

#SMARTer2030

ICT Solutions for 21st Century Challenges



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GLOBAL e-SUSTAINABILITY
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3.1 Health – The doctor in your pocket

Emergence of E-Health – The Context

In the past decade, emerging and developed economies alike have undergone rapid demographic change, with the rise of a new middle class in developing countries perhaps the most striking development. While a rising global middle class has formed the fastest growing income segment, the fastest growing *age cohort* has been – in many countries – citizens above the age of 65.¹ These changes are accompanied by a range of healthcare challenges, including “lifestyle diseases” like obesity and diabetes to conditions associated with old-age, like dementia and arthritis.

Given these trends, access to quality healthcare is becoming increasingly important for developing and developed countries. While developing economies require reliable and affordable healthcare services, developed markets need ways of controlling rising healthcare costs, for example by increasing efficiency across health and social care services.

Alongside changes in demographics and disposable incomes, we can also see behavioral shifts taking root, from a growing awareness of the need to maintain healthy lifestyles to a steadily rising willingness (among both individuals and governments) to invest in preventative care. But this doesn’t make the twin challenges facing the global healthcare sector any less formidable.

We believe addressing these challenges will require a paradigm shift in the healthcare sector. An effective healthcare regime must:

- Strengthen preventative healthcare
- Enhance early diagnostics capabilities for prevalent diseases
- Aim to increase life expectancy and enhance quality of life
- Reduce costs at all stages by using limited resources more efficiently
- Empower people with the knowledge and tools to understand and manage their *own* health

Despite rising health awareness, most emerging economies have been struggling with a lack of access to quality healthcare.

The good news is that progress towards these objectives can be achieved by injecting cutting edge ICT into conventional healthcare practices, through E-Health.

¹ <http://www.pewglobal.org/2014/01/30/global-population/>

What is E-Health?

E-Health seeks to facilitate a seamless flow of information across different stakeholders (such as healthcare professionals, patients etc.) through the efficient use of technology.

Importantly, it seeks to do this in a commercially viable and scalable way. Cutting edge E-Health solutions share the following characteristics:

- **Efficient monitoring and distribution of information** for professionals and consumers, especially through the use of smart devices (e.g. wearable health-monitoring watches or mobile phones) connected to the internet
- **Improved public health services** through improved access to continuing education, training and a wealth of relevant data and in-the-field support for health workers
- **Informed and empowered patients**, enabled to manage their own health through on-demand access to health analysis and information about trends and treatments relevant to their specific conditions

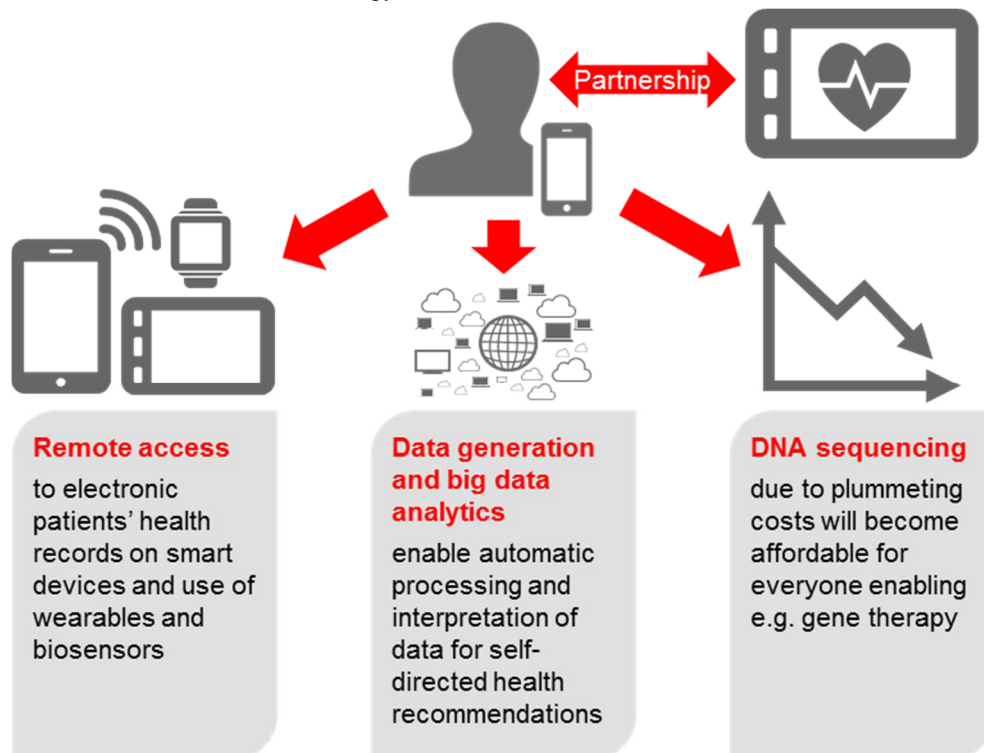
E-Health is about transforming conventional healthcare systems with the help of ICT to make them more reliable, accessible and inclusive while making processes more efficient.

More generally, E-Health solutions provide a platform for information dissemination, interaction and collaboration among institutions, professionals, health providers and patients.

Future of E-Health

The E-Health industry is expected to grow rapidly through a significant infusion of disruptive technologies, bringing about a fundamental shift in the delivery model for healthcare by 2030. These technologies are poised to transform the role of patient engagement from being 'dependent' on a professional's knowledge and expertise, to being more 'self-directed', with the ability to manage one's own health.

Figure 1: Health- Future of E-Health: Technology vision for 2030



By 2030, E-Health is expected to transform a patient's role from being 'dependent' to being 'self-directed'.

The patient's perspective – a doctor in your pocket

With the increase in processing power and the advent of wearable technology, smart devices will play an essential role in the healthcare sector. Devices like smart phones or smart-watches, combined with health-oriented applications and biosensors will be able to monitor health conditions (keeping both users/patients as well as doctors informed in real time), make insightful recommendations and even permit the remote diagnosis of diseases. This will allow patients to better understand and manage their own health.

From patients' perspective, E-Health will consist of three key shifts – (i) anytime, anywhere; (ii) nothing about me without me; (iii) access to care for all.

The resulting increases in the availability of data in the healthcare sector will also help scale solutions faster and make them available in regions where conventional systems cannot be efficiently established. For example, it is difficult to set-up a hospital facility in a remote African village but much easier to set-up a video-conferencing clinic, enabling patients to be consulted remotely.

Furthermore, the costs of DNA and pathogen sequencing are expected to drop significantly by 2030, allowing more and more patients to have their DNA or pathogens sequenced. This, combined with access to a large database securely storing the data, will enable doctors to use data analytics to arrive quickly at precise diagnoses and to tailor treatments accordingly.

The combination of these disruptive technologies: wearable tech, big data analytics and DNA and/or pathogen sequencing is expected to revolutionize the healthcare industry by improving preventive care, access to healthcare, early diagnosis and by enabling fully personalized treatment plans.

The healthcare providers' perspectives - value-based personalized medicine

In addition to revolutionizing the availability of healthcare services for patients, E-Health will significantly benefit healthcare providers as well (such as doctors, hospitals, pharmacology firms and health insurers). Access to bespoke data will generate the greatest impact for healthcare providers.

Indispensable features of E-Health when viewed from their point of view include:

1. Access to data

- Access to electronic health records, standardized data metrics and indicators
- Access to worldwide databases and big data analytics via Artificial Intelligence (supercomputers, e.g. IBM's Watson)
- Increased cost and time efficiency through implementation of smart administration for patient and data management
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From the perspective of healthcare providers/payers, E-Health will bring three key benefits – (i) access to data; (ii) personalized medicine; (iii) value-based reimbursement.

2. Personalized medicine

- Remote patient-doctor interaction, allowing for personalized consultations despite long-distances between the parties
- Access to a patient's real-time health data, providing immediate insights and personalized, automated and remote diagnostic capabilities
- Advanced technologies like gene therapy and genome engineering, allowing doctors to provide tailored treatments

3. Outcome-oriented reimbursements

- Reimbursements of healthcare providers shifting from fees for health services to a model focused on health-outcomes
- New players entering the health insurance market offering incentives for preventative behavior
- Transformation in the role of patients and physicians resulting in “consumer driven health”

The benefits of E-Health

We have quantified the CO_{2e} abatement potential of E-Health by analyzing the effects of four key technologies:

- **Remote Diagnostics** – which involves using web-connected devices to capture and communicate health-related data amongst stakeholders.
- **Videoconferencing**, which makes communication between service seekers and providers seamless.
- **Data storage in electronic form** which makes information portable and secure.
- **Augmented Reality**, which provides assistance during surgery and can help improve medical training, among other things.

The resulting emissions abatement effects of ICT are mainly from reduced travel and decreased use of physical healthcare facilities, leading to 0.007Gt CO_{2e} in the UK alone. Data extrapolated from GDP, population and healthcare access data suggest that the global figure could be as high as 0.205Gt CO_{2e}.

However, the sustainability benefits of an ICT-enabled healthcare sector are not limited to emissions abatement alone, they also include further economic and social benefits, as shown below.

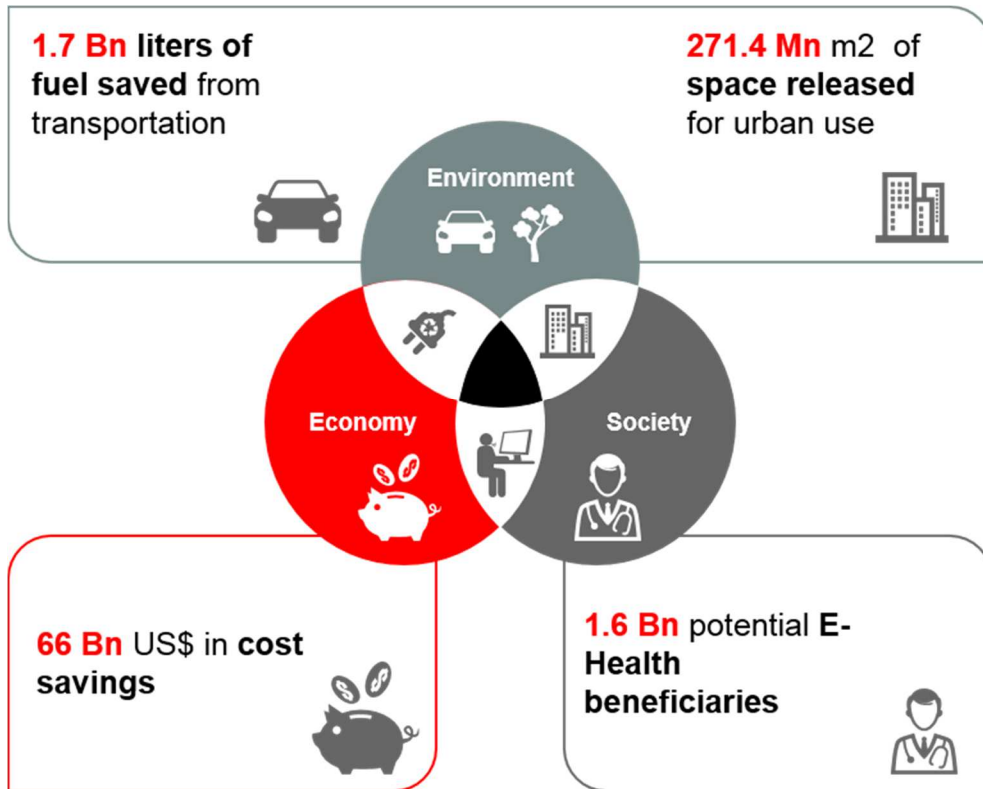
\$66 billion of cost savings: Taking 2030 as an example, E-Health has the potential to save over \$66 billion by freeing up space, with 271.4 million square meters of urban space released for alternative use.

Improved health services for 1.6 billion people: By 2030, ICT enhanced health services will be available to 1.6 billion people.

E-Health is a clear example of a widespread positive gain powered by ICT. There is potential to reduce emissions and generate much higher rates of access to healthcare.

The diagrams below explain in more detail the types of benefits that E-Health services can help provide across the environment, the economy and society, resulting from reduced travel and reduced space requirements.

Figure 2: Health - Benefits from E-Health



A study commissioned by Telenor on the wider socio-economic impact of mobile health found more far-reaching cost saving opportunities, including the potential of mobile health to reduce overall elderly care expenditure by 25% and to cut 50 to 60% of the costs related to hospital nights and re-hospitalizations for patients with chronic conditions.²

Humber NHS Foundation Trust goes mobile and spend more time with patients

A mobile solution for NHS Foundation Trusts, contracted from BT, transforms patient care and the working lives of clinicians, while at the same time saving the Trust money. The mobile solution uses an innovative software from Belfast company, TotalMobile, to give healthcare professionals on the move access to real-time information where and when they need it.

The mobile healthcare technology enables staff at the Trust to provide a range of mental health, community, learning disability, and addiction services. Via the mobile solution, the staff are able to access patient records, view schedules and appointments and update notes while on their rounds, using a mobile device of their choice, such as a tablet or smartphone.

The new mobile solution ensures that clinicians have the most up to date information at their fingertips whether in the office, on the go or at the patient's home. It streamlines the Trust's existing processes, reducing the need to return to base, saving time, paper and money, and allowing more time to be spent on patient care.

² The Socio-Economic Impact of Mobile Health, Telenor, 2012

HipLink consolidates critical health information in a highly secure manner

Hospitals are committed to providing the best clinical care to patients with complicated health conditions. The ability to focus on direct patient care, while reducing alarm fatigue and protecting patients' personal health information is critical to clinicians. Improving communications between hospital and clinic locations can increase efficiency and support centralized medical functions, which is central to quality patient care. HipLink® presented by AT&T mobilizes a new bedside monitoring system, allowing clinicians to quickly respond to critical alerts they receive on their smartphones. Security for these devices is enhanced through AirWatch from AT&T, a mobile device management solution. An AT&T Virtual Private Network seamlessly connects hospital's locations, allowing for a cost effective means to offer centralized support for billing and pharmacy services. An AT&T Network-Based Firewall service helps to protect the security of patient information.



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About GeSI

The Global e-Sustainability Initiative (GeSI) is a strategic partnership of Information and Communication Technology (ICT) companies and organizations committed to creating and promoting technologies and practices to foster economic, environmental and social sustainability. Formed in 2001, GeSI's vision is a sustainable world through responsible, ICT-enabled transformation. GeSI fosters global and open cooperation, informs the public of its members' activities to improve their sustainability performance, and promotes innovative technologies for sustainable development. GeSI's membership includes over 30 of the world's leading ICT companies; the organization also collaborates with a range of international stakeholders committed to ICT sustainability objectives. These partnerships include the United Nations Environment Program (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the International Telecommunications Union (ITU), and the World Business Council for Sustainable Development (WBCSD). Such collaborations help shape GeSI's global vision on evolution of the ICT sector, and how it can best meet the challenges of sustainable development. For more information, see www.gesi.org.

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