns across sectors, and facilitate interactive communications to prevent disease and promote health. These are *Digital Initiatives for Social Impact*. A prominent example is Michelle Obama's "Let's Move" campaign, a multi-year, multi-channel initiative to reduce childhood obesity.

Collectively, these three areas of digital innovation represent a new "fourth space" within the healthcare sector, distinct from the three spaces in which healthcare has traditionally been delivered: hospitals, clinics and homes (see Figure 1). The boundaries between these three areas are fluid, as has been the case with other innovations. Policymakers and executives should take an expansive view of digital and social media, in order to recognise their true potential for altering and improving the dynamics of healthcare.

Figure 1

**Digital is the "Fourth Space" in Health Care**

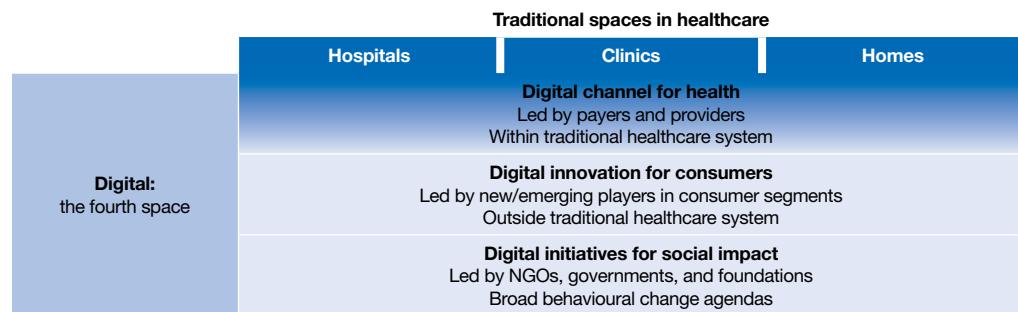
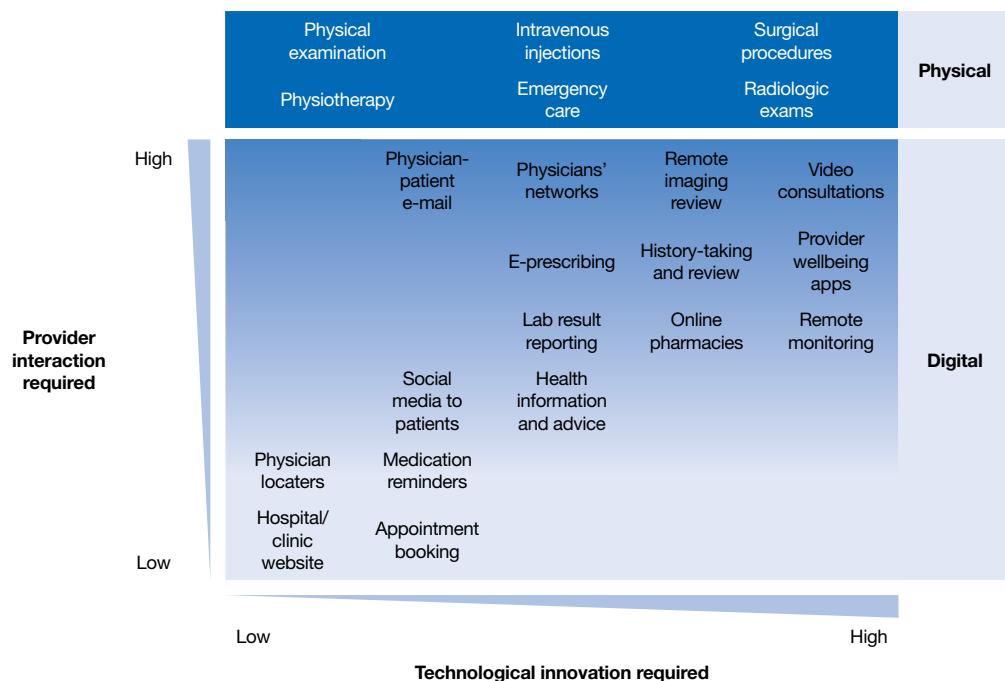


Figure 2

**Profile of Selected Interventions in the Digital Channel for Health**



## Digital Channel for Health

Payers and providers in the traditional healthcare system have progressively implemented numerous digital technologies to improve healthcare (see Figure 2). The greatest uptake has been for healthcare interactions that require less physician involvement and little technological innovation. Increasingly though, we are also seeing digital initiatives that do involve close physician involvement, and where innovative digital technologies enhance the consultation. However, many healthcare interactions between physician and patient remain dependent on traditional techniques, and are more resistant to digital innovations, at least in the intermediate term.

The new digital interactions are transforming traditional healthcare, by means of the following innovations:

- New communication methods that enhance the patient experience and cut costs
- Remote care delivery that expands access, reduces costs, and improves outcomes
- Providing care in packages rather than pieces – by exploiting teams of practitioners, information sharing, and integration of services
- Standardised, evidenced-based care that uses technology and information to test the success of treatments, shorten feedback loops, and improve decision-making

**New Communication Methods.** Apple's iProducts have set the standard that new consumer digital services might aspire to. iTunes, iPad and iPhone are user-friendly, integrated and effective. Healthcare providers have, consciously or not, adopted that model, and started to use technology in similar ways to improve outcomes, patient satisfaction and efficiency. One particularly successful approach is being taken at Duke University in the U.S. (see Panel 1).

### Panel 1 - Tablets Help to Improve Patient Care at Duke<sup>10</sup>

Technology has enabled doctors at Duke University in the U.S. to personalise and improve care for cancer patients. Each time patients visit certain Duke Oncology clinics, they record their symptoms and other perspectives on tablet computers in the waiting room. Between visits, they regularly make similar observations on a secure online site. This method has yielded better and more complete information than typical face-to-face doctor-patient encounters tend to do.

Physicians use the information in various ways: to initiate conversations with patients; to tailor treatments; and to inform health protocols that lead to improved patient outcomes. For example, three-quarters of breast-cancer patients reported that they were now able to remember their symptoms more accurately. Additionally, the system alerted physicians to the problem of sexual distress in patients with gastrointestinal or breast cancer, and prompted Duke to develop targeted educational materials and counselling programmes. The use of digital tablets has also improved clinical productivity, reducing physicians' documentation time by 17%.

The programme has been so well received that it has expanded from eight community cancer clinics to 50 practices in various specialities. One of the key success factors of the initiative was the ease with which patient information could be collected, collated and analysed digitally. In the words of Amy Abernethy, Founder and Director of the Duke Cancer Care Research Program, "Part of the power of mobile health and technological solutions is that they allow us to collect information effectively, so that doctors can spend more time with patients."

Duke's use of tablets highlights the willingness of physicians to use digital technology to listen more closely to patients' views and needs, thereby empowering the patients in the management of their own health. In the process, the tablets are also improving productivity – both by saving physicians time and by improving the quality of their service.

## Panel 2 - Kaiser Permanente's Digital Domains<sup>12</sup>

As a U.S. payer and provider organisation, Kaiser Permanente has a competitive interest in improving quality and reducing costs. Accordingly, the company made the strategic decision to invest substantially in digital initiatives. Recognising the change-management challenge inherent in adoption of new technologies, Kaiser has allocated only about a third of its digital budget to technology, investing the remaining two-thirds in programmes of organisational change. Kaiser's experience shows how digital adoption, despite the unique challenges of healthcare compared with other industries, can unlock value through greater patient engagement, quality improvements and productivity gains.

Kaiser engages with its members through multiple digital channels. All Kaiser physicians have access to electronic medical records for their patients, and Kaiser members are able to send secure emails to their doctors and to access their own medical records on mobile devices. About 3.9 million members use Kaiser's registered online services, on average 19 times each per year. Within the first three months following its launch, its mobile site received 4.8 million visits. Several social-media channels are also used to strengthen relationships with Kaiser's members, and provide them with medical information. A YouTube video promoting mammography attracted more than 125,000 views, including a high share from the target audience of women aged 55 and older.

The power of the digital channel is particularly evident in respect of health outcomes. For example, now that patients can access medical records and fill prescriptions online, the proportion of those who neglect to get their prescriptions filled has halved, from 22% to 7-11%. Thanks to initiatives of that kind, Kaiser Permanente is ranked the leading U.S. Medicare health plan in 9 out of 37 effectiveness-of-care measures.

The digital channel also enables Kaiser to provide new online services, which deliver productivity savings for members' employers and for Kaiser itself. More than 60% of participants in a stress-management programme reported a reduction in stress, resulting in a projected annual productivity saving of over \$3,000 per person. Several other programmes, including those for diabetes and back pain, reported annual productivity gains exceeding \$4,000 per patient. In Northern California, about 55% of primary-care visits and 40% of dermatology consultations are now conducted digitally rather than face-to-face, generating substantial productivity savings.

Kaiser has realised these gains from digital technology because, as an integrated organisation, it ensures that its economic incentives are aligned across payer and provider. In other settings, policymakers can unlock similar value by carefully seeking to align incentives for payers, providers and patients.

## Panel 3 - An Earthquake Shakes Up Medical Care<sup>19</sup>

After a large earthquake hit the Sichuan region of China in 2008, healthcare authorities had to choose whether to invest in traditional facilities or develop a new delivery model built around digital technology. They chose the latter, and have proved that medical care and healthcare education can be effectively delivered through digital means.

A three-year \$50-million public-private partnership involving Cisco Systems and dozens of NGOs set out to re-create health services in the ravaged region<sup>20</sup>. The partnership built three mobile clinics, technology-enabled 66 healthcare organisations and developed 32 "smart" hospitals. It also built four telehealth networks and six regional healthcare internet services that connect rural villages to full-service hospitals. And it created telehealth centres with advanced video-conferencing equipment to enable remote service delivery. More than 7,000 practitioners support nearly 300,000 patients each month using these technologies. Data centres support 60 million medical insurance records and more than 400,000 electronic health records. Through using remote care, patients have saved the equivalent of 22% of their monthly income. Teletraining of physicians has also saved training costs of \$245 per physician – the equivalent of a physician's monthly salary in the county of Wenchuan in Sichuan.

The speedy set-up and the reach of this healthcare system would not have been possible without investment in mobile and broadband infrastructure. This infrastructure provided the backbone on which Cisco and others could build the technological nervous system that has re-established and so greatly improved healthcare and healthcare education in Sichuan.

Alongside digital innovation at the local institution level, broader initiatives are now being launched at the regional and national level, and are registering marked improvements in cost and quality. In England, the National Health Service (NHS) saved £213 million in 2009/10 through NHS Direct,<sup>11</sup> a multi-channel phone, Web and mobile service providing remote health assessment, advice and information. In the U.S., Kaiser Permanente, with nearly 15,000 doctors on staff and nine million members, has likewise been exploring new ways to communicate with patients (see Panel 2).

Social media are also being adopted by traditional providers in the cause of improving health outcomes and containing costs. Big White Wall (BWW) is an online mental wellbeing service for those experiencing psycho-social distress that works across health, military, education and employment markets in the UK and internationally. Bigwhitewall.com delivers its online care pathway, from the community SupportNetwork to individual LiveTherapy, in partnership with the Tavistock and Portman NHS Foundation Trust. BWW is transforming mental health services through technology by delivering safe online self-care with 24/7 access to professional staff on demand. The service, which is also being commissioned by the international healthcare group Bupa, has supported over 8,000 people and saves the NHS alone £37,000 for every 100 patients served.<sup>13</sup>

To help manage specific conditions, providers are looking at highly creative digital innovations. In New Zealand, the Ministry of Health funded a pilot, SPARX, to help adolescents manage their depression by playing an interactive fantasy game incorporating the principles of cognitive behavioural therapy (CBT). Patients who played the game reported a 35% decrease in the symptoms of depression compared with a control group.<sup>14</sup> In England, NHS Direct created the National Pandemic Flu Service, a large-scale self-service online symptom assessment. It carried out a million online assessments during the pandemic, protected primary care from being swamped by flu cases, and perhaps even inhibited the spread of the virus by encouraging sufferers to stay at home. The assessment's underlying algorithm could be updated daily or even hourly to reflect evolving knowledge about the virus and symptoms – a far more efficient way of proceeding than attempting to keep all primary-care physicians up to speed via traditional methods.

Pharmaceutical companies too are using online services to establish a more direct relationship with patients. Novartis has created CF Voice, an online collection of multimedia support resources for cystic fibrosis patients. Bayer has developed a site to assist patients with haemophilia. These initiatives could help pharmaceutical companies to strengthen their ties to patients, and improve patient adherence and lifestyle choices.

Providers and pharmaceutical companies alike, in leveraging digital communications with patients, are realising great value in terms of efficiency, efficacy and patient satisfaction. The challenge now is to extend the adoption of these new communication techniques as widely as possible. For that to happen, economic incentives need to be considered and regulations regarding data need to be clarified.

**Remote Care Delivery.** Thanks to mobile and broadband technologies, healthcare services can now be delivered remotely and at lower cost. Sweden has identified over \$60 million in annual savings on patients with chronic bronchitis or emphysema, for example: instead of staying in hospital, the patients are sent home with remote monitoring technology and videoconferencing devices for consultations.<sup>15</sup>

Another example is the Ontario Telemedicine Network (OTN), one of the largest telemedicine networks in the world. It oversees 135,000 telemedicine consultations a year,<sup>16</sup> mainly for residents in the rural regions where 20% of the province's population live, but which struggle to attract physicians. In addition to lowering costs and expanding access, remote delivery can improve outcomes - a large-scale randomised telemedicine trial in the UK recently reported significant decreases in both emergency hospital admissions and mortality.<sup>18</sup>

Many of the most innovative telehealth solutions are occurring in middle-income countries. Unconstrained by legacy assets, such as buildings, staff, and established ways of doing things, the health authorities in these countries can leap straight to mobile and digital delivery of services (see Panel 3).

To establish telehealth solutions and networks will sometimes take considerable investment, but it will almost certainly pay off in reduced healthcare costs. In order to implement the solutions, policymakers should pay greater attention to reimbursement provisions for digital healthcare.

**Packages, Rather Than Pieces, of Care.** When healthcare is delivered piecemeal by a diversity of providers, it gives rise to continuous and frustrating problems for healthcare systems. For payers, the key metric is the overall health improvement of the patient, not the number of tests and procedures performed.<sup>21</sup> Increasingly therefore, policymakers are imposing accountability for outcomes, in order to drive improvements in the quality of care.

Such accountability is most easily achievable where care is “packaged” – integrated across disciplines or else provided by a single organisation. And where care is packaged in this way, the benefits of digital innovations can be realised more fully – by virtue of technological and economic integration<sup>22</sup> as well as close integration of the digital channel with the traditional three spaces of healthcare.

Integrated models can more easily collect anonymised, aggregated data – the basis for making better-informed medical decisions. And they offer financial incentives to eliminate inefficiencies such as unnecessary tests. Kaiser Permanente adopted a team-based approach to caring for HIV patients, in which technology creates transparency and helps eliminate signal loss and other inefficiencies created when patients are seeing several doctors.<sup>23</sup> In consequence, the mortality rate of these patients is as low as one-half of the national average for HIV patients. The U.S. Department of Veterans Affairs (VA) has created a portal, myHealtheVet, to assist veterans, especially those far from a VA medical centre, with their medical needs, such as refilling prescriptions. The portal benefits patients and practitioners by creating a single medical record for each of the one million registered users. This record can be shared across all 1,400 VA medical centres, and is a crucial component of team-based medical care.<sup>24</sup>

**Standardised, Evidenced-Based Care.** The ultimate value in electronic health data may be as the raw material for improving the efficiency and effectiveness of care. By aggregating, anonymising and analysing this data, providers can determine how to improve and standardise care more quickly.

Kaiser Permanente, for example, recently found that it could cut the death rate of stroke victims in hospital by nearly half – from 11% to 6% – by giving these patients statins as soon as they are admitted.<sup>25</sup> Thanks to technology, this finding could be disseminated directly and was promptly implemented in a clinical setting – far faster than would have happened if only traditional non-digital channels had been available. To tighten the link to clinical practice, Kaiser updated the automated care protocols: starting high-dose statins therapy on day one is now the default regime for stroke patients.

Such success stories illustrate the potential value of making the data available: physicians are able to identify best practices, and policymakers can steer resources towards clinical interventions that achieve the best results.<sup>26</sup> And if these advances are then shared among all providers, that promotes an accelerated learning loop that would improve service delivery and eventually patient outcomes. But policymakers will have to ensure that the medical data really is properly aggregated and anonymised, in order to protect patient confidentiality and so retain public confidence.

### Digital Innovation for Consumers

Digital and social media offer new and better ways for patients (and their care) to manage their own illnesses and to seek wellbeing. Patient empowerment is soaring, thanks to online activities such as “gamification” (the use of video-game features to encourage greater understanding of and adherence to treatment). Many of the developers of these tools come from outside the healthcare sector, and so are unencumbered by its traditions and customs.

The innovations in this field are proliferating, and the range of experimentation is encouraging, but it is too early to know which innovations will ultimately succeed. From a policy perspective, however, the success or failure of individual initiatives is not all that important: what matters is that policymakers should recognise how helpful technology can be in benefiting healthcare.

These benefits are usually achieved by one, or more, of three means:

- Individual engagement in health
- New products and services
- Value from the “gift economy”

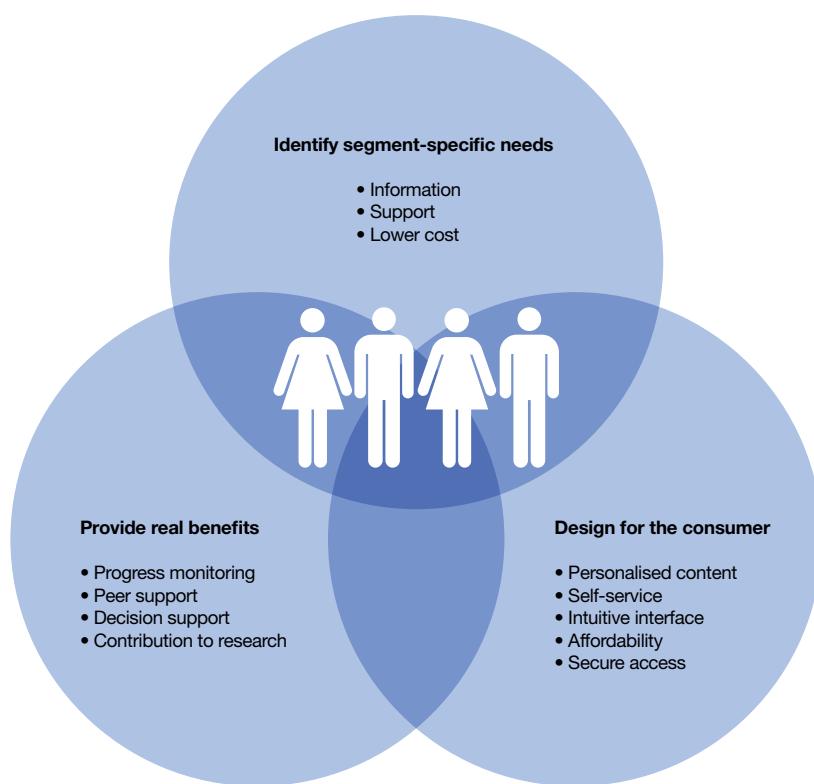
**Individual Engagement in Health.** Individual patients increasingly want to participate more fully in decisions related to their own health and wellbeing. Digital innovations facilitating this engagement not only help to reduce pressure on healthcare systems, by providing an additional means of access to care, but some also drive improvements in healthcare quality. To engage patients, digital and social-media suppliers must meet their needs as consumers across three dimensions (see Figure 3).

Some new entrants have successfully straddled these three dimensions through patient-to-patient networks. Patient sites have tended to serve as static repositories of medical information and as signposts to other sources of support, but some sites are taking advantage of the social and interactive elements of the Internet. Consider the case of PatientsLikeMe, which is built around data, shared experience, and evidence (see Panel 4).

Private payers too have started using online and interactive tools to improve the health engagement of their customers. In April 2012, Aetna, a healthcare benefits company, made the premium version of the online Mindbloom “Life Game” available to all of its members and employees. The Life Game allows users to create a virtual “Life Tree” – a visual representation of the health goals they want to reach. These goals may be to exercise, to eat more healthily, or to quit smoking, for example. Since its September 2011 launch, more than 50,000 users have registered for the Life Game. On average, they visit the site four times a week and devote more than 14 minutes to each visit.<sup>30</sup> Continued engagement is fostered by user-scheduled multi-media reminders that the users themselves have chosen as inspirational, as well as by the offer of virtual rewards within the game when the users reach certain milestones towards their goals. Together with family and friends, users are able to grow a virtual forest of Life Trees, providing peer support to sustain engagement.

Figure 3

**Key Dimensions for Engaging Patients with Digital Innovations for Consumers**



#### Panel 4 - PatientsLikeMe Is Unlike Other Social Networks<sup>27</sup>

PatientsLikeMe was founded in 2004 by two brothers of a patient with amyotrophic lateral sclerosis, also known as motor-neurone disease. They borrowed the idea of information-sharing from the dating site, Match.com – only, the information to be shared would be symptoms and treatments rather than hobbies and interests. Jamie and Ben Heywood hoped that, with better information, patients and doctors would be able to plan and track patient care more successfully.

From the start, PatientsLikeMe has emphasised the value of openness, as expressed in its “openness philosophy”: that sharing medical information will help patients themselves. The openness philosophy and privacy policy are written in plain language, so members understand clearly how their information will be used.

PatientsLikeMe originally focused on a few diseases, but has since expanded to more than 1,800 different conditions. Unlike most other patient-oriented sites, PatientsLikeMe quantifies and charts symptoms, treatments, dosages, moods, and reactions of each user. As *The New York Times* magazine reported, “The members of PatientsLikeMe don’t just share their experiences anecdotally; they quantify them, breaking down their symptoms and treatments into hard data. They note what hurts, where, and for how long. They list their drugs and dosages and crow how well they alleviate their symptoms<sup>28</sup>.”

Many of the site’s 150,000 members report satisfaction with the information and community it offers. Nearly three-quarters have stated that they now understand their symptoms better; 18% of epileptics reported a decrease in emergency-room visits; 22% of patients with mood disorders said they required less inpatient care; and among HIV patients, 41% reduced risky behaviours.<sup>29</sup>

PatientsLikeMe is now starting to explore broader applications for the data collected by the site, in the hope of sharpening the healthcare profession’s understanding of the patient community. For example, PatientsLikeMe user data have revealed the extent to which two common medications are taken by patients for reasons other than their FDA-approved indication. PatientsLikeMe employees have authored more than 30 research papers, making use of similar patient-reported data and an online clinical trial, to advance the practice of medicine.

PatientsLikeMe encourages patients to share data openly and transparently by empowering them with healthcare information and cohort support. It draws on the power of the crowd to help improve the quality and reach of healthcare.

#### Panel 5 - Taking Charge, One Pill at a Time

One of the challenges for patients and their carers is adherence<sup>32</sup> – taking medication at the right time. Some 10% of U.S. hospital admissions are attributable to poor adherence. Proteus Digital Health is helping to solve that problem with a tiny sensor, just the size of a grain of sand, that can be attached to the tablet or capsule and convert it into a “smart pill”. The sensor sends a signal to a skin patch, which in turn relays medical information – dosage, heart and respiratory rates, sleep patterns, and so on – to a secure database via the patient’s or caregiver’s mobile phone.<sup>33</sup>

In addition to the smart pill, Proteus is creating a platform of services, all with a consumer-focused design, to engage patients and their carers and encourage better outcomes. If the patient skips a dose, for example, he or she would receive a reminder via a text message. There is also an application using game-playing concepts to encourage adherence.

Proteus has reached a deal with Lloyds pharmacies in the UK to offer older patients digital-health feedback systems that incorporate smart pills. It is also working with Novartis and other companies to commercialise digital pharmaceuticals in important areas of chronic therapy. Proteus’s success has depended on approvals from the European Medicines Agency and the U.S. Food and Drug Administration, but obstacles still remain, in the form of payment and implementation issues. Policymakers may need to create clearer reimbursement pathways, to enable more patients and their carers to benefit from this remarkable new technology.

---

**New Products and Services.** Several companies from outside the healthcare sector have devised tools that enable users to monitor their health and adherence to treatment. For example, the Nike+ FuelBand is a consumer device that gamifies fitness to improve users' health. The FuelBand is a \$150 wristband device that tracks its users' activity during the day. Users are credited with "NikeFuel", a measurement of total activity during the day, and can share their results on Facebook and Twitter. The device proved so popular that Nike's online store quickly ran out of stock – evidence of the strong consumer demand for products that leverage digital and social media in the cause of wellbeing.

Strong consumer demand is also apparent in peer-support tools. Moodscope, a social networking tool, offers its 36,000 users the opportunity to share their emotions with close friends and families online. The users report an average improvement in their mental disposition of 36%<sup>31</sup>. It works on the theory that daily monitoring of any activity improves performance; for example, people who wear pedometers walk a mile a day more than those who do not. Moodscope goes one better, though, in that it also facilitates peer support through digital and social media to further improve health.

New digital and social media tools are also supporting carers. Bupa, in partnership with Carers UK, has created Carewell, a peer-to-peer network of unpaid family carers, linking them to Bupa experts on their health concerns, most commonly stress. In the pilot phase, over 20,000 people accessed the network. Other new entrants have taken even more innovative approaches to supporting carers as well as patients (see Panel 5).

It is too early to pick winners, but the successful business models will surely be those that demonstrate clear value to consumers – improved health outcomes, lower costs, and easier access to resources. The technological contours of these new products and services are still forming, but clearly some patients want greater control over their health and wellbeing. One of the key challenges will be to increase the number of patients involved in this way.

**Value from the "Gift Economy".** The Internet has unleashed a torrent of sharing and volunteer efforts. It is a form of "gift economy": a recurring exchange of efforts, governed by informal customs rather than negotiated pricing. Wikipedia and the Linux operating system may be the best-known modern examples – both were created with volunteer labour. The phrase "cognitive surplus", coined by the writer Clay Shirky, aptly describes the creativity and knowledge generated by the Internet and made available for public use. By Shirky's calculation, it has taken 100 million hours of human thought to create Wikipedia<sup>34</sup> – evidence of the huge potential input available from individuals outside the mainstream.

Healthcare consumers have created voluminous useful content, not just in Wikipedia and other such obvious places but also through product reviews, blogs, social networking sites, and reviews and ratings of physicians. Zagat, the restaurant-review publisher, has started a service that evaluates doctors and is available to the 5.5 million policyholders of WellPoint. Other sources of patient reviews of doctors and practices include NHS Choices, RateMDs.com, Vitals.com, and FindaDoc.com. One day soon, such sources might command the credibility and power of the ratings on Amazon.com, where highly rated books can outsell those recommended by professional reviewers.

Patient reviews are also being embraced by the traditional healthcare system. Consider the case of Patient Opinion, an independent non-profit feedback platform for patients, their carers, and others, designed to help improve health services in the UK. Unlike patient networks that simply enable patient-to-patient advice and peer support, Patient Opinion encourages patients to share their "stories", and then uses these stories to drive quality improvement at traditional provider organisations. So far, more than 40,000 patient stories have been published online, and more than 1,800 employees of healthcare organisations have registered to view and comment on them. About 48% of the stories have received a response from a provider and 18% have led to changes at the provider organisation.<sup>35</sup> Earlier this year, Patient Opinion received £160,000 in government funding over two years to become the official UK patient feedback site<sup>36</sup>. Policymakers should support similar innovations for consumers, so that they may contribute to improving the affordability, quality and accessibility of traditional healthcare as well.

## Digital Initiatives for Social Impact

Digital and social-media technologies have benefited many recent public-health initiatives, in countries of all income levels. For instance, the technologies have enabled:

- New methods to target hard-to-reach populations and to fine-tune messages
- Broad-based health campaigns, breaking down silos between health and adjacent fields such as education and housing
- Interactive communications that permit a richer set of interactions

**New Methods.** Several agencies in developing countries are experimenting with the tools of online advertising – for targeting, customisation, and interaction – to communicate information on disease prevention and healthy living. In South Africa and Thailand, for example, tuberculosis patients receive text messages or phone calls to remind them to take their medicine. These reminders have improved treatment compliance by 30-70% in different pilots.<sup>37</sup>

Adaptable capabilities are also being developed for worldwide implementation. The Mobile Alliance for Maternal Action (MAMA) is a public-private partnership that is building global capacity for supplying expectant mothers with health and wellbeing tips. The tips come in the form of text messages, tailored to local cultural norms. Trials have been taking place in South Africa, Bangladesh and India. Although the outcomes have not yet been published, other studies indicate that education and communication alone can effect a substantial reduction in perinatal and maternal mortality.<sup>38</sup> New methods such as these can greatly expand access to healthcare in under-served regions at a very low cost, and are bound ultimately to help improve the quality of healthcare systems.

**Broad-Based Health Campaigns.** Digital and social-media technologies are being successfully used in broad-based campaigns for disease prevention and wellbeing – campaigns that range beyond the healthcare field into adjacent fields such as housing, education, and social services. Michelle Obama is tackling childhood obesity through such an initiative (see Panel 6).

**Interactive Communications.** By using new media, many public initiatives have been able to engage their target audience more abundantly and effectively. In the U.S., for example, BecomeAnEx.org uses several online and interactive approaches, as well as traditional media avenues, to encourage people to quit smoking. Twitter, Facebook, and an interactive website join in the mix with billboards and television advertising. Online content is customised for both the Hispanic and low-literacy populations. The site achieved a 24% increase in the number of quit attempts by those who were aware of the programme.<sup>41</sup>

### Panel 6 - Let's Move

Nearly one third of children in the U.S. are obese, a condition that can lead to Type 2 diabetes and other health problems, and can also incur other social costs<sup>39</sup>. In 2010, the U.S. First Lady Michelle Obama launched a national campaign, “Let's Move”, to reduce childhood obesity.

Let's Move uses digital and social media extensively to support campaign messaging and help to disseminate campaign materials. Beyoncé, the pop star, produced a dance video, “Move Your Body”, aimed at young people and promoting the value of exercise. The video has been viewed more than 20 million times. The Let's Move website also disseminates tailored campaign materials for government officials, school chefs, faith- and community-based organisations, sports organisations, museum and garden managers, Native American communal leaders, childcare organisations, and medical associations<sup>40</sup>. The campaign has generated much coverage in traditional media outlets, and has prompted community organisations to sponsor local “Let's Move Meetups” – physical-exercise gatherings organised online.

While it's too early to know whether Let's Move has actually reduced childhood obesity, what is clear is that the coordinated use of online media across multiple fields has brought the issue home to many more young people than traditional methods alone would have.

---

Interactive campaigns using digital and social media are also being used to reform existing healthcare systems. The campaign Stop Stock-Outs, for instance, is active in several African countries – Kenya, Madagascar, Malawi, Uganda, Zambia, and Zimbabwe – where it strives to ensure that medical clinics always have essential medicines in stock. The campaign is a collaboration among western and African NGOs, including Oxfam and George Soros's Open Society Foundations. The way it works is this: consumers alert the campaign organisers via text message when their local facilities run low on the standard drugs for malaria, pneumonia, HIV or diabetes; an online map is then updated, listing the out-of-stock locations, and indicating how far a local patient would need to travel to receive treatment. The online map can serve as a powerful lobbying tool, putting pressure on local governments to refill the shelves. In that way, it helps to reduce the overall costs of the healthcare system and generally improve the quality of healthcare.

The digital dimension of healthcare is still coming into focus. Jointly, the three strands – digital channel for health, digital innovations for consumers, and digital initiatives for social impact – are already yielding the three basic types of healthcare benefit in abundance: improved quality, lower costs, and greater access. However, there is only so much that can be achieved organically. Policymakers need to provide proactive support for digital and social media innovations, and in that way maximise their healthcare benefits.

## The Policymakers' Agenda

---

With regard to the potential for digital and social media, healthcare is distinct from other sectors in several important ways. First, in healthcare a higher proportion of interactions need to remain in the physical realm, at least in the intermediate term. Physician visits and remote monitoring can occur online, but physical exams and radiology tests still require the presence of patients at the provider facility. Second, health information is more complex than the information for other sectors such as banking or travel. Decision-making in health often requires multi-disciplinary input and expert opinion, and patient data must be interpreted in the context of many variables in a constantly evolving landscape. Finally, consumer attitudes towards healthcare are quite distinctive. In most sectors, the product or service is intrinsically desirable to the consumer: people are happy to wear new clothes, try out new restaurants, and watch the latest films. But when it comes to healthcare, the consumer experience is traditionally an unpleasurable one: people don't enjoy being subjected to biopsies, injections, and surgical operations. They do, however, want to be healthy, so initiatives that focus on people preventing poor health may be the best way forward.

Despite these differences between health and other sectors, there are significant overlaps, including the benefits of digital scale and scope. If digital and social media are applied astutely, they have the potential to reshape the healthcare system for patients, providers, payers and society. By using technologies already available, patients could manage their own health and wellbeing far better, and make better choices about their provider and level of care. They could move seamlessly between providers, with their digital record serving as the connective tissue and ensuring integrated treatment. Digital records would help providers too, streamlining their administrative tasks, enabling them to consult more patients (using channels other than just the consulting room), and gain a greater understanding of their patients' conditions. Payers would be able to manage the care of their patients more effectively, by bringing to bear the latest medical advances more swiftly and uniformly. Finally, society would benefit through the wider availability of medical services, often at lower cost and with greater convenience than today, and through improved overall health outcomes.

But for this potential to be fully realised, policymakers will need to take two broad actions: remove barriers that prevent faster adoption and encourage experimentation and development. In doing so, they are adding a layer of technology, complexity, or cost to a system already straining under all three, so they need to be mindful and selective. The impulse to embark on large-scale IT programmes, for example, should be moderated – in many cases, simple modular

solutions would prove more effective. By concentrating on six broad areas, policymakers can lay the groundwork for a more effective and comprehensive healthcare system:

- Set the direction, and commit to it
- Balance patient confidentiality and information-sharing
- Empower patients
- Adapt payment systems
- Reduce barriers to regulatory approval and licensing
- Accelerate the healthcare evidence base

Embedded within these six areas are 18 identifiable goals. They are all important and need attention, but countries might assign different priority ratings to each of them, according to their specific national capabilities, regulations, and health systems.

### **Set the direction, and commit to it**

To capture the full value of digital and social media in health, policymakers need to provide proactive support. They should:

- **Communicate a clear direction and strategy for improving healthcare with the aid of digital channels.** Health professionals, innovators and investors should understand that the use of digital and social media in health is a priority area, and they should be given specific goals. The UK government has duly set a target to give patients online access to medical records by 2015.<sup>42</sup> Policymakers should hold discussions with health professionals, patient organisations, providers and technology suppliers to assess progress and find ways to accelerate it. Policymakers should also show publicly their interest in digital initiatives, and support them by sponsoring events, visiting live programmes and visibly using digital health services themselves. Finally, policymakers should show flexibility, and take an adaptive approach to policymaking based on the latest realities within the fast-moving digital space.
- **Make investments in digital healthcare innovation a priority.** This can be achieved by providing seed financing, sponsoring innovation competitions, and so on. Such measures will have a multiplier effect, and encourage private investment and initiative. Here are some examples: the SPARX fantasy game, to help young people suffering from depression, was funded by the New Zealand Ministry of Health; Michelle Obama's "Let's Move" campaign sponsored a contest to develop software and games to encourage exercise and better diets; and Code for America, a non-profit U.S. organisation, hires programmers on 11 month fellowships to assist city governments in developing technology and applications.<sup>43</sup> Code for America shows how governments can foster digital innovation to advance a public agenda. A similar approach might be adopted in the healthcare sector to analyse the wealth of health data that is already available.
- **Support the creation of infrastructure that will enable digital initiatives to flourish.** The Cisco Connecting Sichuan project (see Panel 3), shows just how effective a strong digital infrastructure can be. Cisco and its partners installed extensive networks, cloud-computing technology, and advanced-video conferencing technologies, and thereby made it possible to revitalise the Sichuan healthcare system at low cost and with broader reach.
- **Support the establishment of centres of digital excellence in healthcare.** These could be modelled on institutions designed to advance the state-of-the-art in cardiology, neurosurgery, and other disciplines. The UK Institute of Digital Healthcare assists policymakers and commissioners in determining whether the use of specific technologies in health will really lead to the claimed benefits.<sup>44</sup> Similar national or regional government-funded agencies, with valuable digital capabilities and platforms, could develop new digital offerings and support experimental initiatives, and thereby improve the efficiency, effectiveness and reach of healthcare services.

## Balance patient confidentiality and information-sharing

When existing medical regulations restrict the dissemination of healthcare information, they might be serving a useful purpose – protecting patient privacy and confidentiality. But the regulations can also, inadvertently, restrict appropriate data-sharing. Many emerging innovations involve analysing large health data sets, and thereby create learning loops to reduce healthcare costs and improve quality and access. To accumulate such large centralised data sets is the challenge, especially when healthcare systems are fragmented, with many different payers and institutions. The issues are sensitive and complex, and they vary considerably by country. Nevertheless, there are a few general principles:

- **Engage more broadly in public debates over data privacy.** The debate over data protection is a very wide-ranging one, especially in Europe,<sup>45</sup> and healthcare policymakers need to be active participants in it. Increasingly, the health data of individual patients is moving to and fro between traditional healthcare and consumer silos, so it's no longer enough to impose data-privacy regulations that apply exclusively to health data. When considering broader data-privacy regulations, regulators need to consider how they apply to health data of different types, collected on different bases and for different purposes.<sup>46</sup>
- **Establish data standards and protocols for two different procedures: the exchange of personally identifiable health data between providers, and the aggregation and dissemination of anonymous health data.** Organisations such as Integrating the Healthcare Enterprise (IHE) International<sup>47</sup> are beginning to address the challenge of creating data standards and protocols, in order to share patients' medical records across healthcare stakeholders. Other health systems would do well to follow IHE's lead. Less controversially perhaps, but no less crucially, anonymised patient data needs to be aggregated and disseminated for research purposes. Such data collection also needs the backing of its own data standards and protocols.
- **Clarify and regulate rights to access, share, de-anonymise, and monetise health data.** In the financial services industry, companies such as Bloomberg and Reuters have created profitable businesses from aggregating and analysing large data sets. If these or other companies have rigorous and proven methods to protect privacy and confidentiality, such methods can surely operate in healthcare. Clear regulations will be needed to define the circumstances in which health data may properly be de-anonymised and monetised. And a designated body with adequate powers will be needed to ensure compliance with these rules. In countries, where there is little commercial interest in providing data to the public, governments may need to step in to create platforms for the public good.
- **Establish an “opt-out” regime for patients.** Given the option, many individuals will act in a self-interested way and will withhold permission for their data to be used. Even in anonymised, aggregated form, that data is at risk of being de-anonymised, or so they might believe.<sup>48</sup> The interests of the wider society, however, are to maximise the sharing of data, since it has such value for medical and consumer-driven health research. So an opt-in policy would conflict with that wider interest, as it would possibly deliver too little health data to generate meaningful data sets. Instead, policymakers should press for an opt-out policy, which should yield enough data for healthcare learning loops, while still enabling individual privacy.<sup>49</sup>
- **Provide protection for people whose health information is improperly de-anonymised and used against them.** If patients permit their data to be aggregated anonymously for the benefit of others, they are surely entitled to legal protections, similar to those in the U.S. Genetic Information Nondiscrimination Act. By establishing such safeguards, policymakers will give patients greater confidence, and will thereby reduce opt-outs and enrich the aggregated data sets.
- **Educate stakeholders in the benefits of sharing anonymised, aggregated health data and in the responsibilities and risks of privacy.** In tandem with the points above, policymakers should allay patients' concerns about the de-anonymisation of data. Educational campaigns aimed at both the public and health professionals should clarify the societal and individual health benefits of data sharing, as well as the requirements to protect privacy.

## Empower patients

Providers have traditionally been reluctant to give patients the tools to manage their own health. Medical records often remain the property of the provider not the patient, thus limiting patients' ability to participate more in their own health management. Patients might not have the option of keeping their physicians informed through digital channels. And they might be unable to access information about provider performance and outcomes in treating similar patients. Accordingly, policymakers should:

- **Establish legal rights for patients to access their healthcare records digitally.** Patients should have access to electronic medical records, and these should follow them easily from physician to physician. For example, the Australian National E-Health Transition Authority programme is promoting Personally Controlled Electronic Health Records (PCEHRs)<sup>50</sup> to enable such access.
- **Establish rights for patients to share information with their providers, and obtain advice from them, using digital methods.** Telemedicine is in demand, and could potentially save healthcare systems a great deal of money.<sup>51</sup> A YouGov survey found that 29% of people in the UK would like to see GPs start offering remote consultations via video-link within the next decade.<sup>52</sup>
- **Encourage the development of open platforms that enable patients to share their experiences.** Patient Opinion, discussed earlier, provides a fine example of this practice. Policymakers should support similar innovations, to ensure that traditional providers hear patients' voices loud and clear, and respond to their concerns. That will help to increase the affordability, quality and accessibility of healthcare.
- **Encourage publication of data on provider performance and patient outcomes, in a format easily intelligible to patients.** In many regions, robust information on providers is limited, and patients have to choose their providers mainly on the basis of availability, proximity, and payer restrictions. In the UK, NHS performance data is disclosed at the level of hospital trusts, but it is not refined into an easily intelligible format for patients.<sup>53</sup> A private-sector app has been developed to do that very refining.<sup>54</sup> Still, patients would benefit more, and healthcare systems improved, if the data were disclosed in an easily interpretable format in the first place. Transparency of data is a powerful tool in raising provider performance and in educating patients about the standard of care they can expect to receive.

## Adapt payment systems

Although the end users of the healthcare industry are consumers, it is not a consumer market. In most countries, the majority of patients are not exposed to the full costs of healthcare, and practitioners are generally reimbursed through third-party private or public payers. This can result in misaligned incentives, with non-payment for more efficient ways of delivering care; in the U.S., for example, 36 out of 50 states do not require private payers to reimburse for telephone consultations.<sup>55</sup> Policymakers should:

- **Create incentives for reimbursement of digital healthcare innovations.** These incentives will vary across geographies. Where provider reimbursement takes the form of a fee for service, public and private payers should reimburse for digitally-delivered care in a way that shares the benefits between provider, payer, and patient. Some people object to digital reimbursement out of concern over its efficacy, but in fact digitally-delivered care is demonstrably clinically effective. A five-year study of 200 HIV patients at the Hospital Clinic of Barcelona, for instance, showed that patients who have a virtual consultation with physicians are treated just as effectively as patients who visit the hospital in person. The programme provided treatment through video-conferencing and home delivery of medications. It did not replace traditional face-to-face visits entirely, but rather complemented and enhanced them.<sup>56</sup> Another solution would be to shift towards reimbursement of care delivered as a package, especially if it is based on health outcomes. For regions with extensive public health systems, a budgeting mechanism should be set up to incentivise digital innovation and enable providers to re-invest the savings that are achieved, rather than assigning them a reduced budget the following year.

### **Reduce barriers to regulatory approval and licensing**

The approval process for traditional medical devices is understandably stringent. However, when applied to consumer-oriented health and wellbeing devices and software, the approval process tends to overestimate the risk they present, and needlessly slows their implementation. Note too that incumbents may fear innovators from outside the industry, and use regulation as a weapon to hinder them from introducing new products and services. Governments need to review their regulatory frameworks in a digital-friendly way in order to identify unnecessary requirements and barriers. Policymakers should:

- **Update regulatory pathways to encourage innovation and to ensure that medical apps are not blocked by medical-device regulations.** Certain medical applications enjoy a lower level of regulatory scrutiny when the software is functioning as a social, behavioural, or informational tool rather than merely having use as a medical device. What does “use as a medical device” mean in this context? The criteria should be established jointly by regulators and industry, with regulators checking that the criteria are flexible and not unduly risk-adverse. The regulatory regime needs to recognise the rapid, iterative nature of software development. Regulators should check for appropriate development processes, rather than looking to approve the software code of all development iterations. Separately, a trusted organisation could be empowered to accredit medicals apps as safe and effective. This accreditation would be akin to a seal of approval and would be distinct from regulatory approval.
- **Clarify provider-licensing requirements for healthcare that is practised remotely through digital channels.** Digital communications can erase geographic boundaries and provide medical services over large distances including national borders, but practitioners might be unwilling to participate in a digital initiative unless they are confident that they are properly licensed. At the same-time, incumbents might attempt to use licensing as an instrument to frustrate reasonable advances in the delivery of medical care. Policymakers must ensure that any such attempt will fail.

### **Accelerate the healthcare evidence base**

One great virtue of digital and social-media innovations in healthcare is that it can develop learning loops to advance the practice of healthcare. In this regard, policymakers should:

- **Support more rapid sharing of clinical protocols, scientific and clinical advances, and best practices.** The Swedish quality registries and competence centres are exemplary in this regard. They constitute an overall knowledge system that the various stakeholders on all levels can exploit actively for continuous learning, quality improvement, and the management of healthcare services.<sup>57</sup> Other countries and regions should strive to introduce similar initiatives.

These are large ambitions. But other industries made large advances by means of digital technologies. It is time for healthcare, and the people it serves, to share comparable benefits.

## Appendix 1: Acknowledgments, Working Group Members and Methodology

This paper was written in collaboration with Peter Goldsbrough, Simon Kennedy, Dr. James Kent, Karalee Close, and Dr. Daniel Becker of the Boston Consulting Group.

Sincere thanks are extended to the members of the advisory board who contributed their unique insights to this paper:

**Annabel Bentley** (Bupa)

**David Blumenthal** (Harvard Medical School, Massachusetts General Hospital, and Partners Healthcare)

**Joe Cafazzo** (University of Toronto)

**Richard Devereaux-Phillips** (BD)

**Andrew Dillon** (NICE)

**Paul Hodgkin** (Patient Opinion)

**Geoffrey Love** (Wellcome Trust)

**Geoff Mulgan** (Nesta)

**Greg Parston** (The Public Management Foundation)

**Guillaume Sarkozy** (Malakoff Mederic)

**Debra Sloane** (Cisco Systems)

**Glenn Steele** (Geisinger Health System)

**Simon Stevens** (United Healthcare)

**Paul Wicks** (PatientsLikeMe)

Much of this paper is based on extensive dialogue conducted with the representatives of private-sector organisations and the academic community. This dialogue involved numerous interviews and interactive sessions to discuss insights into healthcare, innovations and opportunities for action by policymakers. Sincere thanks are extended in particular to Amy Abernethy and Bradford Hirsch (Duke University) and Andrew Thompson and George Savage (Proteus Digital Health) for generously contributing their time and input.

The authors thank a range of BCG colleagues from around the globe for their valuable input. We also thank Joanne Shaw (Chair, NHS Direct) for her review of the draft manuscript.

## Endnotes

---

<sup>1</sup> OECD. Health Data, 2009.

<sup>2</sup> Bjornland D, Goh E, et al. *The Socio-Economic Impact of Mobile Health*. The Boston Consulting Group and Telenor Group. April 2012. <http://telenor.com/corporate-responsibility/impact/>

<sup>3</sup> WHO. Global Health Observatory Data Repository, 2012. <http://apps.who.int/ghodata/?vid=92000>

<sup>4</sup> U.S. Department of Agriculture. *The 20th Century Transformation of U.S. Agriculture and Farm Policy*, USDA, Economic Research Service, 2005. <http://www.ers.usda.gov/publications/eib3/eib3.htm>

<sup>5</sup> U.S. Department of Agriculture. *The 20th Century Transformation of U.S. Agriculture and Farm Policy*, USDA, Economic Research Service, 2005. <http://www.ers.usda.gov/publications/eib3/eib3.htm>

<sup>6</sup> U.S. Department of Agriculture. *Expenditures on food and alcoholic beverages that were consumed at home, by selected countries*, USDA, Economic Research Service, 2010. <http://www.ers.usda.gov/data-products/food-expenditures.aspx#26654>

<sup>7</sup> U.S. Department of Agriculture. *The 20th Century Transformation of U.S. Agriculture and Farm Policy*, USDA, Economic Research Service, 2005. <http://www.ers.usda.gov/publications/eib3/eib3.htm>

<sup>8</sup> Dean D, Di Grande S, Field Dominic, et al. The Internet Economy in the G-20: The \$4.2 Trillion Growth Opportunity. BCG 2012 Mar. [http://www.bcg.com/expertise\\_impact/publicationdetails.aspx?id=tcm:12-100491&mid=tcm:12-100464](http://www.bcg.com/expertise_impact/publicationdetails.aspx?id=tcm:12-100491&mid=tcm:12-100464)

<sup>9</sup> Dean D, Di Grande S, et al. The Connected World: The Digital Manifesto: How Companies and Countries Can Win in the Digital Economy. BCG 2012 Jan. [http://www.bcg.com/expertise\\_impact/publications/PublicationDetails.aspx?id=tcm:12-96526](http://www.bcg.com/expertise_impact/publications/PublicationDetails.aspx?id=tcm:12-96526)

<sup>10</sup> Abernethy A.P, Ahmad A, Zafar SY et al. Electronic patient-reported data capture as a foundation of rapid learning cancer Care. *Medical Care* 2010;48(6 Suppl):S32-8.

<sup>11</sup> NHS Direct press release, August 2010: <http://www.nhsdirect.nhs.uk/Commissioners/NewsDirect/NewsDirectArchive/NewsDirect2010/NewsDirect-Aug2010/EfficiencySavings0910>

<sup>12</sup> Data provided by Kaiser Permanente. <https://www.kaiserpermanente.org>

<sup>13</sup> Big White Wall, 2012. <http://www.bigwhitewall.com>

<sup>14</sup> Merry S, Stasiak K, Shepherd M, et al. The effectiveness of SPARX, a computerised self help intervention for adolescents seeking help for depression: randomised controlled non-inferiority trial. *BMJ* 2012;344:e2598.

<sup>15</sup> Bjornlan DJ, Goh E, Haanaes K et al. The Socio-Economic impact of mobile health. BCG 2012 Apr. [https://www.bcgperspectives.com/content/articles/healthcare\\_payers\\_providers\\_global\\_health\\_socioeconomic\\_impact\\_of\\_mobile\\_health](https://www.bcgperspectives.com/content/articles/healthcare_payers_providers_global_health_socioeconomic_impact_of_mobile_health)

<sup>16</sup> Ontario Telemedicine Network. 2012. <http://otn.ca>

<sup>17</sup> Reference deleted

<sup>18</sup> Steventon A, Bardsley M, Billings J, et al. Effect of telehealth on use of secondary care and mortality: findings from the Whole System Demonstrator cluster randomised trial. *BMJ* 2012;344:e3874

<sup>19</sup> Connecting Sichuan – Year 2 report. Cisco. 2011. [http://www.cisco.com/web/about/citizenship/socio-economic/specialprograms/docs/Connecting\\_Sichuan.pdf](http://www.cisco.com/web/about/citizenship/socio-economic/specialprograms/docs/Connecting_Sichuan.pdf)

<sup>20</sup> Jingting, S. Cisco sends Sichuan \$50m. *China Daily* September 2011. [http://www.chinadaily.com.cn/cndy/2011-09/19/content\\_13729178.htm](http://www.chinadaily.com.cn/cndy/2011-09/19/content_13729178.htm)

<sup>21</sup> Conrad DA. Lessons to apply to national comprehensive healthcare reform. *Am J Manag Care* 2009;15(10 Suppl):S306-21.

<sup>22</sup> Kaushal R, Blumenthal D, Poon EG et al. The costs of a national health information network. *Ann Intern Med* 2005;143(3):165-73; BCG analysis.

<sup>23</sup> Cass D. Kaiser Permanente unveils HIV challenge to help the US create health equity. *Kaiser Permanente News Center* January 2012. <http://xnet.kp.org/newscenter/pressreleases/nat/2012/012612hivchallenge.html>

<sup>24</sup> Department of Veterans Affairs. *My Health eVet Personal Health Record. Consumer Engagement: Increasing Access to Consumer to Data*. Veterans Health Administration: Office of Health Information. 2010. <https://www.cms.gov/Medicare/E-Health/PerHealthRecords/downloads/VAPHRIIncreasingConsumerAccessstoData.pdf>

<sup>25</sup> Flint AC, Kamel H, Navi BB et al. Statin use during ischemic stroke hospitalization is strongly associated with improved poststroke survival. *Stroke* 2012;43(1):147-54.

<sup>26</sup> Soderlund N, Kent J, Lawyer P et al. Progress Toward Value-Based Healthcare – Lessons from 12 Countries. BCG 2012 June.

<sup>27</sup> Gupta S, Riis J. PatientsLikeMe: An Online Community of Patients. *Harvard Business School* 2011;Case:N9-511-093.

<sup>28</sup> Goetz T. Practicing Patients. *New York Times Magazine*, March 2008. <http://www.nytimes.com/2008/03/23/magazine/23patients-t.html?pagewanted=all>

<sup>29</sup> Wicks P, Massagli M, Frost J, et al. Sharing health data for better outcomes on PatientsLikeMe. *J Med Internet Res* 2010;12(2):e19.

<sup>30</sup> Dean T. Health insurer Aetna to give away Mindbloom Life Game. *Gamesbeat* April 2012. <http://venturebeat.com/2012/04/11/major-insurer-aetna-to-give-away-mindbloom-life-game-that-inspires-people-to-be-healthy/>

<sup>31</sup> Mental Health Network. Moodscope. A case study. *NHS Confederation*, 2011. [http://www.nhsconfed.org/Documents/MHN\\_Case\\_study1.pdf](http://www.nhsconfed.org/Documents/MHN_Case_study1.pdf)

<sup>32</sup> Vermeir E, Hearnshaw H, Van Ryen P et al. Patient adherence to treatment: three decades of research. *J Clin Pharm Ther* 2001; 26(5):331-342

<sup>33</sup> Proteus Digital Health, 2012. <http://www.proteusbiomed.com/technology/>

<sup>34</sup> Shirky C. *Cognitive Surplus: Creativity and Generosity in a Connected Age*. Penguin, 2010.

<sup>35</sup> Patient Opinion, July 2012. [www.patientopinion.org.uk](http://www.patientopinion.org.uk)

<sup>36</sup> Todd R. Patient Opinion to cover social care. *EHI* Mar 2012. <http://www.ehi.co.uk/news/ehi/7610/patient-opinion-to-cover-social-care>

<sup>37</sup> Barclay E. Text messages could hasten tuberculosis drug compliance. *Lancet* 2009;373:15-16.

<sup>38</sup> Koch E, Thorp J, Bravo M, et al. Women's Education Level, Maternal Health Facilities, Abortion Legislation and Maternal Deaths: A Natural Experiment in Chile from 1957 to 2007. *PLoS One* 2012;7(5):e36613; Ministry of Health and Family Welfare of Bangladesh.

<sup>39</sup> Facts for Families. *Obesity In Children And Teens*. American Academy of Child and Adolescent Psychiatry, 2011. [http://www.aacap.org/cs/root/facts\\_for\\_families/obesity\\_in\\_children\\_and\\_teens](http://www.aacap.org/cs/root/facts_for_families/obesity_in_children_and_teens)

<sup>40</sup> Let's Move. 2012. <http://www.letsmove.gov/programs>

<sup>41</sup> Vallone DM, Duke JC, Cullen J, et al. Evaluation of EX: a national mass media smoking cessation campaign. *Am J Public Health* 2011;101:302-309.

<sup>42</sup> HM Treasury Autumn Statement, November 2011, Paragraph 1.125 - [http://cdn.hm-treasury.gov.uk/autumn\\_statement.pdf](http://cdn.hm-treasury.gov.uk/autumn_statement.pdf)

<sup>43</sup> Code for America. 2012. <http://codeforamerica.org/>

<sup>44</sup> Warwick Institute of Digital Healthcare. 2012. <https://digital.warwick.ac.uk/IDH/home.html>

<sup>45</sup> European Commission, press release, 25 January 2012 [http://ec.europa.eu/justice/newsroom/data-protection/news/120125\\_en.htm](http://ec.europa.eu/justice/newsroom/data-protection/news/120125_en.htm)

<sup>46</sup> World Economic Forum. Industry Agenda. Rethinking Personal Data: Strengthening Trust. BCG 2012 May. [http://www3.weforum.org/docs/WEF\\_IT\\_RethinkingPersonalData\\_Report\\_2012.pdf](http://www3.weforum.org/docs/WEF_IT_RethinkingPersonalData_Report_2012.pdf)

<sup>47</sup> IHE. 2012. [www.ihe.net](http://www.ihe.net)

<sup>48</sup> Yakowitz, Jane, Tragedy of the Data Commons, *Harvard Journal of Law and Technology* 2011;25. [http://papers.ssm.com/sol3/papers.cfm?abstract\\_id=1789749](http://papers.ssm.com/sol3/papers.cfm?abstract_id=1789749).

<sup>49</sup> World Economic Forum. Industry Agenda. Rethinking Personal Data: Strengthening Trust. BCG 2012 May. [http://www3.weforum.org/docs/WEF\\_IT\\_RethinkingPersonalData\\_Report\\_2012.pdf](http://www3.weforum.org/docs/WEF_IT_RethinkingPersonalData_Report_2012.pdf)

<sup>50</sup> National E-health Transition Authority. 2012. <http://www.nehta.gov.au/ehealth-implementation>

<sup>51</sup> 2020health, 2010. <http://www.2020health.org/2020health/Publication/NHSit/telehealth.html>

<sup>52</sup> Virgin Media Business, 2011. <http://www.virginmediabusiness.co.uk/News-and-events/Business-blog/2011/Digital-diagnosis/>

<sup>53</sup> Kenny C. GP ratings website publishes raft of new data on practices. *Pulse* July 2012.[http://www.pulsetoday.co.uk/newsarticle-content/-/article\\_display\\_list/13155684/gp-ratings-website-publishes-raft-of-new-data-on-practices](http://www.pulsetoday.co.uk/newsarticle-content/-/article_display_list/13155684/gp-ratings-website-publishes-raft-of-new-data-on-practices)

<sup>54</sup> iTunes app, "GP Ratings": <http://www.finefettleapps.com/site/>

<sup>55</sup> Analysis of publicly available data; by The Boston Consulting Group. [www.bcg.com](http://www.bcg.com)

<sup>56</sup> Hospital Clinic of Barcelona Health Communication Blog, 2011. <http://blog.hospitalclinic.org/en/2011/03/assistencia-virtual-eina-control-vih/>

<sup>57</sup> Nationella Kvalitetsregister. 2012. [http://www.kvalitetsregister.se/om\\_kvalitetsregister/quality\\_registries](http://www.kvalitetsregister.se/om_kvalitetsregister/quality_registries)



