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Optimising
E-Health Value
*Using an Investment
Model to Build a
Foundation for
Program Success*



EXECUTIVE SUMMARY

Electronic health (e-health) initiatives that apply information technology to the delivery of healthcare services for patients and management of clinical information are an essential weapon in the battle against the rising costs and other systemic problems in healthcare. For all their promise, however, the introduction of such initiatives has been a slow and arduous process in many healthcare systems.

Large e-health programs are often severely hampered by ill-defined user requirements, low levels of stakeholder engagement, slow solution adoption rates among providers, and an unwillingness to invest the often large amounts of capital required. When e-health programs have successfully moved into their development and implementation phases, they often encounter massive cost overruns and schedule delays.

These problems often cause e-health initiatives to bog down and fail, but they can be overcome. The solution begins with a customisable investment model that can help guide

policymakers as they seek to define, implement, and gain acceptance of viable e-health programs. Such a model must yield a multidimensional business case that accurately calculates and compares the different types of benefits that can be achieved, the value of various e-health applications, the stakeholder groups that will incur related costs, and the stakeholder groups to which the benefits will accrue. This then allows transparent engagement with stakeholders, appropriate design of incentive structures, and a program focus on those components with the potential to rapidly deliver benefits.

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- The business cases for e-health programs tend to be skewed by taking the sole perspective of the stakeholder making the largest investment.
 - The evidence needed to get clinicians to support the program and adopt the proposed technology is not compelling and sometimes is even completely omitted from the business case.

- The quantification of benefits does not include the ripple effects that an investment in one care setting can have in other areas of the system.
- Business cases often take a narrow focus on a single application. For instance, an electronic medical record (EMR) application may be proposed without considering the full spectrum of application or capability options that could be prioritised to address the problem.

In our work on the strategy and implementation of healthcare IT initiatives in various countries, including the United States, Canada, Germany, Italy, UAE, China, and Singapore, it has become clear that bolstering the success rate of e-health programs depends on the development of robust business cases and benefits realisation scenarios. These must measure and compare the value of applications, as well as identify major stakeholders and the distribution of costs and benefits among them.

Costs and benefits are often misaligned in healthcare: Stakeholders that are required to invest significant resources in e-health may only reap a smaller portion of apparent benefits, and those with the most to gain may incur fewer costs.

THE NEED FOR AN E-HEALTH INVESTMENT MODEL

The most effective means for building a business case that can help policymakers navigate through the complexities of e-health initiatives is a rigorous investment and benefits realisation model. The power of such an e-health investment model extends beyond the clear understanding of the application options, costs, and benefits of a program. It also increases implementation success rates by creating a foundation for developing effective incentive frameworks and change management plans, as well as enhancing accountability by enabling the ongoing monitoring and measurement of the projected benefits.

Booz & Company has developed an e-health investment model, testing

and refining it in eight major e-health initiatives in Europe, the Americas, the Middle East, and Southeast Asia over the past decade. These experiences reveal that it is essential to construct e-health business cases using a holistic approach that encompasses four key dimensions (see *Exhibit 1*).

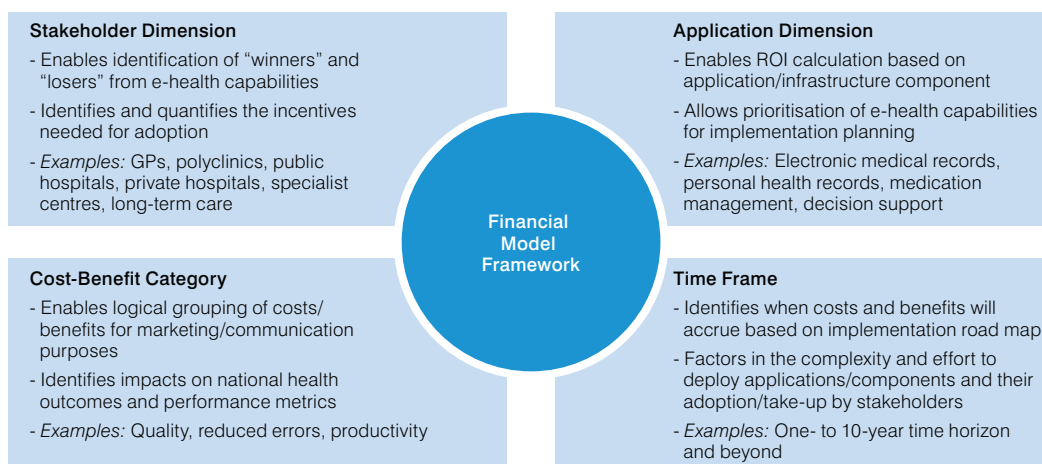
Using a holistic, multidimensional approach to considering e-health programs enables decision makers to create a fact base that includes costs and benefits, the stakeholders to whom they will accrue, the specific applications that drive them, and the implementation time frames they require. Decision makers can draw on this fact base to construct alternative e-health strategies that feature different combinations of options in each dimension. Thus, the investment model is an essential tool for planning the scope of an optimal e-health program and setting its priorities.

In addition to managing multiple dimensions, an effective e-health investment model must enable policy-

makers to estimate benefits and costs as accurately as possible. In the Booz & Company model, the methodology for estimating benefits is underpinned by a high-level scan of more than 2,000 academic research papers and a detailed analysis of more than 400 academic studies. On the cost side, the benchmarks used are based on actual costs of existing e-health programs and then adjusted for anticipated adoption rates and implementation schedules. In both cases, the research and evidence on which the assumptions are based are refined and updated as new findings emerge. Finally, the model and its inputs are validated by a team of distinguished international e-health experts, medical doctors, and academics.

The power of such an investment model in e-health programs (as well as the value that can be derived from successful e-health programs) can be demonstrated by applying it to the Australian healthcare system (see *“Customising the E-Health Investment Model for Australia”*).

Exhibit 1
Four Dimensions of E-Health Financial Model Framework



Source: Booz & Company

An Application Example: Customising the E-Health Investment Model for Australia

To customise the Booz & Company Global E-Health Investment Model for this study, model inputs were based on publicly available healthcare statistics, and key assumptions were adjusted to reflect the financing structure of the Australian healthcare industry. Where research identified a range of potential benefits, conservative figures were applied. Where Australian data was not readily available, benchmarks derived from previous Booz & Company e-health engagements were used.

Our high-level modelling for Australia is focused on the perspectives of stakeholder groups within four major areas:

- *Healthcare providers*, including the nation's general practitioners (GPs), public hospitals and outpatient centres, private hospitals, and nursing homes
- *Patients*—individuals who access Australian healthcare services
- *Governments*, including the Federal Government (through its role operating Medicare Benefits Scheme, Pharmaceutical Benefits Scheme, and Department of Veterans' Affairs) and the governments of the states and territories
- *Private payors*, including the nation's private health insurance organisations

Note that the investment model is very flexible and that different stakeholders and applications can be added at any time to derive new perspectives and insights.

The investment model is an essential tool for planning the scope of an optimal e-health program and setting its priorities.

INTRODUCING AUSTRALIA'S HEALTHCARE SYSTEM

Australia has one of the world's healthiest populations in terms of average life expectancy and infant mortality rates. Australian healthcare spending per capita is far lower than that of the highest-spending nations, such as the United States. The total annual spend on healthcare is approximately AU\$103.6 billion (US\$96.7 billion) with almost 69 percent of the total funded by Australia's Federal and State Governments.¹

With the exception of emergency visits, patient flow in the Australian healthcare system is generally routed through general practitioners (GPs). These physicians play a gatekeeper role and help to coordinate other healthcare services for their patients.

A majority of the Australian population has access to a guaranteed minimum level of care through public funding, and thus employers play a limited role in healthcare decisions. Public health insurance and primary care are funded largely at the Federal level; hospital-delivered acute care is funded at the state level. Australian private healthcare insurance is based on community health ratings, as opposed to an individual's medical

history, thus eliminating price discrimination based on age, health status, and claims history.

For all of its advantages, Australia's healthcare system, like the systems of most developed nations, is under increasing pressure due to a shortage of trained health professionals, the suboptimal distribution of services, and the increasing demand for care, which is driven in part by demographic change. The patient journey within the current system is hampered by disjointed communication and limited access to quality information. These problems are compounded by Australia's dispersed population and the significant distances patients and providers must travel in remote and rural areas.

As a result, the Australian healthcare system is exposed to delays in accessing information and services. The ability to make sound decisions about care is often impaired, and there are a significant number of adverse effects and high levels of frustration, particularly among patients who are elderly, disabled, or suffering from chronic conditions or mental health disorders.

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THE STATE OF E-HEALTH IN AUSTRALIA

Australia was one of the first nations to recognise the potential and benefits of e-health, which led to a number of initiatives in the 1990s designed to encourage GPs in private practice and other primary care providers to computerise their facilities and use shared electronic health records (EHRs) for specific patient segments. As a result, today 95 percent of Australia's GPs are computerised versus 46 percent in the United States.²

E-health in Australia gained further momentum with the creation of the National E-Health Transition Authority (NEHTA) in 2005 and with subsequent efforts to identify a common set of standards for sharing information and to create greater levels of stakeholder engagement. In parallel, a series of state-based e-health initiatives focussing on the public hospital sector also emerged and began rolling out EMR solutions to selected sites.

Despite the relatively high adoption of IT amongst Australian GPs, connectiv-

ity between hospitals and community healthcare providers remains a key issue that only a handful of projects have begun to address. Furthermore, there is an overall lack of investment, accountability, and shared goals in Australia's e-health programs. This is creating insecurity, confusion, and frustration among the healthcare system's primary stakeholders, especially patients who expect clinicians to have access to meaningful information at the point of care.

Although a national e-health strategy has been developed for Australia, a general reluctance to commit funding, resources, and political weight to the implementation effort remains. Missing key elements are a clear, shared understanding of the benefits e-health investments can bring and the quantification of the financial impact that e-health initiatives have on the system's major stakeholders. The e-health investment model has been applied in this study to highlight these issues.

patient information at the point of care. E-health capabilities such as medication management applications can significantly reduce ADEs.

The second most economically valuable benefits category is enhanced adherence to best practices. Decision support tools for providers that incorporate prevention guidelines and best practice care plans can reduce unnecessary admissions. Risk stratification and targeted disease management programs are additional best practice applications that can create substantial savings. Further, e-health services and tools, such as PHRs (personal health records that allow patients to track and control their own health information) linked with medical devices, can help patients, particularly those with chronic conditions, better manage their own health.

Besides calculating the economic benefits of e-health, the investment

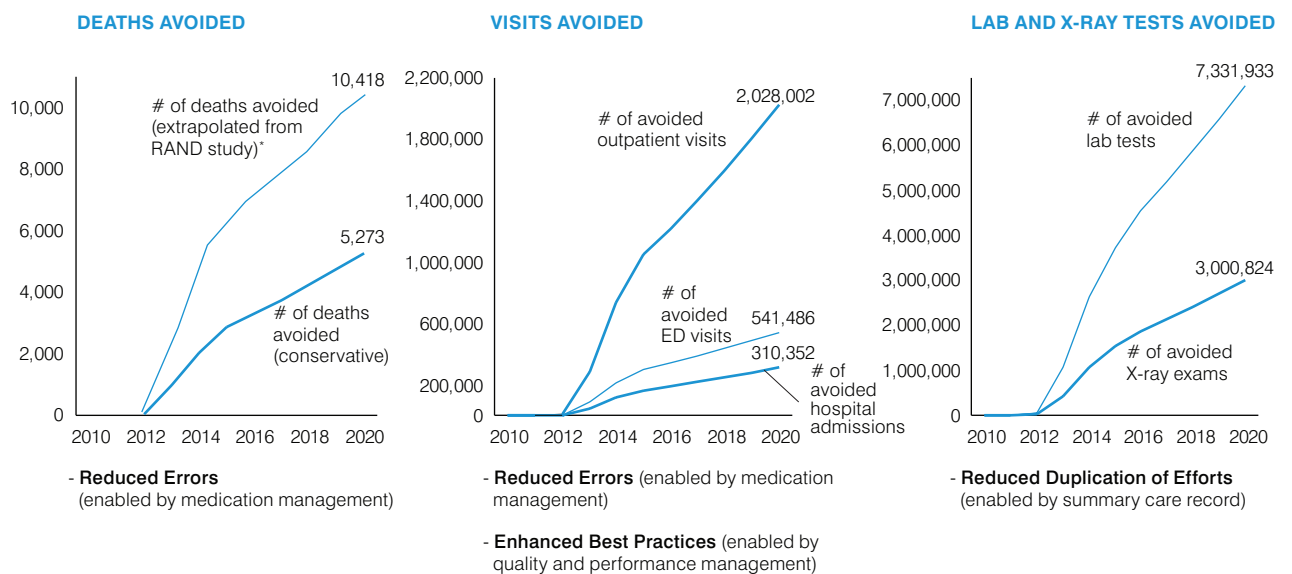
model can also quantify well-being and efficiency benefits, such as the number of deaths, care visits, X-rays, and tests that could be avoided. See *Exhibit 3* for our analysis of the cumulative value of these benefits to Australia over the next 10 years, based on a conservative rollout schedule for e-health applications and adoption rate by patients and practitioners.

The investment model reveals that a commitment to a full e-health program now could help Australia avoid an estimated 5,000 deaths annually once the system is in full operation.⁶ Furthermore, the model estimates that more than 2 million primary care and outpatient visits, 500,000 emergency department visits, and 310,000 hospital admissions could also be avoided per year. These results would represent substantial improvements in the convenience of care and satisfaction for patients, as well as relieve the current supply pressure in the healthcare system, which could

potentially lead to the deferment of other capital investments in public primary care clinics, hospitals, or additional emergency care facilities.

As previously mentioned, there are also significant additional benefits from e-health that we have not quantified, such as enhanced disease surveillance and reductions in the inappropriate use of healthcare services. For example, e-health security and identity management applications can significantly reduce the incidence of fraudulent claims made on public and private healthcare schemes. The National Health Care Anti-Fraud Association in the U.S. conservatively estimates that 3 percent of all healthcare spending is lost to fraud, and other international studies have had similar results, giving an indication of the potential savings in this area.⁷

Exhibit 3
Additional E-Health Benefits Quantified, 2010–2020



* Localised estimates from RAND study, J. Bigelow et al., 2005.
Notes: Figures are annual estimates. Well-being benefits that are expected to accrue over the years will also lead to reductions in capital infrastructure costs, which have not been captured in modelling in order to maintain a conservative view.
Source: Booz & Company Global E-Health Investment Model

ANALYSING E-HEALTH APPLICATIONS AND CAPABILITIES

An e-health investment model must be able to analyse a core set of e-health applications and capabilities if it is to provide adequate support to decision makers (see “*Core E-Health Applications and Capabilities Defined*,” page 12).

All e-health applications and capabilities require an infrastructure to connect providers within and across healthcare settings. Shared infrastructure often represents the majority of the investment required for an e-health program, but it is the core e-health applications and capabilities that drive the anticipated benefits. Further, the core applications and capabilities are not always entirely exclusive of one another. They are often combined according to group and end-user functionality so that features can be prioritised for implementation.

Political jostling and powerful special interests often affect the prioritisation of different applications and capabilities in healthcare systems. In systems that are heavily funded by governments, like Australia’s, this often skews decisions towards care settings that receive the most public funding. For example, EMR systems are often the first e-health application implemented, even though implementing networked medication management capabilities for private GPs can deliver more economic benefits and do more to relieve pressure on hospital infrastructure.

A rigorous investment model can help the leaders of large healthcare systems avoid suboptimal decisions and priorities by quantifying the benefits of different applications and capabilities. See *Exhibit 4* for the results of such an analysis and

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Core E-Health Applications and Capabilities Defined

Connected care enables the electronic transfer of referral information from one provider to another and supports shared care plans where multiple providers are involved with the case treatment of a patient over time.

Decision support provides clinicians with access to guidelines, reminders, and best practices to improve patient outcomes by helping them to make more informed and cost-effective decisions.

Electronic medical records extend a clinical information system with comprehensive patient records, imaging, specialised clinical tools, and interfaces to the local administrative systems within a healthcare organisation.

Identity and access control provides the security infrastructure needed to maintain patient privacy, effectively identify and authenticate providers and patients, and control access to facilities and health information.

Medication management provides clinicians, patients, and dispensing pharmacies with information regarding a patient's current and past medications, allergies, and basic medication-related decision support in the quest to eliminate medication errors.

Patient self-management provides patients with a portal view for managing their health records and researching health topics. In addition, the capability can provide secure, private patient communications with clinicians, enabling more effective participation in disease management programs and avoiding unnecessary visits to a clinic.

Quality and performance management provides a comprehensive database supporting intelligent performance reporting, monitoring, and the revision and improvement of care guidelines and best practices. It can also support clinical trials and academic research.

Shared summary care records (also referred to as EHRs) provide clinicians with summarized descriptions of the medical events in a patient's history that may pertain to the current treatment, along with electronic access to detailed procedure, laboratory, and radiology reports.

CONSIDERING STAKEHOLDER GROUPS

Although quantitative insights into the benefit levels of e-health applications and capabilities help to prioritise and justify funding, a robust understanding of the various stakeholders is also required to quantify the flow-on effects of the applications and capabilities. The stakeholder dimension in economic modelling also provides insight into the change management effort that will be needed to implement applications and capabilities successfully. For example, this dimension enables the identification of stakeholders that may offer resistance or require financial incentives to adopt the new technology.

When we apply the investment model to major stakeholders in Australia's healthcare system, the gross annual benefits by stakeholder group are revealed (*see Exhibit 5*).

Note that the analysis of e-health value differentiates between its *sources* (the stakeholder group that has implemented e-health within a care setting) and its *beneficiaries* (the stakeholder group that actually realises the benefit). This confirms and highlights the misalignment of costs and benefits in the Australian healthcare system.

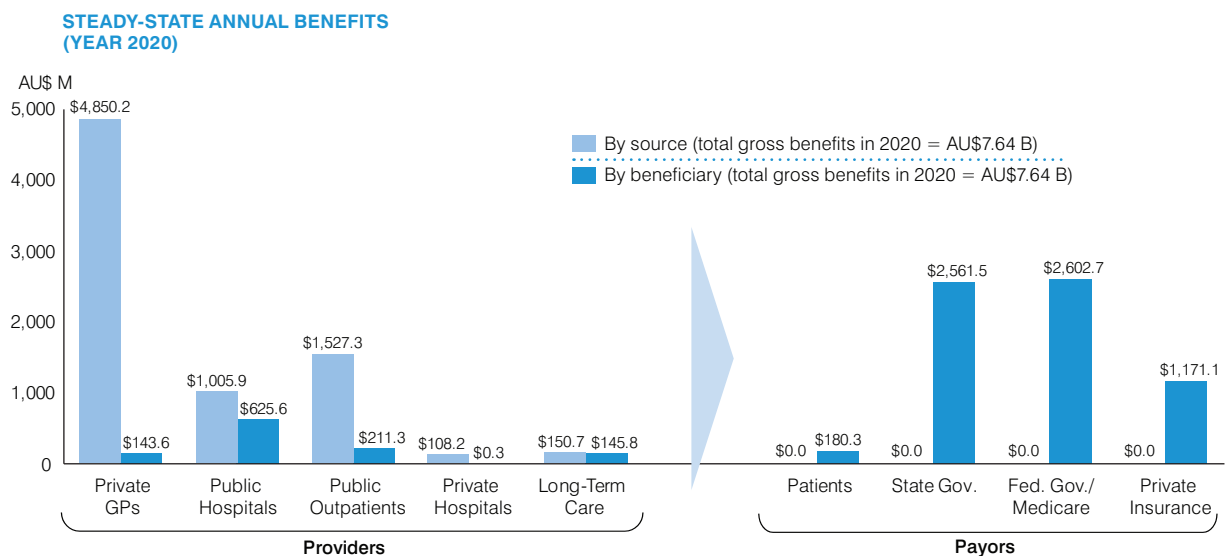
What is often not recognised is that the greatest beneficiaries of e-health are usually the payors within the

healthcare system. In healthcare systems such as Singapore’s, where there is a greater out-of-pocket payment for healthcare services, one large payor group are the patients themselves. In Australia, they are mostly the State and Federal Governments, and they would share a combined 68 percent of the benefits from e-health, an estimated AU\$5.2 billion annually.

The analysis of stakeholder benefits also indicates that nearly AU\$5 billion

of the total AU\$7.6 billion in annual e-health benefits in a steady-state scenario arise from the connectivity of private GPs. This suggests that even though 95 percent of GPs in Australia already have stand-alone EMR systems, they lack the connectivity needed to gain the full benefit of sharing event summaries and medication details about their patients with other providers. One potential explanation for this is that private GPs are reluctant to connect their EMR systems without some form of

Exhibit 5
Annual E-Health Benefits by Stakeholder Group in Australia



Source: Booz & Company Global E-Health Investment Model

incentive or subsidy that would enable them to recoup their investment, thus allowing other stakeholders to realise the full value of this benefit.

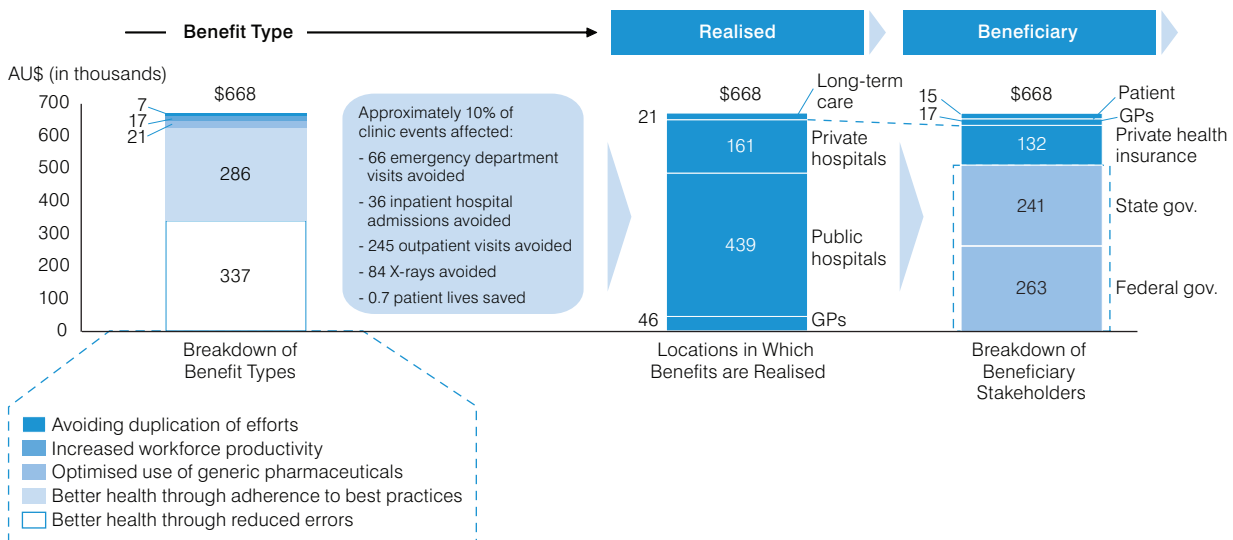
Further, the bulk of Australia's e-health investment to date and the planned focus of current programs are directed mainly towards acute care settings. This is a response to the growing demand for services within the hospital sector, but it fails to address the underlying driver for this demand and the area from which the greatest value could be gained—the

primary care setting. This is confirmed by an analysis of the flow-on benefits from shared e-health capabilities across GPs (see Exhibit 6).

The analysis of primary care value generation reveals that the flow-on benefits of this investment would be AU\$668,000 per annum per GP clinic at a direct cost of approximately AU\$3,000 per annum per practice to establish and maintain connectivity. Note that this cost reflects the majority of GP clinics already being computerised and assumes they

would be sharing EMRs for their patients; it does not include program overheads to develop a shared e-health infrastructure. The benefits will accrue through reduced errors and enhanced adherence to best practices, and result in a reduction in unnecessary visits to public and private hospitals. The analysis also makes a highly compelling, effective case for Australia's State and Federal Governments to fund the required infrastructure to connect GPs because the governments will be the primary recipients of the resulting value.

Exhibit 6
Annual Value Generation from Primary Care, per GP Clinic



Note: Number of GP clinics = 7,261.
Source: Booz & Company Global E-Health Investment Model

BETTER HEALTHCARE IN AUSTRALIA AND ELSEWHERE

The failure to understand and effectively communicate the benefits of e-health has been a major impediment to the implementation of e-health in Australia and many other developed countries. But with the right tools, sound, informed decisions can be made that are based on a clear understanding of how value is created from e-health applications and capabilities in different care settings, and how value flows through to different stakeholders.

This is important because the value inherent in computerising the healthcare sector has wide-ranging implications and can significantly enhance reforms, including those currently being discussed in Australia. For example, activity-based funding and better performance transparency in the system are enabled by the quality and performance management capability, while, as previously noted, demand on emergency departments is influenced by medication management and decision support. As such, e-health is an important enabler for any modern healthcare reform effort.

The economic analysis described above outlines this rationale and highlights the importance of providing e-health infrastructure and

capabilities to connect primary care as a priority. Its key conclusions are applicable across healthcare systems and bear emphasis:

- Developing a business case for any major reform of a complex networked system such as healthcare requires a holistic approach to determining the costs and benefits derived by multiple stakeholders by providing a combination of different capabilities over time.
- Investment in comprehensive e-health programs can lead to substantial savings in annual national healthcare expenditures (in the case of Australia, this will equate to an estimated AU\$7.6 billion at minimum in 2020 alone, representing 3 percent of the nation's total healthcare expenditures, given current trends).
- The largest type of benefit from e-health is the reduction of adverse drug events caused by the lack of access to pertinent patient information at the point of care.
- Of the core e-health applications and capabilities, the one with the greatest benefits is medication

E-health is an important enabler for any modern healthcare reform effort.

management. Other capabilities, such as quality and performance management and electronic medical records (EMRs), offer significant but secondary benefits.

- The implementation of e-health capabilities in primary care drives the majority of systemic benefits. However, these benefits are not realised in the primary care setting itself but flow on to acute settings through the avoidance of hospital visits.

Of course, an investment model alone cannot guarantee the successful implementation of e-health initiatives or realisation of their anticipated benefits. Indeed, there are many critical success factors that need to be considered when taking a holistic approach to an e-health strategy. Among them:

- An appropriate governance model or innovative public-private partnerships to help fund, implement, and operate the e-health solution
- Consideration of long-term trends in e-health, such as enhanced provider technologies, home care, personal medicine, and Medicine 2.0
- A clearly defined national interoperability architecture that

defines the standards for sharing information across different organisations

- A comprehensive set of user requirements sourced from clinical representatives and encompassing the findings of the latest research into e-health benefits
- A fully considered implementation approach that gives appropriate weight to stakeholder engagement at each step in the transformation process, as well as guaranteeing privacy and security
- An implementation road map that ensures the prioritisation of capabilities in a way that delivers the most benefits and alignment with policy and regulatory reforms
- Effective incentive schemes that encourage the early adoption—as well as the appropriate ongoing use—of e-health application capabilities and information sharing throughout the system
- Robust benefits realisation framework and tracking mechanisms that ensure that anticipated benefits are accounted for during the life of the implementation program

We have not mentioned costs in this Perspective as there has not been an

explicit infrastructure proposed for Australia and it is difficult to compare costs from other countries since each country's e-health program is at a different stage and invariably includes different applications. However, experience and published figures from Canada, Germany, the U.S. and many others, suggest a typical investment in the range of AU\$200 to AU\$400 per head, although some countries spend much less—or much more. That translates to roughly AU\$4 billion to AU\$8.5 billion for a full deployment of e-health functionality throughout Australia. In other countries, these costs are most often borne by Governments, although there are innovative approaches including large-scale private/public partnerships (PPP) that have been successful in bringing the private sector into the equation.

As Australia and other nations continue to take cautious steps towards the large-scale implementation and adoption of e-health, many lessons have been learned and the potential benefits of e-health have been compellingly confirmed. Now more than ever, we need the leadership, the willpower, and the tools to invest wisely in the future of healthcare delivery services and proactively address the mounting pressures our healthcare systems are facing. Our health and collective futures demand nothing less.

Endnotes

¹ "Health Expenditure Australia 2007–08," Australian Institute of Health and Welfare, September 2009. www.aihw.gov.au/publications/index.cfm/title/10954

² "A Survey of Primary Care Physicians in 11 Countries, 2009," Commonwealth Fund, 2009. www.commonwealthfund.org/Content/Publications/In-the-Literature/2009/Nov/A-Survey-of-Primary-Care-Physicians.aspx

³ There are additional categories for less quantifiable e-health benefits that could be considered, such as reduced fraud and enhanced disease surveillance, but these were excluded from Australia's economic modelling due to the limited availability of public data.

⁴ "Adverse Drug Events: Counting Is Not Enough, Action Is Needed," *Medical Journal of Australia*, 2006.

⁵ AHHA, 2008. www.consultmagazine.net/StoryView.asp?StoryID=469420

⁶ Based on the assumption that the pattern for adoption and technology rollout will be similar to e-health projects in other developed countries.

⁷ "The Problem of Health Care Fraud," National Health Care Anti-Fraud Association. www.nhcaa.org/eweb/DynamicPage.aspx?webcode=anti_fraud_resource_cent&wpscode=TheProblemOfHCFraud

⁸ "Economic Impacts of a National Individual Electronic Health Records System," Allen Consulting Group, July 2008.

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