DISCUSSION PAPER

E-Health: Enabler for Australia’s Health Reform

Prepared for the National Health & Hospitals Reform Commission

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The views expressed in this paper are those of the author(s) and should not be taken to be the views of the National Health and Hospitals Reform Commission or the Australian Government.
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1. Executive Summary

This report discusses the place of E-Health initiatives in the Australian Health care system, the need for IT in the reform agenda and the case for change. E-health is a term used to describe the “combined use of electronic communication and information technology in the health sector”.

While Australia’s current health system excels compared to international standards, reform is required to retain this status, ensuring sustainability into the future and addressing inequities that exist. The following points are emerging as consistent themes in the Australian healthcare environment:

- The Health Reform Agenda cannot proceed effectively without universal adoption of Information Technology.
- Continuing and enhancing quality and safety in Healthcare requires IT.
- Information, data voice and images in healthcare are dependent upon adequate broadband infrastructure, as is the whole digital economy.
- Proper governance and planning is required to maximise the benefits of this infrastructure and ensure that investments in e-Health applications are made in the nation’s best interest.

Many of the higher order priorities in the health system can be addressed with E-Health facilitating progress. Critical to this success, however, is that the E-Health agenda is championed at the highest levels in Government. Furthermore, adoption should be facilitated by Federal investment in E-Health implementations that comply with nationally accepted standards and direction.

The benefits of widespread adoption of E-Health applications accrue to:

<table>
<thead>
<tr>
<th>Beneficiary</th>
<th>Example Benefits</th>
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| Users of Health Services and their carers | • Support for personal health care  
• Access to patient support information  
• Clearer records, information recall, safer care  
• Improved communication of care: including notes from self and carers  
• Opportunity for access to services with telemedicine and providing patient rebates for professionals at both ends of the encounter  
• Use of secure messaging to/from/between providers to streamline processes (e.g. renew medications or referrals where appropriate) |

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1 World Health Organisation  
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<th>Beneficiary</th>
<th>Example Benefits</th>
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<tr>
<td>Health Care Providers</td>
<td>Time efficiency; Team Care / Collaboration; Quality; Safety</td>
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<td>Reduced Red-Tape; Enter data once only</td>
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<td>Access to timely patient data – timely decisions</td>
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<td>Disease surveillance; Planning</td>
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<td>Information transfer: data, voice and visual. Better communication</td>
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<td>Clinical decision support and computerised physician order entry (CPOE)</td>
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<td>Remote specialist support / second opinions</td>
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<td>Educational activities from a distance attended locally</td>
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<td>Health Managers and Planners</td>
<td>Improving patient flows</td>
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<td>Streamlining of operational service delivery (e.g. OPD clinics, Operating Room</td>
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<td>bookings, Wait list management, Throughput systems)</td>
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<td>Population based data collection</td>
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<td>Indicators and Benchmarks measured in real time</td>
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<td>Timely reporting and feedback of data</td>
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<td>Research Education</td>
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<td>Knowledge management for the Nation</td>
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<td>Safer Care; Improved Quality</td>
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<td>Closer monitoring and shorter cycles of measurement and improvement</td>
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<td>Reduced health care costs</td>
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<td>More accurate data to monitor the health system</td>
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### 1.1 The Context for Change

Australia has one of the healthiest populations in the world. However, Australia’s healthcare system is increasingly under pressure with a shortage of trained health professionals, a mal-distribution of services, increasing demands and demographic changes within the population. Our health is becoming more expensive to maintain.

The patient journey in the current system suffers from disjointed communications and poor access to quality information. This is causing delays accessing information and services, duplication of services, decision making in the absence of all current and pertinent details about an individual, a significant number of adverse effects and frustration, particularly for patients suffering from chronic conditions, mental health disorders, the elderly and disabled.

Overseas experience and several stand-out initiatives in Australia suggest E-Health technology is a core component in the future health system and a significant enabler for improving quality, safety, access and efficiency of healthcare services, and the deployment of efficient human capital. Central to its success is that consumers, providers, health management and governments have bought into a common vision for E-Health, high level requirements for what is needed and the ultimate solution to be delivered.
1.2 Current E-Health Environment in Australia

Australian E-Health initiatives accelerated in the 1990s and then gained further momentum with the creation of the National E-Health Transition Authority (NEHTA) in 2005 and subsequent activities. Initiatives driving the computerisation of Primary Care and General Practice peaked in 1999 and now over 90% of General Practitioners (GPs) are computerised.

Despite these achievements, there is an overall lack of direction, accountability and shared goals for E-Health in Australia. This is creating insecurity, confusion and frustration amongst stakeholders and is not addressing the expectations of the public for clinicians to have access to meaningful information at the point of care. The challenge now is to connect consumers, community providers and the hospital sectors (public and private), to achieve an optimal outcome overall.

Given the breadth of applications and diverse stakeholders, E-Health strategies are notoriously difficult to implement and typically exceed planned budgets and timeframes. To date, the national agenda has addressed the challenge by focusing on the necessary development of interoperable standards and designs, rather than directly driving outcomes through E-Health implementations. The most significant implementations of E-Health are through numerous independent projects across the states and regions. These are occurring without coordination, vision or cohesiveness at a national level. The key challenge remains an electronic interface between community providers and the public and private hospital sectors for the communication of health related information.

In the long term, the proliferation of Electronic Health Record (EHR) projects that are kicking off as part of the jurisdictional E-Health programs will undermine the much larger benefits that would be achieved from a national program. There is strong desire and need for action but as a National E-Health agenda has not yet materialised, various jurisdictions have embarked on the tortuous course of gaining funding from their treasuries with political commitment and expectation.

Rather than dismissing these initiatives and the plans as they stand, it is critical to forge ahead towards an agreed national vision, harnessing what is currently being developed with a view to the National agenda, a complete solution for all Australians.

In order to maximise the benefits from the investment being made by Australian Governments, it is important to harness the expertise, knowledge, funding and procurement bargaining power in the national interest. Ultimately this will benefit jurisdictions, the taxpayer and the patient whom the health system must ultimately support.

1.3 The Opportunity to Improve Healthcare through E-Health

In Australia, E-Health can help address key challenges in the current health system by delivering a range of benefits. For individuals, benefits arise through better management and coordination of their care, increasing quality and safety and significantly decreasing costs. For clinicians, benefits accrue from improved collaboration in care delivery, synthesising care plans with accurate patient information, using decision support tools to reduce potential adverse effects and to make the right decisions and in being released from chasing various
reports from multiple sources across the system. E-Health also provides benefits to health funds and planners as costs are lowered and data is more accurate and readily accessible. These data assist management and performance measurement of healthcare services, as benchmarks and timely reporting of relevant information is used more effectively.

A business case commissioned by NEHTA for a National Shared Individual EHR (SIEHR) program suggests a net benefit between $7.5 billion and $8.7 billion to the Australian economy over the first 10 years\(^3\). The benefits proposed in the NEHTA business case are similar in magnitude to other E-Health programs around the world that are already well into implementation. Whilst many of these benefits are not immediately realisable as cash to be returned to treasury coffers, they effectively flatten the exponential trajectory of demand and cost projections for health services.

Despite the relatively high adoption of IT amongst General Practitioners, connectivity between hospitals and community healthcare providers remains a key issue that only a handful of projects have begun to address. General Practice over and above other community providers (for instance Royal District Nursing Service (RDNS) Victoria) has adopted E-Health and has significant capacity to be a driver of greater information exchange and connectivity. There is an enormous appetite in General Practice and Pharmacy for greater progress in the integration of data, voice and visual interactions using technology.

There is also significant excitement at the potential of E-Health amongst health consumers. For example, in the recent 2020 Summit one of the main ideas was that of a “Health Book” – a personal health record that put the patient in charge of their health information and which health professionals can access. The demand for technology use in the healthcare sector, and the associated process improvements this brings, is increasing with the rise of a new tech savvy generation of providers and patients. The challenge will be in managing consumer expectations around the speed of delivery, capability and security of these technologies, especially given the progress in other service industries (e.g. Telecommunications and Financial Services).

At a national level, E-Health implementations in Australia are falling behind the best in the world where this technology was embraced years earlier as an enabler for deep reforms in healthcare – in particular by amassing relevant healthcare data and facilitating the better use of limited resources. For example, the Danish MedCom program began rollout of a national health data network in 1995 with net benefits that started to accrue back in 1999\(^4\).

There is currently a window of opportunity in Australia to drive this critical element of the health care agenda forward. This is due to a confluence of provider thirst for E-Health and patient demand, availability of technology and know-how, and a reform agenda from Federal government with the consent of all jurisdictions through the COAG.

While it is important to realise this opportunity and act quickly, it is also important to note the many critical lessons that have been learned from E-health projects in the past.

\(^3\) Allen Consulting Group, “Economic impacts of a national Individual Electronic Health Records system”, July 2008. Note dollar figures have been expressed are in current value.

\(^4\) eHealth Impact, “eHealth is Worth it – The economic benefits of implemented eHealth solutions at ten European sites”, 2006
The following nine “Cs” and one “E” defined by Professor Kidd\(^5\) provide guiding principles to progress this agenda:

1. Confidentiality and security
2. Consumer involvement and ownership
3. Compatibility of systems
4. Common record structure
5. Communication standards
6. Clinical focus to drive clinical uptake
7. Clinician involvement (training and support)
8. Change management (not just the technology but also streamlining work practices)
9. Cash for infra-structure and supporting adoption (commitment to the process)
10. Evaluation of progress and results

1.4 Conclusions and Recommendations

The National E-Health Information Principle Committee engaged Deloitte to develop a National E-Health Strategy due to be delivered September 2008. This document continues to be reviewed by major stakeholders (including the jurisdictions) and will inform the future E-Health agenda in Australia.

E-Health consists of a number of information technology and information management applications which can be implemented independently in order to achieve benefits which are additive when built to an integrated national plan. Overall these applications represent a significant quantifiable opportunity to the economy and will be beneficial to the quality of health care services and the patient journey. A rapid, phased program approach is recommended, combining nationally funded projects to implement key infrastructure applications with the ongoing development of standards for interoperability, security and privacy to support innovative projects across all health sectors.

Whilst several E-Health initiatives are already underway, significant effort and infrastructure is being duplicated across each of the Jurisdictions. NEHTA is playing a role at the National level to ensure appropriate standards are in place. There is a lack of collaborative national governance to ensure duplication is minimised when designing and implementing systems across the country. The planned outcomes in each jurisdiction need to be aligned. Furthermore, there is currently a lack of accountability and funding to support the expansion of highly successful initiatives already being used within certain communities.

\(^5\) Professor of General Practice, University of Sydney: personal correspondence, September 2008
E-Health is an enabler for addressing the objectives of the planned reform of the health sector currently being reviewed by NHHRC. Progress towards a SIEHR will reap dividends as individuals take on more control of and have greater access to their health information.

In order to realise the opportunities, four recommendations for immediate action are:

1. **Prioritise the analysis and implementation of key “Quick Wins”**

   Identified quick wins recommended for immediate action include:

   - **Implement a limited functionality Electronic Health Record (EHR)** with key data for chronic disease patients who may opt in on a voluntary basis. The Brisbane based GP Partners scheme (HRX) which is already connecting GPs, other specialists and hospitals should be enhanced initially using the National Service Improvement Frameworks approved by COAG for the following chronic diseases:
     - I. Stroke, heart disease & vascular disease
     - II. Cancer
     - III. Diabetes

   Once the GP Partners system has been enhanced with these frameworks the solution should then be expanded to other communities, sharing the knowledge whilst adding to a national infrastructure. The key is that this implementation is quick, the clinical matter pertinent and the results tangible.

   - **Enhance Medication Management functionality and introduce medication decision support software** – Adverse Drug Event monitoring is possible. A relatively minor enhancement could be made to PBS online to display a person’s medication list upon swiping their Medicare card to check for potentially dangerous combinations of drugs, doses, and usage. The system could be designed to automatically display appropriate warning messages at time of prescribing and dispensing. This initiative requires the coordination of many parties including PBS Online, the National Prescribing Service, the Australian Medicines Handbook, compilers of proprietary medicines databases and best practice guidelines, Medical and Pharmacy software vendors all collaborating with consumers, prescribers and dispensers of medicines.

   There should be confluence of work in this area including that being undertaken by pharmacists.

   - **Widening the Australian Childhood Immunisation Register data** and expanding its application to provide a whole of life immunisation register that includes all administered vaccines with data being accessible to individuals and their providers using the Medicare card.

   - **Expansion of eHealthNT initiatives to other rural and remote areas** – Upgrading and rolling out the highly successful system to encompass the needs of Aboriginal and Torres Strait Islander people into the North West of WA, North East Queensland and the Torres Strait (i.e. Capricornia) improving access to, continuity and quality of care. The major benefits of this expansion will be to those currently experiencing immense inequality of health and access to care.
Also a short review of the e-Prescribing functionality currently used within the NT should be performed to assess its suitability for implementation at a national level.

- Analysis of the business case for a **Picture Archiving and Communications System** (PACS) across the nation’s hospitals where all images are to be fully compatible and accessible from systems across the public and private, acute and community care sectors. The design for storage and access to the digital images should ensure that community providers are also able to gain access and have the appropriate infrastructure (i.e. bandwidth) to support the picture quality required for analysis and diagnosis. Indicate that this will be a requirement for radiology service accreditation.

2. **Identify the optimal strategy for a National secure messaging solution and implement a solution**

Define the optimal plan for transitioning this major piece of health infrastructure to the public sector or structure a potential private/public partnership to achieve desired public benefits, noting the proposed solutions in some jurisdictions (e.g. iHealth Care in Queensland[^6]). National secure messaging and authentication is a vital piece of infrastructure for all health care providers to facilitate electronic communication and information exchange within a common secure environment. The current authentication system requires significant overhaul to make ensure the ease of its uptake and use as governed by the Electronic Transaction Act for Electronic and paper (sic) referrals and requests (Cwth1999)[^7]. It is also required for supporting the following applications, the standards and designs for which have already been packaged by NEHTA, and are ready to be rolled out by 31 December 2008 and physically implemented for selected sites in each jurisdiction:

- **E-Pathology** – The penetration of pathology into clinical practice is all pervasive. Considerable progress has been made which would make the implementation of a fully functional pathology solution available in a very short time-scale initially in specific sites with a view to national adoption. This has been a key project undertaken by NEHTA. This will require review of improved times for result reporting[^8] and adherence to principles of Quality use of Pathology.

- **E-Referrals & E-Discharges** – The relevance to clinical practice of an accurate, timely, consistent, legible detailed referral and discharge note is vital and valuable to transfer and continuity of care and quality and safety. Considerable progress has been made and the implementation of a fully functional acceptable solution can be available rapidly: initially in specific sites with a view to national adoption. This has been a key project undertaken by NEHTA and is a key stepping stone in successful implementation of technology in health care.

- Additional infrastructure that should be ready soon for similar analysis and implementation includes **E-Prescriptions**. To capture under the "safety-net" cost and Over The Counter (OTC) medication, prescribing and dispensing data will need to be pursued to capitalise on the ability to prescribe and generate an electronic

[^6]: General Practice Queensland, "Health Care – A Shot In The Arm For Better Patient Information Transfer", 11 Aug 2008
[^8]: www.achs.org.au; pathology clinical indicators volume 3
prescription by dispatching, receiving, dispensing and notifying of dispensing in a manner that is not intrusive, but flags where non-compliance or potential medication errors have occurred.

3. **Create a detailed National Action Plan for E-Health initiatives and have it approved by the Council of Australian Governments (COAG) at the earliest possible juncture.**

The plan should include the following aspects:

- Clearly defined national outcomes, including implementation of the projects defined below, and adherence to an overall National E-Health Strategy once it is agreed. This will incorporate a uniform standards framework and the local flair and innovation from various pilots that have been implemented.

- Defined scope of national initiatives in terms of business requirements, technical infrastructure and national standards that are clinically relevant and incorporate connectivity across the General Practice, Community based medical specialists, other non-medical specialist providers, pharmacy, private hospitals, aged care homes as well as the public hospital system. In time scope may increase to social services providers.

- A detailed review of the E-Health programmes that are currently planned or being implemented within the jurisdictions to identify aspects of the solutions that need to be rationalised and moved to a national approach or reused for greater benefits at the national level (e.g. Shared IEHR)

- A stakeholder map and change management strategy that addresses the needed activities and incentives to obtain engagement and buy-in.

- A detailed business case which leverages the work done to date on a national EHR but also quantifies the cost-benefit of other E-Health applications such as e-Prescribing, medications management, e-Referrals and e-Discharge summaries and assesses them by stakeholder group

- An execution roadmap for national initiatives showing interdependencies and impact of the major milestones of the jurisdictions’ E-Health programs, to include specific reference to the health informatics workforce necessary to progress E-Health.

- An implementation plan realising the expectation (and probably a requirement) that in order for services to attract Medicare and Private health insurance rebates / PBS subsidies, they will need to be referred to and discharged through the use of electronic secure messaging. This includes the patient and providers being identified by a Unique Health Identifier and authentication of providers adhering to the National Standards.

- Focused benchmarks and indicators for E-Health services to be developed for quality monitoring.

- A mechanism for reporting, monitoring & evaluating the progress of the E-Health program and realisation of the benefits based on benchmarks and KPIs to measure health outcomes.
4. **Establish an empowered central expert E-Health organisation** to drive the E-Health National Action Plan and implementation of “Quick Wins” forward at a national level. Such a body would encompass the experts and the key stakeholders in the development, use and implementation of E-Health and a sub-set would act as an Executive for E-Health.

Responsibilities of this committee should include:

- Overseeing the execution of the detailed national action plan above.
- Determining and guiding policy implementation and report to the Council of Australian Governments via the Department of Prime Minister and Cabinet as there are many Commonwealth agencies involved (i.e. DoHA, DHS, DBCDE, DSI, DVA, Defence).
- Incorporating objectives and work in progress of NEHTA to ensure a standards based framework is used to guide state and regional E-Health initiatives (including data, voice and image transfer capability) in a congruent manner.
- Partnering with the jurisdiction based E-Health implementation programs to provide funding (for which adherence to national standards and direction with wide connectivity beyond the public hospitals would be incumbent), support, guidance, and to monitor progress (i.e. timeliness and quality of deliverables) while ensuring realisation of the anticipated benefits.
- Ensuring the related issues of information sharing, interoperability, data security, identification, authentication and privacy are addressed.
2. The Context for Change

Australia's healthcare system is generally well regarded given the country has one of the healthiest populations in the world and life expectancy continues to increase.

Australia has excellent health outcomes relative to other countries. Along with Switzerland and Japan, Australia leads other Organisation for Economic Co-operation and Development (OECD) countries with an average life expectancy of 82 years and low infant mortality of 4.7 deaths per 1,000 (compared with OECD average life expectancy of 78.6 years and infant mortality rate of 5.4%). Furthermore, Australia's overall health is improving with Australian Institute of Health and Welfare (AIHW) data showing the increased life expectancy at birth of Australians: 83.3 for females and 78.5 for males today from 82 for females and 77 for males in the period 1998-2000. AIHW data in the figure below shows the changes in the age profile of Australia’s population.

![Figure 1 – The changing age profile of Australia's Population](image)

Australia spends a relatively low proportion (9.5%) of GDP on healthcare to achieve this compared to other OECD countries. However there is growing concern due to a number of trends that are increasing demand and costs.

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10 Australia’s Health 2008: AIHW
However, Australia’s healthcare system is increasingly under pressure and becoming more expensive to maintain with health related prices outstripping GDP annual growth by 1.9% over the past 10 years.

Key contributing factors to rising costs and expenditure on healthcare services are illustrated in Figure 2.

Figure 2 – Pressure Drivers on Healthcare in Australia

As shown in this figure, there are a number of major demand and supply factors:

- **Supply-side factors:**
  - Increasing **wage inflation** and longer wait lists due to workforce shortages as the health workforce ages, work practices shift towards fewer hours, more locum based work and trends to higher wages in other sectors of the economy (e.g. the mining sector in northern WA).
  - **Technology advances** continuing to drive up costs as a result of a specialist market, comparatively expensive new equipment and devices, and high public expectations for access to these.
  - New **diagnostic methods** and **adherence to service improvement frameworks** including genetic screening, preventative schemes (such as bowel cancer screening and subsequent colonoscopies), more frequent use of modalities such as magnetic

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*Booz & Company Analysis, September 2008*
resonance imaging (MRI) and increasing indications for existing diagnostic services such as Echocardiograms in best practice management of heart failure.

- **Pharmaceutical advances** which are introducing new expensive, individualised treatments and lifestyle related benefits together with the relatively high cost of generic drugs in Australia.

- A **fragmented system** with governance and funding split between federal and state governments, and a limited degree of integration leading to unclear responsibilities and variable accountability for decisions made.

**Demand-side factors:**

- An **ageing population**, placing greater pressure on the tax and insurance systems – particularly as the prevalence of chronic diseases associated with longevity, care of dementia and higher consequent risks of prescribing errors, and adverse drug effects due to poly-pharmacy, confusion from generic substitution and multiple prescribers (i.e. community provider – usually the General Practice – specialist provider in the community and hospital provider).

- Changing public **beliefs and behaviours** increasing both patient wariness of new or existing diseases and therapeutic options. Also patients are demanding more from each encounter including more openness and transparency of decision making, risks and benefits.

- Lifestyle factors (e.g. obesity, alcohol abuse and smoking) and new diagnostic methods driving an increase in the prevalence of chronic illness and their demand for appropriate ongoing care within the community.

- New **diagnostic methods** and adherence to service improvement frameworks (as mentioned under supply).

- The ever increasing gap in the health status of rural and remote areas needs to be addressed. In particular there is a very real need to close the gap for indigenous Australians, improving equality in life expectancy and access to health services.

One of the key emerging issues with the healthcare system has been the lack of access to services in Aboriginal and Torres Strait Islander communities (life expectancy at birth: 65 years for females and 59 for males in the period 1998-2000; Standard Mortality Ratio (SMR)\(^\text{12}\) 2.9 and 3.0 respectively\(^\text{13}\)). Poorer health is particularly the case for those in regional rural and remote Australia (SMR 1.07-1.69 compared to the SMR in major cities) where the access to the benefits of Medicare through GPs is not possible because of a lack of GPs. Specific groups have particularly poor access to services including those with mental illness, those with disabilities and people needing dental care.

\(^{12}\) SMR refers to Standardised Mortality Rate where ‘1’ = the national average

\(^{13}\) Australia’s Health 2008: AHW
The patient journey in the current system functions with disjointed communications and poor/inaccessible information causing duplication of services, a significant number of adverse events, and frustration for patients and their providers.

Australian healthcare is delivered in a range of community and hospital based settings where the sharing of information is limited and fragmented, if it occurs at all. At each care interface a patient encounters, there is the potential that poor information transfer inherent due to the inefficiencies of outdated processes, will undermine the delivery of care.

A high dissatisfaction from patients, exasperation from clinicians, occurrence of adverse events and sub-optimal care scenarios can generally be attributed to the following factors:

- Failure to have sufficient and accurate patient information accessible at the point of care. Rather it is fragmented across different sites and clinical settings.
- Poor sharing of information between healthcare providers, partly due to the lack of infrastructure (e.g. computer desktops, broadband connectivity, secure access, privacy regime) and ability to rapidly share information when it is required.
- Difficulty some patients have in remembering the complexity and breadth of their medical history and in explaining the various interactions they have had with health services.

For example, the inability of a healthcare professional to discover what medications a patient takes, the sources of and reasons for medications being prescribed, and the confounder of numerous brands of the same drug can lead to confusion and adverse drug interactions. This is particularly a problem when patients go to more than one healthcare provider, have multiple medical conditions and medications, are stressed and are vulnerable. Preventable medication errors are very costly, with inappropriate use of medicines in Australia costing $380 million per year in the public hospital system alone\(^\text{14}\).

The lack of high quality health information, and the ability to capture this and share it in a timely and useful format (i.e. content and media), has a particular impact on the treatment of chronic disease. Patients with chronic diseases often are complex and develop conditions that require referrals to a variety of medical and other specialist services. They frequently use multiple medicines and require care over extended periods of time from multiple providers. Figure 3 shows the experiences of a chronic disease patient attempting to negotiate the current healthcare system.

\(^{14}\) Australian Institute of Health and Welfare, Australia’s Health no. 8, June 2002.
This example illustrates how poor information sharing can contribute to inefficiencies and sub-optimal care. Furthermore, from a patients perspective there is unnecessary repetition of diagnostic tests and increased risk of communication errors.

A recent consultation with Doctors in training from around the country noted a patchwork availability of Picture Archiving and Communication Systems (PACS) around the country. Those who had access to the service were very enthusiastic about the potential for efficiencies, improved clarity of images, instantaneous availability across the entire hospital / region where it was in place and the fact that they are stored securely where they will not get lost. Key findings were that work practices improved. Training optimises the use of the technology and there is a need to ensure stored media could be read on local systems from other external providers. Examples given were of repeated MRI scans and the attendant cost and reduced opportunity for other patients who have longer to wait and of further exposure to radiation with repeated plain X-rays and CT scans.

The factors mentioned above are contributing significant pressure on Australian healthcare and there is resulting growth in related prices and expenditure.

The rising Health Consumer Price Index (CPI) and related expenditure as a proportion of GDP cannot be sustained in the medium to long term. If unchecked a likely scenario is:

- Demand for health services and resources **outstrip supply**.
- Universal healthcare **cannot be maintained within cost boundaries** or may need to be further rationed.
- Quality, **best practice and therefore patient safety becomes compromised**.
- Future change or reform becomes **increasingly difficult** as resources are spread thinly across a myriad of initiatives without the capacity to fund the required change management.
- A significant shortage of **qualified health informaticians** and a need to develop the required skills to support the design, development and change management of E-Health initiatives that achieve the optimal benefits from implementation.

Australia has recognised the risks associated with these issues in undermining a traditionally strong track record in healthcare. As a result the Australian Government, with the endorsement of the COAG (12/2007), instituted the **National Health and Hospitals Reform Commission** (NHHRC) to advise the Government on the changes required in order to maintain the high quality of Australia’s health services in the medium to long term.

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16 NHS “The world before and after PACS”, Information Flyer, 2008
17 Booz & Company Analysis, September 2008
3. E-Health Initiatives in Australia

E-Health refers to the general application of IT and communications technology within the health sector – the EHR provides the most important platform for other applications.

The term E-Health covers a range of technological areas and different names have been used for applications which are now seen as part of the E-Health field. These include medical informatics, telemedicine, health telematics, and ICTs for health18. E-Health capabilities are essentially a broad collection of IT applications, each addressing a different healthcare problem and impacting different stakeholders. The following diagram provides an illustration of the major E-Health applications under their appropriate R&D, clinical, administrative or public health classification. This framework provides a view of the scope of the technology referred to generally as E-Health.

Figure 5 – Classification of E-Health Applications19

This figure illustrates the importance for an EHR as infrastructure that effectively supports other types of E-health applications and the potential benefits they bring. Whilst each E-Health application can be implemented independently, the EHR is required to achieve their full potential benefits. It must also be noted that the full value from an EHR is only achieved when the information it contains is available through shared connectivity between healthcare providers in the public hospital sector, General Practice, Primary and community care, including medical specialists, non-medical specialist providers, pharmacy, private hospitals and aged care homes. There have been several initiatives in Australia’s recent history to progress the agenda for an EHR and other E-Health applications.

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19 Booz & Company framework, 2008
National E-Health initiatives accelerated in Australia in the 1990s and gained further momentum with the creation of NEHTA in 2005 and subsequent activities.

Australia has long recognised the important role of E-Health and embarked on key initiatives since the early 1990’s. The momentum increased with the creation of the National E-Health Transition Authority (NEHTA) in 2005. An overview of some of the major E-Health highlights and achievements of the last 15 years is provided in the following diagram:
Figure 6 – Major E-Health Highlights and Achievements of the Last 15 Years

- **PBS Online Endorsed by Pharmacy Guild**
  DoH developed online payment interface between pharmacists and Medicare accepted by PGA after many problems and subsequently rolled out to pharmacies across Australia

- **DHS Access Card Programme**
  $1.1bn Federal Government initiative that involved issuing a single smart card to replace 17 current health and welfare services cards, including Medicare, Centrelink and Pensioner Concession Cards

- **COAG Funding NEHTA**
  Commonwealth of Australian Governments (COAG) committed $130m in funding to NEHTA to develop standard clinical terminologies and provider/patient identification services by mid-2009

- **National E-Health Transition Authority Team Formed**
  A collaborative enterprise formed by Federal and State governments to identify and develop foundations for eHealth in Australia ($23m funding received)

- **Broadband for Health (BFH) Program**
  $69 million Australian Government program to provide broadband Internet access to GPs, Aboriginal Community Controlled Health Services (ACCHS), and community pharmacies nationwide

- **Health Online: A Health Information Action Plan for Australia**
  The national plan for information management in the health sector developed by NHIMAC in consultation with the Commonwealth, State and Territory governments and stakeholders

- **National Health Information Management Advisory Council (NHIMAC)**
  Formed to advise Health Ministers on options to promote a uniform national approach to information management in the health sector

- **National Health Information Development Plan**
  Identified and promoted the directions that the development of high priority health information for the subsequent 5-10 years

- **National Health Information Agreement (NHIA)**
  The foundation of a coordinated strategy for the Australian government, states and territories to develop, collect and exchange uniform health data, information and analysis tools at all levels of the healthcare system

- **Unified Health Identifier (UHI) Proposed**
  Contract between Medicare Australia and the National E-Health Transition Authority (NEHTA) for the development of a Unique Healthcare Identifier (UHI) service

- **DHS Access Card Abolished**
  The change in Federal Government and subsequent policy review resulted in the abolishment of the DHS Access Card Programme

- **NEHTA Review**
  BCG engaged to conduct a review of NEHTA’s achievements to date and progress towards its 2009 objectives

- **Medicare eClaiming**
  Medicare Australia introduced an eClaiming facility allowing patients to lodge their Medicare claim direct through doctors surgeries by swiping their Medicare Card

- **Legislative Changes for e-Health**
  Medical bodies begin updating codes, guidelines and legislation to reflect potential applications of E-Health technologies (e.g., AMA, State Medical Boards, RACGP, MDO’s and Medicines Australia)

- **MediConnect merged with HealthConnect**
  MediConnect field tests completed and the effort was merged with HealthConnect to become the flagship project for developing standards for and implementing EHRs throughout all the states of Australia. Trials begin in Tasmania and SA but the HealthConnect board is disbanded later that year.

- **National Health Information Group Formed**
  Established to advise AHMAC and AHMC on planning and management requirements and to allocate resources for national projects (now known as the NHIMPC)

- **MediConnect Established**
  An Australian Government electronic health initiative with a system developed jointly by the Department of Health & Aging (DoHA) and the Health Insurance Commission (HIC). Field tests conducted in Tasmania and Victoria for an electronic prescription tracking system

- **BMMS Exposure Draft Bill**
  The Better Medication Management System bill provided patients with substantial control over their medication profiles, including the ability to suppress or destroy profile information

- **HealthConnect Established**
  Based on recommendations from Health Online, a partnership between Australia, State and Territory Governments was established to leverage E-Health systems in different parts of the health sector through a common set of standards

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Booz & Company Analysis, 2008

The views expressed in this paper are those of the author(s) and should not be taken to be the views of the National Health and Hospitals Reform Commission or the Australian Government.

Booz & Company Date: 27 November 2008
The key milestones (not an exhaustive list) illustrated above are:

- **1993**: The creation of the **National Health Information Agreement** – the foundation of a coordinated strategy for the Australian Government, states and territories to develop, collect, and exchange uniform health data, information and analysis tools at all levels of the healthcare system.

- **1999**: **Health Online** – a Health Information Action Plan for Australia – this national plan for information management in the health sector was developed by the National Health Information Management Advisory Council which was set up only a year earlier.

- **2001**: Exposure Draft of **The Better Medication Management System Bill 2001 (Cwlth)** – The Better Medication Management System (BMMS) Bill provided patients with substantial control over their medication profiles, including the ability to suppress information or destroy their profile. The BMMS project evolved into the MediConnect program.

- **2000 – 2003**: Establishment of **MediConnect and HealthConnect**. HealthConnect was viewed as a partnership between Commonwealth, State and Territory governments to leverage E-Health systems through common standards, and MediConnect was a joint electronic health initiative of the Department of Health and Ageing (DoHA) and the Health Insurance Commission (HIC) which included field tests of electronic prescriptions. In 2004, these two initiatives were merged under the HealthConnect brand later the same year the HealthConnect board was disbanded.

- **2003**: The **National Health Information Group** (now known as **National E-Health Information Principal Committee – NEHIPC**) was formed to advise Australian Health Ministers’ Advisory Council (AHMAC) and Australian Health Ministers’ Conference (AHMC) on national health IT projects.

- **2005**: The **Broadband for Health** program is launched to provide internet access to GPs, community pharmacies and Aboriginal Community Controlled Health Services.

- **2005/2006**: The **National E-Health Transition Authority NEHTA** is set up and later funded by COAG to develop standard clinical terminologies and provider/patient identifier services by mid-2009.

- **2006**: 10th Feb COAG: to promote better health and community care for all Australians, COAG agreed to accelerate work on a **national electronic health records system** to build the capacity for health providers, with their patient's consent, to communicate quickly and securely with other health providers across the hospital, community and primary medical settings.

- **2006/2007**: **PBS Online and Medicare e-Claiming** were two services rolled out to facilitate payments between pharmacists and Medicare and patients and Medicare, respectively. The rollouts were not without challenges as seen with the initial take-up of PBS Online falling behind expectations resulting in a review and a new strategy.

- **2006/2007**: The **Access Card** program was initiated by the former Howard Government. This smartcard program was to have included (among other functionality) the
replacement of the Medicare card, and potential healthcare functionality, such as, emergency data and future options for the individual patient identifier. Many stakeholders at the time expected the card to become the token for secure authentication to the new E-Health world. The Access Card program was cancelled in November/December 2007.

- 2007: 20th December COAG: Consideration of E-Health, workforce planning and public hospital emergency departments

- 2008: NEHTA made advances with a Medicare contract focusing on development of the Unique Healthcare Identifier Services. A few months earlier, COAG had also commissioned a review of NEHTA to pave the way towards the future. As part of this review, a National E-Health strategy undertaking was commissioned early 2008 by NEHIPC and Department of Human Services (DHS) Victoria. This work is now being undertaken by Deloitte.

Initiatives driving the computerisation General Practice peaked in 1999 and now over 90% of GPs are computerised

In contrast to the initiatives that have spanned the broad healthcare sector, the computerisation of GPs has occurred at a faster pace. It is estimated that 90%\(^{21}\) of GPs in Australia are now computerised and use administrative and/or clinical applications in running their practice. The early initiatives of the RACGP into general practice computing in the early 1980s provided a significant step forward\(^{22}\), particularly the Computer Fellowship, Computer Assisted Practices Project (CAPP) in 1985 (MacIsaac et al 1990) and Standards Project (Crampton & Lord 1988). An overview of some major highlights in the computerisation of GPs since these early initiatives is provided in the following diagram:

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\(^{21}\) DK McInnes, DC Saltman, MR Kidd. GPs’ use of computers for prescribing and electronic health records. MJA 2006;185:88-91

\(^{22}\) http://www.project.net.au/hisavic/hisa/mag/nov93/the.htm
Figure 7 – Major E-Health Highlights and Achievements of the Last 15 Years

2007
Legislative Changes
Medical bodies begin updating codes, guidelines and legislation to reflect potential applications of E-Health technologies (e.g. AMA, State Medical Boards, RACGP, MDO’s and Medicines Australia)

2007
Medicare eClaiming
Medicare introduced a e-Claiming facility to replace MedClaims which allowed patients to lodge their Medicare claim direct through GP’s surgeries by swiping their Medicare Card

2005
Broadband for Health Program
$69m Australian Government program to provide broadband Internet access to GPs, Aboriginal Community Controlled Health Services (ACCHS) and community pharmacies nationwide

2004
Medicare MedClaims
Medicare rebate paid directly into patients’ bank account from the doctor’s surgery avoiding the need to line up at a Medicare office

2000
HealthConnect Established
A partnership between Australian State and Federal governments established to leverage E-Health systems in different parts of the health sector through a common set of standards

2005
DoHA ceases to fund to GPCG
DoHA decides that computing in General Practice has reached a satisfactory level and ceases its funding of the General Practice Computer Group (GPCG)

1999
HCN buys Medical Director
MD used by 54% of GPs, 90% of those computerised. HCN lists on ASX and markets the MD clinical software as cheap and effective

1998
Practice Incentive Program (PIP)
Provided a $7,500 financial incentive for general practitioners to computerise. Incentive scheme evolved over time.

1999
General Practice Strategy Review
Promoted rapid adoption of IT as the single most effective step to enhance the quality of general practice

1998
General Practice Computer Group
Organisation established to support the adoption of IT by General Practice. Funded by Department of Health and Aged Care

1992
General Practice Strategy Report
Identified initiatives for enhancing diagnostic, patient education and business management of practices through IT. Set the stage for Federal Health Department funding of many health informatics projects.

1992
Medical Director Software Package Available
A GP in Queensland designed a desktop clinical application for GP’s called Medical Director (MD)

1990
Identified initiatives for enhancing diagnostic, patient education and business management of practices through IT. Set the stage for Federal Health Department funding of many health informatics projects.

As shown in this diagram the majority of the significant developments occurred around 1999. AMA and RACGP, through many years of computer conferences and development, culminated in the Practice Incentive Program (PIP) that then took GPs from 20% to 90% penetration.

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21 Booz & Company Analysis, 2008
The main drivers for the take-up of computers within the GP community included:

1. Availability of low cost software packages which reduced complexity of e-Prescription generation as well as improved sophistication, reduced cost, and enhanced reliability and user friendliness of computers and operating systems (OS).

2. GP Divisional support for introduction and support of IT in practices

3. Legislation to allow Prescriptions NOT to be hand written

4. The 1998 GP Strategy Review and funding of the GP Computing Group

5. The Practice Incentive Program (PIP)

The costs and risks associated with purchasing, implementing, training and maintaining practice based systems accrued to the GPs. The Practice Incentive Payment (PIP) provided a financial incentive to GPs who chose to adopt computers within their practice. Following this initiative, market forces and a clinical thirst for better systems and information then guided the rapid uptake of practice management and clinical software to the relative maturity it has now achieved. Similar developments in retail community pharmacy occurred in parallel.

A key point to note from comparison of E-Health development within the primary care and acute sectors is the different strategies that were used and the resulting momentum and take-up achieved. A holistic approach to developing E-Health across these sectors is clearly lacking and now integration between disparate technologies introduces additional complexity for national or state E-health initiatives to address.

Despite growing momentum of E-Health, there is an overall lack of accountability and shared goals creating insecurity, confusion and frustration amongst stakeholders – the challenge now is to connect consumers, community providers and the hospital sector.

Stakeholders have seen scope, funding and agendas for E-Health programs in the past operating at multiple levels (i.e. Local, State and Federal Government and others). In the past, initiatives have often been funded at a national level while the implementation has been managed by the states (e.g. HealthConnect). This has resulted in a lack of clear national accountability, considerable insecurity and negative perceptions concerning the future development of E-Health in Australia. Often successful pilots with immense effort to gain ‘buy-in’ and manage expectations and introduce change have been stopped ‘dead in their tracks’ as funding and vision run out (e.g. Ballarat Health Connect trial), alienating a cohort of previous enthusiasts.

This failure to gain momentum and the growing list of less successful E-Health pilots in Australia is often attributed to several inhibiting factors including a lack of a strategic direction, poor execution of initiatives, insufficient stakeholder engagement and a poor

understanding of the benefits of E-Health. Some of these views have been captured in Figure 8.

Figure 8 – Factors Hindering E-Health in Australia

Key issues in the development of E-Health in Australia

- Lack of strategic direction and clear policies
- Poor execution of E-Health initiatives
- Stakeholders not engaged and/or unwilling to change
- Poor understanding of potential benefits from E-Health

(1) ACHI response to AHIC eHealth Future Directions Stakeholder Survey, 2007
(2) HISA’s viewpoint as quoted from Dearne, K. “Warning on eHealth Expertise”, The Australian, 7 August 2007
(3) HL7 Australia viewpoint as quoted from Dearne, K. “Warning on eHealth Expertise”, The Australian, 7 August 2007
(4) BMA News magazine, 1 Feb 2008

Given the breadth of applications and the diverse stakeholders that need to be addressed, E-Health strategies are notoriously difficult to implement and typically do not meet expectations against projected timeframes.

Implementing E-Health programs is often recognised as one of the most challenging transformations a nation can face. This is due to the conservative nature of the health professions, their need to minimise risks to their patients and the need to have confidence that changes are to improve existing practice rather than cause unpredictable damage. There is also a vast array of processes that have matured and become entrenched over many decades, and where each of the stakeholder groups have survived without the need to communicate and collaborate extensively regarding patient care. Change management aspects need to be carefully implemented, with clinical champions promoting the endeavour and support being available at all stages from qualified staff. Healthcare stakeholder groups are very powerful, largely due to the respect with which they are held by the population at large. Surveys around the world routinely show, for example, that clinicians and GPs are much more trusted by citizens than politicians or public servants.

It is therefore important to recognise that E-Health applications do not automatically create a winning situation for every stakeholder. In fact, evidence from international programs show business-case driven incentives are important for spreading the costs/benefits fairly around

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25 Booz & Company Analysis, 2008
the stakeholders and for aligning their interests. Unless this is made clear, strategy-driven conflicts between stakeholder groups can slow down E-Health advances considerably. Successful and widespread adoption will only be achieved if the interests of all stakeholders are fairly balanced.

Privacy protection and identity management is at the heart of E-Health. If customers’ health information cannot be securely protected and they cannot be accurately identified, trust in the system will be compromised.

Within Australia, several major challenges are particularly relevant to adopting E-Health including27:

- The fragmented state of the health care system, including the divide between federal and state based funding.

- Extreme cost pressures on the current health care system due to an ageing population with increasing burden of chronic diseases, and health workforce shortages across many health professions – resulting in increasing inflationary pressure on wages.

- Healthcare systems that are not yet set up as an alliance network – i.e. fostering cooperation and integrating care planning with the hospital as a hub and spokes system integrated with GPs, other specialists and allied health professionals – evidence suggests this is one of the prerequisites for successful implementations.

- Several attempts have been made in the past to adapt varying aspects of E-Health – several with good results (i.e. eClaiming, Electronic Medical Records, etc.). However, full capabilities have been slow to achieve, resulting in increasingly sceptical stakeholders.

- Complexity through the number and also large variety of stakeholders – many with interlinkages, dependencies and complex motivations. For example, there has been no broad consensus achieved on the priorities of key applications amongst the stakeholders.

- Need to incentivise key stakeholder groups who incur cost, but personally do not experience benefits increasing the burden of cost for implementation.

- Significant infrastructural enhancements typically necessary for changes to occur.

- Large-scale public scrutiny of privacy issues – particularly personal health records.

- Legislative implications – i.e. changes to providers’ duty of care.

- Necessity for service continuity - i.e. maintaining health outcomes whilst overhauling, upgrading and linking existing E-Health applications.

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27 Booz & Company analysis, 2008
The national agenda has addressed many of these challenges by focusing on the development of standards and designs for interoperability and accuracy of data, rather than driving outcomes through the implementation of E-Health transformations.

The national E-Health agenda in the last few years has been conducting several foundation projects largely in response to demand for national standards. Robust national standards are required to achieve interoperability, accuracy and certainty of health information from a secure and trusted source. These standards under-pin and facilitate the adoption of E-Health technology as it builds confidence from consumers, carers and the healthcare community.

The projects pursued by NEHTA and are summarised in the table below (note the dollar amounts quoted where COAG funded).

<table>
<thead>
<tr>
<th>Foundation Project</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification and Authentication Services</td>
<td>▪ National Individual Identifier – plan and design for a unique number for each Australian to map all their health information to ($45m planned COAG spend).</td>
</tr>
<tr>
<td></td>
<td>▪ National Provider Identifier – plan and design for a unique number for each health provider and health service on the system to ensure information is sent to the right provider across jurisdictions ($53m planned COAG spend)</td>
</tr>
<tr>
<td></td>
<td>▪ National Authentication Service for Health (NASH) – Secure access to the system by authorised health professionals.</td>
</tr>
<tr>
<td>Secure Messaging – Web Services migration</td>
<td>▪ Defines connectivity standards and endpoint specifications to support secure, reliable end-to-end clinical connectivity between healthcare organisations (e.g. HL7 and IT-14).</td>
</tr>
<tr>
<td></td>
<td>▪ This incorporates rolling out a reference site which will demonstrate connectivity to the broader e-Health Community</td>
</tr>
<tr>
<td>National clinical terminology</td>
<td>▪ Aims to ensure that there is a common, coded national clinical language that describes diagnoses, procedures, therapies, medications, and other clinical terms to underpin the clinical information flows (e.g. SNOMED CT).</td>
</tr>
<tr>
<td></td>
<td>▪ COAG has allocated $32m to this project</td>
</tr>
<tr>
<td>E-Health Software Certification</td>
<td>▪ Aims to ensure that vendors produce products that meet the agreed specifications so that they are able to interoperate with planned national infrastructure and other compatible systems.</td>
</tr>
<tr>
<td></td>
<td>▪ The certification process requires the development of tools and processes to guide suppliers when building products and providers when purchasing software products</td>
</tr>
<tr>
<td></td>
<td>▪ NEHTA will establish the framework for industry to undertake the certification.</td>
</tr>
<tr>
<td>Domain Packages</td>
<td>▪ These packages tie together NEHTA’s standards of secure messaging, clinical information, terminology and national e-Health infrastructure services to promote efficient business processes and an interoperable e-Health environment.</td>
</tr>
<tr>
<td></td>
<td>▪ The priority clinical areas include: Medication Management; Discharge Summaries, Referral and Pathology.</td>
</tr>
<tr>
<td>National Shared Electronic Health Record</td>
<td>▪ Development of standards and designs to support a national shared electronic health record</td>
</tr>
<tr>
<td></td>
<td>▪ Development of a business case based on cost-benefit analysis and modelling of impacts to the Australian economy</td>
</tr>
<tr>
<td></td>
<td>▪ Report due to COAG late 2008</td>
</tr>
<tr>
<td>Business Architecture</td>
<td>▪ Aims to ensure the design integrity of the eHealth Infrastructure and that solutions are able to integrate with existing / planned ICT investments in the health sector by the States and Territories</td>
</tr>
<tr>
<td>Supply Chain Reform</td>
<td>▪ National Product Catalogue created to ensure efficient supply chain systems that ensure the rights products are ordered when they are needed</td>
</tr>
</tbody>
</table>

28 Information on projects has been supplied by NEHTA, September 2008
It is important to note that NEHTA is now ready to begin implementing its first ‘Domain’ initiatives which have so far been in the design and planning stage. The pathology, referral and discharge packages are ready to be rolled out via a program of work into selected demonstration sites after which their footprint can be expanded towards a national level.

The recent change in Governments has also changed the name of the Department of Communications, Information Technology and the Arts to the Department of Broadband Communications and Digital Economy (DBCDE). This Department is continuing the Clever Networks Program to deliver improved communication services to rural and remote areas of Australia. The program consists of a portfolio of 26 projects of which 13 relate specifically to the health sector\(^{29}\). The projects are community based initiatives and include the following:

- Shared EHR applications (e.g. for Royal Flying Doctor Service and NSW Health)
- Video conferencing / e-consultations (e.g. connecting Loddon Mallee Emergency Department with the Austin for “virtual trauma and critical care”)
- Training and mentoring junior professionals in remote areas from regional centres
- Chronic disease management (e.g. CDM Net in Victoria)
- Special needs care for patients suffering disabilities and mental illness (e.g. SCOPE in Victoria for the disabled)
- Starlight Foundation initiative in Victoria to connect children in hospital with their families at home

Based on this list of initiatives, the DBCDE is currently responsible for implementing federally funded E-Health initiatives, although most of these initiatives are region-based. The E-Health initiatives that impact on the larger Australian populations are being implemented by the various State and Territory governments.

The most significant progress for E-Health in Australia continues through numerous independent projects across the jurisdictions which are lacking coordination, vision or cohesiveness at a national level.

The following table canvasses the E-Health initiatives which have either recently been completed or are still being pursued at a national and state level\(^{30}\). Interestingly the jurisdictions appear to have abandoned hope for a national E-Health strategy and are either initiating or expanding their own EHR related initiatives.

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\(^{29}\) Interview with Lyn Thompson, Clever Networks Program Manager, DPCDE, 1/9/2008

\(^{30}\) Booz & Company Analysis, 2008
<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>E-Health Initiatives</th>
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</table>
| NSW | **Healthelink** – $40m program to roll out a Medical Record system for the state's eight area health services by 2009\(^{31}\).  
- Pilot system currently being run in Maitland and Greater Western Sydney for high risk potential patients (i.e. people over the age of 65 and under 15) |
| Victoria | **HealthSMART** – $323m program established in 2003 for updating technical infrastructure across the public healthcare system with particular focus on rolling out patient administration clinical and community care systems\(^{32}\).  
- Barwon Health area (i.e. Geelong) operating a Electronic Health Record system worth $3.3m which includes Picture Archive and Communications System rolled out to health professionals across acute and primary care (see Case Study insert below for more details)  
- $21 million funding to establish Australia's first electronic prescribing hospital program to assist clinicians with in-patient care. |
- **Queensland Health** will invest $243 million over 4 years through its E-Health program to introduce the following\(^{33}\):  
  - EHRs in a centralised, state-wide **Enterprise Information Repository** fed by existing and future information systems and accessible to care providers through secure Internet User Portals (including Portals for GPs, Health Professionals, Emergency Departments and Anaesthetists).  
  - Mobile devices, faster broadband, telecommunications and video conferencing capability to enhance care in rural and remote locations, improve waiting times and clinical decision making.  
  - New information systems developed to support the electronic record and improve health care practice including medications reporting, diagnostic imaging, resource scheduling, community health, mental health and chronic disease management, ePrescribing and eOrdering.  
- Primary Care Electronic Health Document Exchange Project by GP Partners, Brisbane North Division of GPs (see Case Study insert below for more details) |
| Western Australia | **eHealthWA** (formerly HealthTec) – originally $335m program over 5 years to upgrade information systems in State hospitals\(^{34}\).  
- 5 work streams which cover EHRs, patient management and clinical information systems, network and server technology, links between information systems and medical equipment, and maintenance of existing platforms while new software and hardware is rolled out\(^{35}\).  
- One priority is the delivery of a new state-wide pharmacy application.  
- **Eastern Goldfields Medical Division of GPs** implemented an EHR system within its community using the same system as GP Partners in Queensland\(^{36}\).  
  - Intelligent Disease Management Service provides a full service facility for disease management, care surveillance, and wellness monitoring for people with chronic disease and complex needs.  
  - Broadband network of web-based and call-centre services to assist healthcare providers and consumers to continuously monitor and manage chronic disease. |

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\(^{35}\) The Australian, “Bid to put E-Health on track”, 4 September 2007  
<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>E-Health Initiatives</th>
</tr>
</thead>
</table>
| South Australia  | - **Careconnect.sa** – $350m program setup as part of the State’s own health reform agenda[^37]:  
|                   |  - Plans to develop Australia’s first fully integrated state-wide electronic health record system in a program comprising 65 interrelated IT projects  
|                   |  - The first enterprise system announced under the program is the $17 million web-based information system to give nurses and midwives access to patient records (inc. smartcards)  
|                   |  - Other projects slated for year one include client identification, web services, pharmacy management and operating room information system upgrade[^38]  
|                   |  - The patient information system will comprise smartcards and biometric technology for security                                                                                                                                                                                                 |
| Tasmania          | - **Information Services Branch** formed in June 2006 to provide quality Information services and projects for the State Health department. Projects include[^39]:  
|                   |  - Coordinating the agency’s systems preparedness for implementing Home and Community Care system for the elderly  
|                   |  - Oral Health Services’ Information Management Enhancement Project  
|                   |  - Client management information systems for the Community Options Program, Palliative Care Services and Mental Health Triage services  
|                   |  - The CASE Program is focused on those patient information systems which are used predominantly within hospitals. The Program will deliver successive projects which either upgrade or replace current systems, or implement new functionality  
|                   |  - Tasmania have recently undertaken a the development of a State-wide E-Health strategy with Deloitte                                                                                                                                                                                                 |
| ACT               | - “Your Health – Our Priority” program includes computer software, networks, servers and medical devices to support an integrated electronic health record.  
|                   |  - Plans to introduce health cards for residents that will facilitate health practitioners access a database of patients’ medical histories[^40].                                                                                                                                 |
| Northern Territory| - **eHealthNT** – continuation of the HealthConnect NT program and joint venture between the State Government and DOHA. The focus of projects is on supporting rural and remote health with projects that include[^41]:  
|                   |  - Shared Electronic Health Record  
|                   |  - Secure Electronic Messaging Service (including eReferrals) for General Practice  
|                   |  - Electronic Transfer of Prescriptions  
|                   |  - Childhood Immunisation Records  
|                   |  - Health Provider Service Directory  
|                   |  - Medchart Advanced Medication Management  
|                   |  - Primary Care Information System accelerated implementation                                                                                                                                                                                                                                                                                        |

These initiatives are evidence that every one of the states and territories is progressing with its own independent E-health program without coordination or governance at a national level. Interestingly almost every one of these programs has run into significant delays and cost blow-outs (with the exception of Northern Territory, and Tasmania whose program is only just beginning).

[^38]: [Woodhead, “Biometric smartcard security for health system”, Australian, 3/7/07, pg29](http://www.careconnect.sa.gov.au/)
[^39]: [http://www.dhhs.tas.gov.au/about_the_department/structure/operational_units/statewide_systems_development/information_services#ict](http://www.dhhs.tas.gov.au/about_the_department/structure/operational_units/statewide_systems_development/information_services#ict)
[^40]: [Canberra Times “Canberrans to get health cards in $1B overhaul, 29 July 2008](http://www.ehealthnt.nt.gov.au/)
For example, the Victorian HealthSMART program recently revised its schedule due to delivery being two years late and $61m over budget – the major reason being cited in an Auditors Report as being “the lack of a whole-of-program business case”\(^{42}\). Similarly, WA’s HealthTec program was launched in 2003 but recently it was announced that the program was three years behind schedule prompting a major review and re-branding of the change program to eHealthWA\(^{43}\).

State based E-Health programs have been criticised by the GP community and other specialists for their focus on the acute sector with little consideration being given to connectivity with primary care and community health services.

The proliferation of EHR projects that are kicking off across the different jurisdictions is undermining the much larger benefits that would be achievable from a national EHR program.

In its consideration of alternative strategies for EHRs in Australia, NEHTA conducted analysis to determine the potential net benefits achievable from three scenarios. The three scenarios that were modelled included the following\(^{44}\):

- **Option 1**: Base case with no investment in an Individual Electronic Health Record (IEHR) service across the nation

- **Option 2**: Independent implementation – IEHRs are conceived and implemented by the individual States and Territories; and

- **Option 3**: National IEHR – 10 years of full investment in a national based IEHR.

The findings from this analysis revealed that the total net benefits of a national EHR are substantially higher than those that would be achieved from pursuing independent State based EHRs (see figure below).

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\(^{42}\) The Australian, “Vic: Health IT program late, over budget”, April 16 2008

\(^{43}\) The Australian, “Bid to put E-Health on track”, 4 September 2007

\(^{44}\) KPMG, “Cost Benefit Analysis of Shared Electronic Health records”, NEHTA, September 2007
This diagram illustrates the cumulative net benefit (i.e. the costs of implementing the national IEHR have been accounted for) for each of the three scenarios. Development of independent jurisdictional IEHR programs would result in significant delay before any net benefit is achieved with a total benefit of $5.6b over 10 years. A national IEHR solution on the other hand indicates a payback around 2013 and a total benefit of $20.8b over the same period. Comparison of the business cases for these different options obviously builds a strong argument for a national based Shared IEHR.

As stated in the recent 2020 Summit, the EHR “requires national infrastructure, and if it is a national system you need national guidelines and a national framework”46. The European Union has recently acknowledged the opportunity and potential benefits from a cross-border EHR solution for all the EU member states47 and is planning to achieve this by 2015. Current Australian initiatives for rolling out EHRs in each jurisdiction will mean that the long term economies of scale and value for money will not be achieved. However, it is important to note the challenges that would be faced by such a program and as was also recognised at the 2020 Summit, there needs to be “money on the table for this” to achieve the higher benefits48.

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4. The E-Health Opportunity

In Australia, E-Health can help address the four key challenges that have been identified by the National Health and Hospitals Reform Commission

As announced on February 28, 2008, the focus of the NHHRC in Australia is to address key challenges for Australia’s Health Care system. It is to formulate a plan for health from 20 years hence. Although informed by the here and now, it does not seek to address this situation head on but more to provide the ‘stepping-stones’ towards achieving a future vision of optimal healthcare for the Nation. Each of the principles and challenges discussed in the “Beyond the Blame Game” paper can be significantly addressed using IT.

Feedback from National Consultation Sessions to the NHHRC regarding E-Health is listed in part below. Each consultation in the various locations around the country (all Capital cities and five regional centres) and with each stakeholder grouping (Health consumers, Front-line health workers, Government agencies and Non-Government Organisations) all spoke of the need for IT and E-Health in the following contexts:

- IT is a vital enabler
- IT is a vital driver of Access Quality & Safety
- Individuals want accessible, quality healthcare information
- Expectation of information transfer between carers
- Individuals want to be able to write to some part of their health record
- Carers have a need to write patient information to a central health record
- Benefits of IT acknowledged in healthcare
- All stakeholders want access to better quality data / clinical information
- All stakeholders want respected source information
- All stakeholders want a variety of media to be used
- Recognition that broadband communications is vital
- In rural areas, demand for broadband is most significant
The key challenges facing the health system today can be addressed in varying degrees by appropriate E-Health initiatives. The table below provides examples as to how E-Health can help to address several of these challenges based on experiences from the E-Health programs in Italy, Germany, Canada and the US:

**Figure 10 – E-Health Goals Observed in Efforts Worldwide**

<table>
<thead>
<tr>
<th>“Future Challenges”</th>
<th>Example related E-Health efforts worldwide</th>
</tr>
</thead>
</table>
| Chronic disease    | ▪ Disease Management Programs conducted with IT based decision support for chronic diseases  
                      ▪ Shared individual electronic health records with specialised data on certain chronic diseases such as cancer or heart disease  
                      ▪ Adverse drug effects combated through e-enabled medication safety, of particular concern for this group who may be on long-term medication |
| Population ageing  | ▪ Adverse drug effects combated through e-enabled medication safety, of particular concern for this group who may be on long-term medication  
                      ▪ Electronic Health Record makes this group easier to treat and avoids duplication of treatment efforts  
                      ▪ E-Prescribing assists to ensure compliance and medication logs help ensure safety |
| Rising health costs| ▪ Medication Safety Management reduces Adverse Drug Effects through logging and decision support leading to significant reduction in cost  
                      ▪ e-Prescriptions may avoid scanning costs and lead to more efficient administrative processes  
                      ▪ Patient self help with portals and evidence based medicine may lead to better prevention and more informed and empowered patients |
| Inefficiencies and cost shifting/blame | ▪ Avoidance of duplicate examinations through better logging of treatment  
                                           ▪ e-Referral and e-Discharge to increase shared information flow  
                                           ▪ Transparent business cases and IT-tracked Key Performance Indicators (KPIs) have helped ease discussions and incentive plans for all healthcare participants |

Perhaps even more relevant to the reform agenda is the potential of E-Health to provide an efficient means of data collection and reporting to ensure proper transparency and accountability of health services. E-Health infrastructure and applications will significantly improve the accuracy of data to support the reporting of performance benchmarks as proposed by the NHHRC. Publishing this information would also encourage a degree of competition between healthcare providers, encouraging a culture of continuous improvement and innovation. An example of how benchmarks have been used in reporting hospital performance in USA is included in the Appendix (Data Sets in USA: Example of Benchmarks and Indicators).

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49 Booz & Company Analysis, 2008
The case for a National Shared Individual E-Health Record program in Australia suggests an overall benefit between $7.5 and $8.7 billion to the economy for the first 10 years with significant benefits from increased productivity and reduced adverse effects.

A national EHR reduces fragmentation and duplication in healthcare delivery by facilitating the exchange and access to quality information for healthcare providers and consumers. EHR drives better health outcomes through improved quality and safety by reducing preventable medication errors and inappropriate referrals, assisting in the management of chronic disease and increasing the participation of individuals in their treatment. The inefficient and often ineffective sharing of health information between health service providers compromises the safety and quality of healthcare leading to preventable errors, reduced productivity and costly misuse of resources.

Extensive analysis has been commissioned by NEHTA in order quantify these benefits and propose a national business case for the national EHR opportunity. The analysis conducted by the Allen Consulting Group (ACG) revealed between 4.8% and 6% increase in real output from the hospital and medical services sector. The results of economic modelling undertaken by the ACG also revealed that there would be an increase of between $7.5 billion and $8.7 billion in GDP by 2019 as a direct result of the implementation of a national IEHR service. The ACG report concludes that “implementing a national IEHR system will have a positive impact upon the Australian economy and improve the efficiency of the health sector”50.

The Productivity Commission Research Report into Australia’s Health Workforce concluded that “Electronic Health Records...would support a more seamless provision of care [and] also facilitate better coordination and cooperation in a range of other health workforce contexts, offering potential cost savings and benefits to consumers”51.

The overall benefits of widespread adoption of E-Health applications and to whom they would accrue to are illustrated in the following table.

<table>
<thead>
<tr>
<th>Beneficiary</th>
<th>Example Benefits</th>
</tr>
</thead>
</table>
| Users of health Services and their carers | - Support for personal health care  
- Access to patient support information  
- Clearer records, information recall, safer care  
- Improved communication of care: including notes from self & carers  
- Opportunity for access to services with telemedicine and providing patient rebates for professionals at both ends of the encounter.  
- Use of secure messaging to/from/between providers to streamline processes (e.g. renew medications or referrals where appropriate) |

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The views expressed in this paper are those of the author(s) and should not be taken to be the views of the National Health and Hospitals Reform Commission or the Australian Government.

Booz & Company  Date:  27 November 2008

<table>
<thead>
<tr>
<th>Beneficiary</th>
<th>Example Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Care Providers</td>
<td>▪ Time efficiency; Team Care / Collaboration; Quality; Safety</td>
</tr>
<tr>
<td></td>
<td>▪ Reduced Red-Tape; Enter data once only</td>
</tr>
<tr>
<td></td>
<td>▪ Access to timely patient data –timely decisions</td>
</tr>
<tr>
<td></td>
<td>▪ Disease surveillance; Planning</td>
</tr>
<tr>
<td></td>
<td>▪ Information transfer: data, voice and visual. Better communication</td>
</tr>
<tr>
<td></td>
<td>▪ Clinical decision support</td>
</tr>
<tr>
<td></td>
<td>▪ Remote specialist support / second opinions</td>
</tr>
<tr>
<td></td>
<td>▪ Educational activities from a distance attended locally</td>
</tr>
<tr>
<td>Health Managers and Planners</td>
<td>▪ Improving patient flows</td>
</tr>
<tr>
<td></td>
<td>▪ Streamlining of operational service delivery (e.g. OPD clinics, Operating Room</td>
</tr>
<tr>
<td></td>
<td>bookings, Wait-list management Through-put systems)</td>
</tr>
<tr>
<td></td>
<td>▪ Population based data collection</td>
</tr>
<tr>
<td></td>
<td>▪ Indicators and Benchmarks measured in real time</td>
</tr>
<tr>
<td></td>
<td>▪ Timely reporting and feedback of data</td>
</tr>
<tr>
<td></td>
<td>▪ Research Education</td>
</tr>
<tr>
<td></td>
<td>▪ Knowledge management for the Nation</td>
</tr>
<tr>
<td>Government</td>
<td>▪ Safer Care; Improved Quality</td>
</tr>
<tr>
<td></td>
<td>▪ More effective, efficient processes</td>
</tr>
<tr>
<td></td>
<td>▪ Better value for money</td>
</tr>
<tr>
<td></td>
<td>▪ Closer monitoring and shorter cycles of measurement &amp; improvement</td>
</tr>
<tr>
<td></td>
<td>▪ Reduced health care costs</td>
</tr>
<tr>
<td></td>
<td>▪ More accurate data to monitor the health system</td>
</tr>
</tbody>
</table>

The quantified gross benefits of a national IEHR application alone is estimated to be $28.6 billion over the first eight years of operation (2012/13 to 2019/20)\textsuperscript{52}. The categorisation of these benefits based on this analysis is shown in the following figure.

\textsuperscript{52} KPMG, “Cost Benefit Analysis of Shared Electronic Health Records, Sept 2007
This breakdown shows the major benefits are from productivity gains, thereby helping to address the critical issue of workforce shortages within the healthcare sector.

Analysis by Booz & Company also indicates that the benefits for Adverse Drug Effects (ADE) may be higher than stated in the business case, because partial benefits might accrue earlier than previously anticipated.

The benefits proposed for a national EHR are similar in magnitude to other E-Health programs around the world that are already well into implementation.

Similar business cases have been developed overseas such as the Canadian Health Infoway Initiative (see Figure 12 – Cost-Benefit Calculations for Canadian Health Infoway) which calculated Can $6.1 billion in annual savings from E-Health in a steady state, of which Can $3.6 billion alone was attributable to reduced ADE, not only saving money but many lives each year.

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53 KPMG, “Cost Benefit Analysis of Shared Electronic Health Records, Sept 2007. Note that these figures are based on several assumptions as stated in the report and are net of any costs
In the US, the Bush Government stated that “failure to use health IT has resulted in high costs, uncertain value, medical errors, variable quality, administrative inefficiencies and poor coordination”. The Institute of Medicine estimated that between 44,000 and 98,000 Americans die each year from medical errors and as much as $300 billion is spent each year on health care that does not improve patient outcomes.

In Germany, the cost-benefit calculations concluded substantial benefits in the billions of Euros from the availability of emergency data and also reduced ADE. In a detailed evaluation of the different applications taking into account all stakeholder groups involved in the program, costs & benefits were detailed by application and stakeholder group. The high-level results are shown in the following diagram:
This analysis in Germany suggested that the largest benefit with immediate results was delivered by the medication log which addressed the potential for ADE. In fact, when both the Canadian and German analyses of ADE are taken into account, an approximate gross benefit of A$20-A$100 per patient per year could be realised⁵⁷. This is a significant nationwide benefit of around A$400M - A$2bn per year. In addition to this benefit there is a large quality impact on the population at large. This indicates that focusing on short term wins that address ADE as a matter of priority is a prudent course of action.

Another key takeaway from the analysis in these other countries is that several of the stakeholders themselves often experience negative benefits from E-Health implementations due to the cost of changing their existing practices (e.g. computer infrastructure, training, software) and typically require financial incentives. This was recognised in Australia by the Practice Improvement Program (PIP) which paid a $7,500 incentive towards the costs of GPs that chose to adopt the use of computers in their practice. Similar incentives are needed to encourage other stakeholders to adopt E-Health applications (e.g. e-Prescribing and transmission to pharmacies) so the benefits can flow through to other areas of the health system.
Stakeholder concern that E-Health has a low “hype to delivery” ratio can be addressed through planned investment in existing, proven technology.

There is a current concern amongst stakeholders that there is a high “hype to delivery ratio” with arguably little return for large investments. Confidence in the E-Health agenda has been troubled in the past because of sporadic initiative, poor coordination, patchy funding, unsupportive governance and the burning out of selflessness and goodwill from early adopters and enthusiasts. More lately larger numbers of actively participating practitioners (medical, nursing, pharmacy and others) are becoming frustrated that progress has been slow.

In order to restore confidence in the E-Health agenda, the following are recommended as guiding principles:

- Use existing technology (in Australia or internationally) where possible
- Ensure that National Standards are useful, useable and used
- Promote a secure messaging network that is able to receive messages in a useable format from any message provider (inter-operable)
- Encourage all providers to use the secure messaging services (build the links with existing ‘feeder’ systems)
- Build on, support and advance the outstanding initiatives that exist and use them as active working sites for others to learn from, replicate and be supported by
- Introduce technology in a way that systematically builds up the various layers towards a well connected national health system. This will require working with pre-existing ‘legacy’ systems which should in time evolve to current technologies.
- Ensure patients and carers can write to a part of their EHR.
- Require that proprietary products for recording health information conform to national standards and are then able to be incorporated into a national shared IEHR scheme.

Significant quick wins are possible by developing existing applications to deliver national ePrescribing and Medication Management functionality and realise benefits from reducing the number of adverse drug events.

DoHA is currently determining its preferred operating model and strategy for an ePrescribing platform. The following figure depicts three alternate operating models for an ePrescription solution that could potentially be applied within the Australian context.
A decision between these models can cause considerable concern for the associated stakeholders. For example, in Germany, progress in the E-Health program was delayed substantially by a conflict of interest between the pharmacy association and national insurance companies. While the insurance companies wanted a central repository, the pharmacies preferred a distributed model. Legislated timeframes have not been met and stakeholder relationships are strained.

eHealthNT has found a way to effectively implement an end-to-end e-Prescribing solution using a barcode system to track the issuance of a script by a GP through to its fulfillment at a local pharmacy. This platform has the potential for wider application in other jurisdictions and could potentially be enhanced to pilot electronic transmission of prescriptions between GPs and pharmacies, eliminating the need for a barcode altogether.

Another platform that has already been rolled out to pharmacies across Australia is PBS online which is currently used for automatic reimbursement of pharmacies when they dispense prescribed medicines to patients. This platform currently holds a medication history for every Medicare card holder and could potentially be used to alert the pharmacist of the potential for adverse effects at the point at which they dispense the medicine.
Despite the relatively high adoption of IT amongst General Practice, connectivity between hospitals and community healthcare providers remains a key issue that a handful of successful projects have begun to address.

The adoption of IT in the General Practices of Australia has been significantly higher than the acute sector and GPs in other parts of the world. For example, currently it is estimated that over 90% of GPs use desktop clinical and administrative software. Of the computerised GPs ~83% use their clinical package to store electronic medical record information (i.e. approximately 75% of total GPs). This contrasts with Canada which is recognised as having one of the most advanced E-Health programs in the world but still only has 20% of GPs using electronic medical records or technology in their practice. In the USA, this statistic is even worse with only 13% of GPs using electronic medical records for their patients.

Despite this statistic, however, there remains a significant lack of inter-connectivity between general practices, other specialists, allied health providers and the acute sector with the exception of a few pockets of good practice such as the NT, GP Partners in Queensland and Barwon Health in Victoria. An example of the results that can be achieved from such an approach on a larger scale can be seen by the PROSPER program in Germany. These case studies are explored in more detail in Appendix 1: Case Studies of Interconnected Community Care. These examples demonstrate how communities are recognising the opportunity of improving healthcare quality and efficiency by connecting the acute and primary care sectors. In particular they recognise the value of a shared IEHR as opposed to traditional medical records in caring for patients, particularly the elderly or those with chronic illness.

There is significant excitement at the potential of E-Health amongst health consumer – the challenge will be in managing their expectations around the speed with which these technologies can be delivered

Research commissioned by NEHTA indicates that 82% of consumers support the establishment of an EHR. As one GP stated in the NEHTA Consultations:

“I think it’s every single Australian health care consumer’s right to have timely, safe, effective healthcare, and you cannot get that without an E-Health record”

This statement not only drives home the critical importance of the EHR application in improving the quality of healthcare but also notes its role in ensuring better equality in the system as well. According to the Consumers Health Forum of Australia, direct benefits of E-Health to individual health consumers include the following:

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59 DK McInnes, DC Saltman, MR Kidd. GPs’ use of computers for prescribing and electronic health records. MJA 2006;185:88-91
60 Canadian Medical Association "IT in General Practice: A 10-country comparison" based on a 2005 study by Canada Health Infoway
Increasing consumer involvement in the management of their health by giving them access to their own health records

Improved access to individual’s health records across the health system and the country

Improved safety through better access to more complete and accurate health information

Better quality of care through communication and sharing of health information between consumers and health professionals

The following figure shows how E-Health can transform the patient journey through the health system to one that is more patient-centric.

Figure 15 – E-Health Transforming the Patient Journey

The individual patient is able to share the information on their EHR with healthcare providers at the point of care. E-Health applications are also used to facilitate the electronic transmission of forms between health providers treating the patient. This process is in contrast to the current paper-based system depicted in Figure 3, where information flows between points of care can take weeks, if they occur at all (for example a doctor might find it quicker to redo a test in order to get the results he needs).

The following five real life situations bring to life some of the tangible ways in which an accurate and complete electronic health record would benefit individuals:

Figure 16 – Sample Scenarios Illustrating the Potential of EHRs

Scenario 1: Antenatal Care Quality
Lucy is pregnant with her first child. Her local GP orders several tests before referring Lucy to an obstetrician. When Lucy visits the obstetrician, he will be able to view her IEHR for test results. Throughout her pregnancy, Lucy knows that her GP, obstetrician or any other healthcare provider she visits will be able to access her most up to date health information, ensuring there is no unnecessary repetition of tests or miscommunication about care.

Scenario 3: Medication Safety
Susie is 85 years old and takes four different types of medication for her various ailments. Susie’s GP recently referred her to a neurologist because she is showing symptoms of dementia. The neurologist asks Susie what medication she is on, but she can only remember the names of two. Susie can, however, grant the neurologist access to her IEHR, and he is able to see the exact medications Susie is taking as well as the diagnosis of her other ailments.

Scenario 5: Emergency Room
Kevin, a 35 year old man, is taken to the emergency department by police in an agitated and confused state and is initially assumed to be under the influence of drugs. The doctor tending Kevin, who has been authorised by the hospital to have emergency access to IEHRs, views Kevin’s IEHR and discovers several privileged care episodes. The doctor uses her ‘emergency care access privileges’ to view details of these episodes and discovers that Kevin has had several previous admissions to psychiatric institutions with paranoid psychosis. She commences anti-psychotic treatment immediately and refers Kevin to an appropriate psychiatric institution within 24 hours. Without this information, the appropriate treatment for Kevin’s agitated and confused state may not have been provided and may have placed hospital staff in danger.

Scenario 2: Aged Care Quality
72 year old John has recently suffered a stroke. Upon discharge from hospital John is transferred to an aged care facility for rehabilitation. By granting authorized providers at the facility access to his IEHR, John does not have to provide his medical details to each provider he comes into contact with. Instead, his medical history and the full details of his stroke, including test results, medications and risk factors, are readily accessible to those treating John.

Scenario 4: Administrative Efficiency
Jeff and Mary move to a new neighbourhood and seek out a new GP to guide them in the care of their 4 year old child with Downs Syndrome. On their first visit, they expect to have to fill out numerous forms with shared details and medical histories for the entire family. Instead, by granting the GP access to their IEHRs, subject to privacy legislation, she is instantly and accurately up to date.

By having a shared IEHR, medical details and communications of importance from any source can be viewed by the patient and their authorised health care provider from the IEHR. The following illustrates the ideal communication tree.

Figure 17: Communications between care centres within the Hospital or Community sector and the GP or other Primary Carer

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65 NEHTA, “eHealth Record Shaping the future of healthcare – Privacy Blueprint for the Individual Electronic Health Record”, 2008
66 Diagram provided courtesy of Suresh Haikerwal
At a national level, E-Health uptake in Australia is falling behind the best in the world where this technology has been embraced as an enabler for deep reforms.

Many of the issues at the heart of the national reform agenda such as the ever-increasing cost of healthcare and concerns with quality and patient safety are in fact not only being discussed in Australia but paramount all over the world. E-Health is widely seen to be a critical enabler of any nation’s reform agenda by reducing costs through productivity enhancements and at the same time increasing transparency, quality and safety.

There are a number of countries with major E-Health initiatives already underway. Whilst at a high level, all of these programs are attempting to achieve similar objectives and benefits, there are significant differences in the approaches that are being taken. The following framework broadly classifies a sample of major country case studies for comparison.

**Figure 18 – Comparison of Different Approaches to E-Health**

This table illustrates how the majority of countries, particularly in Europe, are adopting a national smart card to support their E-Health transformation.

A national health card is a valuable piece of technology infrastructure in itself which allows for secure authentication and storage of health data for a patient. Comparison of the different approaches that have been adopted by countries around the world is summarised in Appendix 2: Comparison of International Approaches to Identification. Recent plans for a health and social services card in Australia were put on hold with the recent change in Government that resulted in the plans for the Access Card being cancelled. Now individual jurisdictions are pursuing their own Health Card solutions such as those planned for the ACT and South Australia E-Health programs.

The most costly and publicly complex program to date has been running in the UK (the NHS National Program IT costs are now thought to be about 20 billion UK pounds), but other European nations such as Denmark, France, Germany and regions of Italy have been progressing E-Health initiatives for a number of years and have so far had relatively smooth implementation programs even though some have hit delays. A more detailed analysis of the German program is included in the Appendix (Case Study 2: National Smart Card Approach (Germany))

In the Lombardy region of Italy, a successful and ambitious public private partnership was launched many years ago. The program resulted in the delivery and operations of applications such as e-booking, e-referral and e-prescriptions to 9 million citizens and more than 160,000 healthcare providers – ahead of time and below budget. While this program is recognised as a model of success, political squabbles have prevented its introduction in other Italian states, indicating that a national rollout would have been a better strategy for Italy. A more detailed analysis of this case study is included in the Appendix (Case Study 1: Regional Smart Card Approach (Lombardia, Italy))

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In Asia, the Taiwan Health Card was introduced in 2003 and has since led to significant growth in E-Health as it continued to introduce a range of additional medical functionality on the card.

The US is geared to make massive investments in E-Health. This was first signalled by George W. Bush in his 2005 State of the Union Address which declared his “continuing support for information technology to improve healthcare, asking Congress to move forward on improved health information technology to prevent medical errors and needless costs”\(^{68}\). The President also stated the federal government’s role was to fund “regional hubs [supporting health information exchange] to really get the process started”\(^{68}\).

A key instrument for implementing the US strategy is a nationwide public-private collaborative called the Connecting Communities for Better Health Program. Each initiative involves communities of physicians, hospitals, labs, public health agencies, payers and other groups working together to make use of clinical applications and electronic connectivity to improve patient care\(^{69}\). Barack Obama has also pledged to invest $10 billion a year over the next five years to move US healthcare to adopt standards based health information systems, including EHRs\(^{70}\). These plans are expected to galvanise the healthcare industry and some of the largest US companies such as Microsoft and Google are already moving into the Electronic Health Record space.

There are two stand out regions in the USA with successful E-Health programs – the Cleveland Clinic and the Inland North-West Health Service (refer to details in Case Study 3: Regional, Non-Smart Card Approach (USA – NW Area Solution))

There is currently a ‘window of opportunity’ in Australia to drive this critical element of the health care agenda forward – we can’t waste this and must act quickly.

- In terms of the political environment: The political alignment between Federal, and most State and Territory governments and a reform mandate provides a conducive environment to implement initiatives of national significance, like E-Health. The challenges in health are no longer about ineffective management alone – there are real challenges, like an ageing population and an increasing need to fund health care for the elderly, increase in hospital admissions, the rise in chronic disease and workforce capacity to service both urban and rural Australia among others. The impact is being felt at the political level and long-term sustainability of healthcare and delivering better health outcomes requires action now – hence promises in the 2007 federal election focused on healthcare reform and the visible actions surrounding the Health and Hospitals Reform Commission.

- In terms of the policy environment: This is fundamentally about addressing security and privacy concerns. Lessons learnt from international E-Health experience are to keep legislative and policy changes to a minimum. It is more effective to apply an enabling approach to revitalise E-Health, and address obstacles, similar to the approach in Sweden and Germany than to try to legislate every aspect of E-Health. The Australian

\(^{68}\) Market Wire, “President Bush’s Address Puts Health IT in Spotlight”, February 2005

\(^{69}\) Market Wire, “President Bush’s Address Puts Health IT in Spotlight”, February 2005

\(^{70}\) [http://barackobama.com/issues/healthcare](http://barackobama.com/issues/healthcare)
environment already has regulations and policy that will enable many aspects of E-Health – by understanding the gaps that need to be addressed, and leveraging on other countries experiences a pragmatic and forward looking approach to policy and legislation can be adopted.

- In terms of standards, NEHTA has consolidated considerable progress to date in establishing the set of standards, identifiers and terminologies that can now form a foundation for E-Health applications being developed in Australia. In establishing a 'reference platform' E-Health applications can be tested and developed further. The HL7 V2 and SNOMED CT standards that have been endorsed are recognised internationally and ensure that local and overseas software vendors have a degree of certainty around the technical requirements for their products within the Australian healthcare market. The opportunity is now to better collaborate with these stakeholder groups to leverage the standards developed to deliver applications that are relevant to the healthcare industry.

- In terms of stakeholders, everyone involved (e.g. commonwealth, state, private sector, providers, suppliers, health informaticians etc.) has recognised the important role of E-Health. While in many instances they are keen to push ahead, there is varying opinion and support for the strategic options on how to achieve an end state.

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5. Conclusion & Recommendations

The National E-Health Information Principle Committee engaged Deloitte to develop a National E-Health Strategy due to be delivered September 2008. This document continues to be reviewed by major stakeholders (including the jurisdictions) and will inform the future E-Health agenda in Australia.

E-Health consists of a number of information technology and information management applications which can be implemented independently in order to achieve benefits which are additive when built to an integrated national plan. Overall these applications represent a significant quantifiable opportunity to the economy and will be beneficial to the quality of health care services and the patient journey. A rapid, phased program approach is recommended, combining nationally funded projects to implement key infrastructure applications and the ongoing development of standards for interoperability, security and privacy to support innovative projects across all health sectors.

Whilst several E-Health initiatives are already underway, significant effort and infrastructure is being duplicated across each of the Jurisdictions. NEHTA is playing a role at the National level to ensure appropriate standards are in place. There is a lack of collaborative national governance to ensure duplication is minimised when designing and implementing systems across the country. The planned outcomes in each jurisdiction need to be aligned. Furthermore, there is currently a lack of accountability and funding to support the expansion of highly successful initiatives already being used within certain communities.

E-Health is an enabler for addressing the objectives of the planned reform of the health sector currently being reviewed by NHHRC. Progress towards a SIEHR will reap dividends as individuals take on more control of and have greater access to their health information.

In order to realise the opportunities, four recommendations for immediate action are:

1. Prioritise the analysis and implementation of key “Quick Wins”

   Identified quick wins recommended for immediate action include:

   - Implement a limited functionality Electronic Health Record (EHR) with key data for chronic disease patients who may opt in on a voluntary basis. The Brisbane based GP Partners scheme (HRX) which is already connecting GPs, other specialists and hospitals should be enhanced initially using the National Service Improvement Frameworks approved by COAG for the following chronic diseases:
     I. Stroke, heart disease & vascular disease
     II. Cancer
     III. Diabetes

   Once the GP Partners system has been enhanced with these frameworks the solution should then be expanded to other communities, sharing the knowledge whilst adding to a national infrastructure. The key is that this implementation is quick, the clinical matter pertinent and the results tangible.
- Enhance Medication Management functionality and introduce medication decision support software – Adverse Drug Event monitoring is possible. A relatively minor enhancement could be made to PBS online to display a person’s medication list upon swiping their Medicare card to check for potentially dangerous combinations of drugs, doses, and usage. The system could be designed to automatically display appropriate warning messages at time of prescribing and dispensing. This initiative requires the coordination of many parties including PBS Online, the National Prescribing Service, the Australian Medicines Handbook, compilers of proprietary medicines databases and best practice guidelines, Medical and Pharmacy software vendors all collaborating with consumers, prescribers and dispensers of medicines. 

There should be confluence of work in this area including that being undertaken by pharmacists.

- Widening the Australian Childhood Immunisation Register data and expanding its application to provide a whole of life immunisation register that includes all administered vaccines with data being accessible to individuals and their providers using the Medicare card.

- Expansion of eHealthNT initiatives to other rural and remote areas – Upgrading and rolling out the highly successful system to encompass the needs of Aboriginal and Torres Strait Islander people into the North West of WA, North East Queensland and the Torres Strait (i.e. Capricornia) improving access to, continuity and quality of care. The major benefits of this expansion will be to those currently experiencing immense inequality of health and access to care.

Also a short review of the e-Prescribing functionality currently used within the NT should be performed to assess its suitability for implementation at a national level.

- Analysis of the business case for a Picture Archiving and Communications System (PACS) across the nation’s hospitals where all images are to be fully compatible and accessible from systems across the public and private, acute and community care sectors. The design for storage and access to the digital images should ensure that community providers are also able to gain access and have the appropriate infrastructure (i.e. bandwidth) to support the picture quality required for analysis and diagnosis. Indicate that this will be a requirement for radiology service accreditation.

2. Identify the optimal strategy for a National secure messaging solution and implement a solution

Define the optimal plan for transitioning this major piece of health infrastructure to the public sector or structure a potential private/public partnership to achieve desired public benefits, noting the proposed solutions in some jurisdictions (e.g. iHealth Care in Queensland72). National secure messaging and authentication is a vital piece of infrastructure for all health care providers to facilitate electronic communication and information exchange within a common secure environment. The current authentication system requires significant overhaul to make ensure the ease of its uptake and use as governed by the Electronic Transaction Act for Electronic and paper (sic) referrals and

72 General Practice Queensland, “iHealth Care – A Shot In The Arm For Better Patient Information Transfer”, 11 Aug 2008
requests (Cwth1999)\textsuperscript{73}. It is also required for supporting the following applications, the standards and designs for which have already been packaged by NEHTA, and are ready to be rolled out by 31 December 2008 and physically implemented for selected sites in each jurisdiction:

- **E-Pathology** – The penetration of pathology into clinical practice is all pervasive. Considerable progress has been made which would make the implementation of a fully functional pathology solution available in a very short time-scale initially in specific sites with a view to national adoption. This has been a key project undertaken by NEHTA. This will require review of improved times for result reporting\textsuperscript{74} and adherence to principles of Quality use of Pathology.

- **E-Referrals & E-Discharges** – The relevance to clinical practice of an accurate, timely, consistent, legible detailed referral and discharge note is vital and valuable to transfer and continuity of care and quality and safety. Considerable progress has been made and the implementation of a fully functional acceptable solution can be available rapidly: initially in specific sites with a view to national adoption. This has been a key project undertaken by NEHTA and is a key stepping stone in successful implementation of technology in health care.

- Additional infrastructure that should be ready soon for similar analysis and implementation includes **E-Prescriptions**. To capture under the “safety-net” cost and Over The Counter (OTC) medication, prescribing and dispensing data will need to be pursued to capitalise on the ability to prescribe and generate an electronic prescription by dispatching, receiving, dispensing and notifying of dispensing in a manner that is not intrusive, but flags where non-compliance or potential medication errors have occurred.

3. Create a detailed National Action Plan for E-Health initiatives and have it approved by the Council of Australian Governments (COAG) at the earliest possible juncture.

The plan should include the following aspects:

- Clearly defined national outcomes, including implementation of the projects defined below, and adherence to an overall National E-Health Strategy once it is agreed. This will incorporate a uniform standards framework and the local flair and innovation from various pilots that have been implemented.

- Defined scope of national initiatives in terms of business requirements, technical infrastructure and national standards that are clinically relevant and incorporate connectivity across the General Practice, Community based medical specialists, other non-medical specialist providers, pharmacy, private hospitals, aged care homes as well as the public hospital system. In time scope may increase to social services providers.

- A detailed review of the E-Health programmes that are currently planned or being implemented within the jurisdictions to identify aspects of the solutions that need to


\textsuperscript{74} www.achs.org.au; pathology clinical indicators volume 3
be rationalised and moved to a national approach or reused for greater benefits at the national level (e.g. Shared IEHR)

- A stakeholder map and change management strategy that addresses the needed activities and incentives to obtain engagement and buy-in.

- A detailed business case which leverages the work done to date on a national EHR but also quantifies the cost-benefit of other E-Health applications such as e-Prescribing, medications management, e-Referrals and e-Discharge summaries and assesses them by stakeholder group

- An execution roadmap for national initiatives showing interdependencies and impact of the major milestones of the jurisdictions’ E-Health programs, to include specific reference to the health informatics workforce necessary to progress E-Health.

- An implementation plan realising the expectation (and probably a requirement) that in order for services to attract Medicare and Private health insurance rebates / PBS subsidies, they will need to be referred to and discharged through the use of electronic secure messaging. This includes the patient and providers being identified by a Unique Health Identifier and authentication of providers adhering to the National Standards.

- Focused benchmarks and indicators for E-Health services to be developed for quality monitoring.

- A mechanism for reporting, monitoring & evaluating the progress of the E-Health program and realisation of the benefits based on benchmarks and KPIs to measure health outcomes.

- A national governance structure with responsibility for allocating funding and ensuring the realisation of E-Health benefits from initiatives at both national and jurisdiction levels.

4. Establish an empowered central expert E-Health organisation to drive the E-Health National Action Plan and implementation of “Quick Wins” forward at a national level. Such a body would encompass the experts and the key stakeholders in the development, use and implementation of E-Health and a sub-set would act as an Executive for E-Health.

Responsibilities of this committee should include:

- Overseeing the execution of the detailed national action plan above.

- Determining and guiding policy implementation and report to the Council of Australian Governments via the Department of Prime Minister and Cabinet as there are many Commonwealth agencies involved (i.e. DoHA, DHS, DBCDE, DSI, DVA, Defence).

- Incorporating objectives and work in progress of NEHTA to ensure a standards based framework is used to guide state and regional E-Health initiatives (including data, voice and image transfer capability) in a congruent manner.

- Partnering with the jurisdiction based E-Health implementation programs to provide funding (for which adherence to national standards and direction with wide connectivity beyond the public hospitals would be incumbent), support, guidance, and
to monitor progress (i.e. timeliness and quality of deliverables) while ensuring realisation of the anticipated benefits.

- Ensuring the related issues of information sharing, interoperability, data security, identification, authentication and privacy are addressed.
6. Appendices

6.1 Appendix 1: Case Studies of Interconnected Community Care

6.1.1 Case Study 1: GP Partners Health Record eXchange

GP Partners is based in North Brisbane and represents the largest GP Division in Australia. They are successfully operating the Health Record eXchange (HRX) service to members in their community. HRX is a shared electronic health summary and document exchange system used by general practitioners, hospital staff and other health care services to share critical patient information. More than two years in development, the HRX is currently being used in general practices and hospitals and by allied health providers and community centres in Brisbane’s northern suburbs.

At the core the system is a central repository that holds health summary information provided by and shared between multi-sector, multidisciplinary team members providing and managing patient care.

The goals of the HRX are to improve health outcomes for patients by:

- Reducing errors and duplication
- Assisting health care providers to coordinate care for patients with chronic and complex health problems
- Share patient health information in a timely manner.

The technology delivers a secure, scalable, interoperable platform for building a shared electronic health record network. Key to its success is its role in connecting the different health providers operating within or the largest GP Division in Australia. This includes a community of:

- Public Hospitals (The Prince Charles Hospital, Royal Brisbane and Women’s Hospital, Redcliffe Public Hospital)
- Private hospitals (Greenslopes Private Hospital, Wesley Hospital, St Andrew War Memorial Hospital)
- Allied Health providers and Community Services (North Brisbane)
- General Practices (53 practices in total)

The HRX application, supplied by a commercial vendor, uses open electronic health record standards (aligned with NEHTA’s standards) and automatically links with GP desktop software packages. Rather than replacing existing systems, the HRX provides the interoperable interface for sharing information between health care sectors.75

6.1.2 Case Study 2: Barwon Health

Barwon Health is the largest Regional Health Service provider in Victoria. It offers a range of general and specialist hospital, rehabilitation, residential and community services to the Geelong community and nearby regions.

Since 2003, The BOSS Electronic Clinical Solution has been providing patient management, electronic order entry and results review functionality to clinicians at the Geelong Hospital and Grace McKellar Centre, using traditional desktops, smart card operated terminals and handheld computers.

The Barwon Health Area have also implemented a Digital Medical Record (DMR) which went live at McKellar Centre in August 2008 and meant that all paper forms are now being scanned within 24 hours of a patients discharge. This facilitates clinician access to all the paper forms paper forms. The DMR will go-live at the Geelong Hospital site in October and then across all Community programmes by the end of 2008.

A significant achievement is that Barwon Health system incorporates the electronic transmission of discharge summaries, operation notes and O/P letters via HL7 to GPs and other specialists within the community. This effectively facilitates the sharing of electronic medical records from the acute sector to primary care within the community.

Furthermore, Barwon has established an extensive PACS system replacing the need for traditional hard copy films. This not only facilitates the transfer of radiology images between hospital departments but also streamlines the business process required in taking the X-Ray, can be sent electronically to community based specialists and ensures that the images are not lost by the patient after the patient after leaving the hospital.

The system that has been implemented by Baron Health Area is well in advance of the rest of the State E-Health program. Its relative success has been attributed by a strong, forward thinking Board that has been permitted to use fund in innovative initiatives to meet the demands of local clinicians, managers and patient groups.
6.1.3  **Case Study 3: PROSPER network in Germany**

The “Bundesknappschaft”, one of several hundred public health insurance firms in Germany, pioneered an integrated alliance network between primary care physicians, specialists, and hospitals in 1999. The system, called PROSPER has been implemented in different communities, illustrated by the map below:

These five community networks cover about 130,000 patients (recently expanded with the entry of a further health insurance company) and comprise more than 1200 physicians and specialists and nine hospitals. The basic network functions with patient booklets and enhanced connectivity of providers. It is currently being augmented with an electronic patient record compatible with the national health card.

The networks have been very successful, saving between 8–12 % of total patient treatment costs. Per region, this translates to approximately A$30M per year, and on a per-patient basis, the cost savings average A$560 per year. PROSPER describes the advantages for the different participants in the following fashion:

- Hospitals benefit from clear clinical pathways that are integrated with pre- and post-admission treatment. For example, patients suffering from certain types of coronary heart insufficiency may need hospitalisation up to 6 times per year due to excessive water in their bodies. As part of PROSPER, these patients are in an integrated program that increases physician and specialist participation in the treatment. Through this program alone, 15 days of hospitalisation can be saved per patient, a significant contribution to overloaded hospitals.

- Physicians and Specialists benefit from the networking. For example, with the patient booklet (and with the electronic patient record currently being introduced), all medications are logged and Adverse Drug Events can be avoided. Also, the participating providers are networked through information flows, training, conferences and expert advice on optimal clinical pathways, thus enhancing the teamwork for the benefit of the patient

The health insurance and the patients benefit from proven lowered costs (see above) while at the same time increasing the quality of medical care. Some of these lower costs have been passed on to the patients through lower or more stable insurance premiums or lower co-payments.

6.1.4  **Case Study 4: eHealthNT**

**Health Provider eXchange**

General Practice Network NT (GPNNT formerly TEDGP) subcontracted to implement:

- Secure Electronic Messaging Service (SEMS)
- Electronic Transfer of Prescriptions
- Shared Electronic Health Record (in 3 urban private practices)

**Secure ‘point to point’ electronic messaging**
- for all clinical communications between all health providers in the Territory
- Progressive implementation to over 400 sites

Hospital to GP Reports include:
- Inpatient Discharge Summaries Emergency Department Discharge Summaries
- Referrals IN to the hospitals through Emergency & Outpatients
- Outpatient specialist reports out to GPs
- *Automated Hospital Notifications out to the GPs*

**Electronic Transfer of Prescriptions**
- **Phase 1** – digitally signed prescriptions and medication charts to pharmacies via secure email (December 15, 2006)
- **Phase 2** – digitally signed prescriptions from GP to community pharmacy; full electronic processing (system to system downloads) with use of web services standards (April 10, 2008)
- **Phase 3** – advanced medication management in an aged care facility in conjunction with ETP 2 (May 7, 2008)
- **Phase 4** – advanced medication management on Admission and Discharge (using data from GPs' electronic referral to update hospital medication management chart; modified and then uploaded to hospital system. On discharge, medications available in electronic format to be uploaded to GP system if so desired and to shared electronic health record.

**Shared Electronic Health Record (in three urban private practices)**
- Three General Practices in Darwin urban region identified (MD3 sites)
- Feasibility study and workshops undertaken to determine appropriate implementation strategies in conjunction with Practice Principals and Practice Managers
- Commenced registrations May; go live June 2008

Builds on current NT Shared Electronic Health Record (SEHR)
- Over 25,000 consumers registered to participate (40% of total Indigenous population
- 90% uptake in Indigenous communities
- Strong consumer interest and support
- Consumer Advisory Group established with broad representation meets monthly
6.1.5 Case Study 5: Tele-Psychiatry

This simple example provides significant potential for improvement.

Following its introduction as an MBS rebate-able item in 2002/2003, the usage of these items (353, 355, 356, 357, 358, 359 and 361) has been very limited.

This reflects current practice, lack of infra-structure, and the current situation whereby the patient presents to the GP and together they have a consultation with the Psychiatrist. Any management agreed to is then acted upon the GP: only 1 MBS rebate is available for such a consult. This does not reflect services provided public mental health teams.
The charts below compare all MBS A8 items (Consultant Psychiatrist) with the Tele-Psychiatry and Tele-psychiatry alone.

<table>
<thead>
<tr>
<th>DATA: MBS (22/9/2008)</th>
<th>MBS A8 Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Psychiatry</td>
</tr>
<tr>
<td>2002/2003</td>
<td>2,048,618</td>
</tr>
<tr>
<td>2003/2004</td>
<td>2,012,725</td>
</tr>
<tr>
<td>2004/2005</td>
<td>1,990,820</td>
</tr>
<tr>
<td>2005/2006</td>
<td>1,997,162</td>
</tr>
<tr>
<td>2006/2007</td>
<td>1,967,914</td>
</tr>
<tr>
<td>2007/2008</td>
<td>1,929,661</td>
</tr>
</tbody>
</table>

6.2 Appendix 2: Comparison of International Approaches to Identification\(^{77}\)

<table>
<thead>
<tr>
<th>Country</th>
<th>Highlights</th>
<th>Identification</th>
<th>Sample Offline Functionality</th>
<th>Sample Online Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Significant Medical Functionality enabled via Token (current or planned)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Italy (Carta di Servizi Lombardy)</strong></td>
<td>9 million citizen cards, 160k providers since 2005</td>
<td>Token without photo (smartcard)</td>
<td>Emergency Data</td>
<td>Insurance Check, e-Prescribing, e-Referral, EHR</td>
</tr>
</tbody>
</table>

\(^{77}\) Booz & Company Analysis, 2008
<table>
<thead>
<tr>
<th>Country</th>
<th>Highlights</th>
<th>Identification</th>
<th>Sample Offline Functionality</th>
<th>Sample Online Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taiwan (Healthcard)</td>
<td>24 million citizen cards, health professional cards since approx. 2003</td>
<td>Token with optional photo</td>
<td>Emergency data, vaccinations, allergies, chronic diseases, maternity info, Insurance check</td>
<td>Periodic verification of card after longer time period of offline use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(smartcard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany (Gesundheitskarte)</td>
<td>80 million citizen cards, 2 million providers early apps in test phase</td>
<td>Token with photo</td>
<td>Emergency Data, possibly other data</td>
<td>Insurance check, e-Prescribing, Medication Log, e-Referral, EHR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(smartcard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>2 million citizens</td>
<td>Token without photo</td>
<td>Personal physicians, organ donation, emergency data (planned)</td>
<td>Insurance Check, e-Prescribing (planned)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(smartcard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Token used mainly as a Secure Insurance identifier</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France (Sesam Vitale 2)</td>
<td>53 million citizen cards 600k providers</td>
<td>Token with photo</td>
<td>Family doctor, organ donation</td>
<td>Insurance check, EHR planned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(smartcard)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austria (eCard)</td>
<td>11 million citizen cards 30k providers</td>
<td>Token without photo</td>
<td>Insurance check, Medical functions planned (e.g. e-Prescribing)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(smartcard)</td>
<td></td>
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<tr>
<td><strong>Identifier Card for Citizen ID only – functionality online</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>UK</td>
<td>61 million citizens</td>
<td>Paper card or ID process at</td>
<td>Informational – name, address and NHS number</td>
<td>All NHS Connecting for Health Applications in place or to be rolled out incl. EHR and others</td>
</tr>
<tr>
<td></td>
<td></td>
<td>provider (verifying forename,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>surname, date of birth, postcode, sex and address)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>No national approach to identification 300 million citizens</td>
<td>Plastic card with or without</td>
<td>Depending on insurance, pharmacies, HMO etc</td>
<td>Depending on insurance, pharmacies, HMO etc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>magnetic stripe in some instances, occasionally ask for POI including drivers licence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada (Health Infoway)</td>
<td>Issued by provinces as opposed to federal government 33 million citizens</td>
<td>Depending on province, dumb</td>
<td>Informational – e.g. name, date of birth, sex, province and personal health number</td>
<td>All Canadian Health Infoway Applications, e.g. Adverse Drug Events prevention etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>card with or without photo</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(magnetic stripe or paper)</td>
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</tbody>
</table>

### 6.3 Appendix 3: Case Studies of International Approaches to E-Health

#### 6.3.1 Case Study 1: Regional Smart Card Approach (Lombardia, Italy)

At the end of 1999, the regional government of Lombardia in Italy wanted to launch a program with two distinct goals: The first aim of the project was to improve the health care services, using innovative technologies such as multi-application cryptographic smart cards with digital signature (CRS – Carta Regionale dei Servizi – Regional Service Card), a
broadband secure Extranet to connect all health providers and collaborative middleware to enable web-based services.

**Figure 19 – Lombardia E-Health Model**

The second goal of the project was to host other ‘public and commercial services’ on the card (Electronic Payments, Loyalty programs, Digital Signature, TV services…) in order to increase the use and value of the Regional Service Card and to find additional third party financial sources for the public services delivery infrastructure.

The Lombardy region in Italy comprises about 9M citizens and over 160.000 health care operators (pharmacies, hospitals, general practitioners). This project – along with the smart health card in Taiwan – is one of the most advanced smartcard healthcare infrastructure in the world that has actually been rolled out and is being used on a daily basis. It includes a number of technical highlights: the cryptographic multifunction / multiplication card introduces full PKI for all nine million citizens (based on RSA 1024bit, 3DES 128bit), and includes the option of a digital signature for all users. The card can also be upgraded in the field if new applications or data is introduced or changed. In addition to the smartcard for citizens, a major part of the program was focused on networking of medical providers. The healthcare providers are all equipped with a Health Professional Card (which includes powerful digital signature functionality to sign e.g. prescriptions and referrals) and connected via an encrypted broadband extranet. The architecture is based on leading internet technologies (web services, SOAP, VPN):

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78 Booz & Company Analysis, 2008
The views expressed in this paper are those of the author(s) and should not be taken to be the views of the National Health and Hospitals Reform Commission or the Australian Government.

### Figure 20 – Lombardia E-Health Architecture

<table>
<thead>
<tr>
<th>Services Offered Through the Extranet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General services</strong></td>
</tr>
<tr>
<td>- Identification and authentication (for both operators and citizens)</td>
</tr>
<tr>
<td>- Digital signature (embedded in the card using PKI, RSA)</td>
</tr>
<tr>
<td>- Encrypted mail, …</td>
</tr>
<tr>
<td><strong>Health care services</strong></td>
</tr>
<tr>
<td>- prescription, booking, reception</td>
</tr>
<tr>
<td>- publication of medical report</td>
</tr>
<tr>
<td>- information of emergency process</td>
</tr>
<tr>
<td>- authorization to services</td>
</tr>
<tr>
<td>- acceptance (beginning of treatment)</td>
</tr>
<tr>
<td>- discharging (end of treatment), …</td>
</tr>
</tbody>
</table>

The program is very successful, with 100s of thousands of clinical results being published across the network, e.g. lab results, Emergency Department and surgery reports. In 2007, first trials began to create a “summary patient record" based on HL7 standards and accessible via web-browser or an XML compliant application.

**6.3.2 Case Study 2: National Smart Card Approach (Germany)**

In 2003/2004, Germany issued a law for the modernisation of the national healthcare system (Gesetz zur Modernisierung der gesetzlichen Krankenversicherung – GMG). Within this legislation, the lawmakers specified the introduction of a national health card scheme with the following three compulsory and six voluntary applications:

1. **Compulsory applications**
   - **German health insurance data** for treatment within Germany (administrative data)
   - **European health insurance** information for treatment abroad (EHIC)
   - **Electronic prescription exchange** between providers (physicians and pharmacies) and payers (insurance companies)

2. **Voluntary applications** (PIN restricted access voluntarily granted by the patient on a case-by-case basis)

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79 Booz & Company Analysis, 2008
- **Emergency data** – To enhance treatment of patients in an emergency (containing information on allergies, chronic illnesses, etc.) – no PIN restriction here to allow physician access in case of incapacitated patient

- **Medication interaction safety information** – Containing a medication log listing dates, relevant diagnosis, procedures and dosages of drugs obtained either on prescription or over-the-counter to enable checking for Adverse Drug Events with every medication the patient is taking each time he/she buys a new drug.

- **Electronic referral letter** – To enable providers to enhance communication with each other (e.g. physician to hospital, hospital to physician, general practitioner to specialist….)

- **Electronic patient health record** – To enhance communication between all healthcare partners and improve the quality of healthcare by building a personal healthcare history profile to reduce double diagnostics, mistreatment and improve information retrieval times

- **Patient receipt** – An electronic receipt detailing the costs incurred for health treatments

- **Patient personal data file** – Data storage for additional information that the patient would like to store on the card, e.g. blood sugar levels for a diabetic or other information not visible in any of the other applications

The scope of the applications and the rollout of the cards to more than 80 million insured and up to two million health professionals as well as the implementation of the required background infrastructure (secure communications and networking of about 250 health insurance companies, more than 2,000 hospitals, 21,000 pharmacies and 100,000 physician offices as well as corresponding databases, servers, card and application management systems etc.) currently makes this the most ambitious E-Health project in the world. The investment estimates for this endeavour range from 2.5 to about 7.6 billion AUS $.
The project has been plagued by delays since its inception. Originally, the lawmakers stipulated implementation in 2006; however, conflicts of interest between stakeholders repeatedly pushed this deadline back. The program is now in an extended testing phase with seven regions of 10,000 users, 15 GPs and 7 pharmacies each. Four hospitals are also taking part. The current (still preliminary) timeline envisioned is indicated below.

Figure 22 – Preliminary Timeline for German E-Health Program
6.3.3  Case Study 3: Regional, Non-Smart Card Approach (USA – NW Area Solution)

The United States has – in aggregate – the most expensive healthcare system in the world (see chart). Due to the history of the US, this system is also highly privatised and because of the many different stakeholders and intense economic pressures, it drives different “pockets of innovation” which manifest themselves in different geographic regions and different types of companies.

Figure 23 – Global Healthcare Expenditure Comparison

Total expenditure on health as % of GDP (2005)

<table>
<thead>
<tr>
<th></th>
<th>% of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>15.3%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>11.6%</td>
</tr>
<tr>
<td>Germany</td>
<td>10.7%</td>
</tr>
<tr>
<td>Canada</td>
<td>9.8%</td>
</tr>
<tr>
<td>Australia</td>
<td>9.5%</td>
</tr>
<tr>
<td>Sweden</td>
<td>9.1%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>9.0%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>8.3%</td>
</tr>
<tr>
<td>Ireland</td>
<td>7.5%</td>
</tr>
</tbody>
</table>


One of the very innovative players in the US market is a company called INHS (Inland Northwest Health Service). This not-for profit organisation in Washington State was created in 1994 by two competing hospital systems to provide shared services for both, which initially focused on critical air ambulance services, an inpatient rehabilitation hospital and integrated hospital information systems. Today, INHS has expanded throughout parts of the US and comprises almost 40 hospitals, including a VA facility and a US Air Force base). In the hospitals, more than 1,000 physicians can wirelessly access patient data e.g. via PDAs and more than 450 clinics and physician offices are connected to the system. In addition, 65 hospitals, clinics and public health agencies are connected to the INHS TelE-Health network, which provides Tele-Emergency Room and Tele-Pharmacy services. 11 of the INHS hospitals have won praise in form of the US “most wired” hospital awards.

INHS provides a number of IT services to its members. For example, hospitals can be provided with a turnkey hospital information system to run medical records, pharmacy and financials, or their existing systems can be integrated with the INHS backend system. This backend system offers e.g. a shared electronic medical record system which operates in all hospitals and clinics, providing one standardised clinical data structure and presentation,

81 The commercial off-the-shelf system that is used is that provided by Meditech, the largest E-Health systems provider in USA but does not have a presence for its software solutions in Australia
including visit histories and transcription reports (e-sign), cumulative lab results and radiology reports, information on patient demographics, computerised physician order entry and a patient has unique Master Patient Index. Equally, INHS backend systems can integrate with a number of GPs systems. However, INHS recommends the use of GEs Centricity system for practice management and Electronic Medical Records. The Centricity system is being provided in an ASP format and is fully web accessible.

In discussions with INHS, they felt aspects of their system could be rolled out in Australia provided local partners were identified to support the implementation. It should also be noted that while this system is currently non-token based, INHS is testing smartcards to aid in the identification of their customers.
6.4 Data Sets in USA: Example of Benchmarks and Indicators

In the USA data on relative hospital performance was recently made publicly available to consumers, providers and funders via the Internet. The figure below provides an image from this tool delivering information on the top 100 performing hospitals for heart attacks.

**Figure 24 – USA Hospitals – 100 Best Performing for Heart Attacks**

It must be noted that whilst this information may make consumers feel empowered to make certain health decisions, making this data on hospital performance public may lead to misunderstandings or anxieties amongst the patient community. For example, comparisons of hospital performance must consider a variety of factors such as local community demographics and transfers with other nearby hospitals for particular episodes. The key benefit to note here is that E-Health applications provide more timely information for performance management of health services that could be used to identify areas of the system that are in the most need of additional resources or investment. It also allows for medical insurers to negotiate with hospitals. For example, Medicare in the US is ready to implement “quality matrixes” to pay healthcare organisations based on adherence to “medical best practices”.

The case for change is driven by the multiplicity of factors which require smarter working practices by all those involved in health care. Our finances, our health workforce, our resources physical and intellectual are all in need of optimisation to ensure we achieve the best outcomes.

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82 Bower, B., “Hospital death rates unveiled for first-time comparison”, USA Today, 21 August 2008
### 7. Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACCHS</td>
<td>Aboriginal Community Controlled Health Services</td>
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<tr>
<td>ADE</td>
<td>Adverse Drug Effects</td>
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<tr>
<td>AHMAC</td>
<td>Australian Health Ministers’ Advisory Council</td>
</tr>
<tr>
<td>AHMC</td>
<td>Australian Health Ministers’ Conference</td>
</tr>
<tr>
<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
</tr>
<tr>
<td>ASP</td>
<td>Application Service Provider</td>
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<tr>
<td>COAG</td>
<td>Council of Australian Governments</td>
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<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
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<tr>
<td>DBCDE</td>
<td>Department of Broadband Communications and Digital Economy</td>
</tr>
<tr>
<td>DHS</td>
<td>Department of Human Services</td>
</tr>
<tr>
<td>DoHA</td>
<td>Department of Health and Ageing</td>
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<tr>
<td>DVA</td>
<td>Department of Veterans’ Affairs</td>
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<tr>
<td>EHR</td>
<td>Electronic Health Records</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GP</td>
<td>General Practice</td>
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<tr>
<td>GPs</td>
<td>General Practitioners</td>
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<tr>
<td>HIC</td>
<td>Health Insurance Commission</td>
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<tr>
<td>HRX</td>
<td>Health Record eXchange</td>
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<tr>
<td>IEHR</td>
<td>Individual Electronic Health Record</td>
</tr>
<tr>
<td>INHS</td>
<td>Inland Northwest Health Service</td>
</tr>
<tr>
<td>IM</td>
<td>Information Management</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>KPIs</td>
<td>Key Performance Indicators</td>
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<tr>
<td>MRI</td>
<td>Magnetic Resonance Imaging</td>
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<tr>
<td>NASH</td>
<td>National Authentication Service for Health</td>
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<tr>
<td>NEHIPC</td>
<td>National E-Health Information Principal Committee</td>
</tr>
<tr>
<td>NEHTA</td>
<td>National E-Health Transition Authority</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Government Organisation</td>
</tr>
<tr>
<td>NHHRC</td>
<td>National Health and Hospitals Reform Commission</td>
</tr>
<tr>
<td>NHHRC</td>
<td>National Health and Hospitals Reform Commission</td>
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The views expressed in this paper are those of the author(s) and should not be taken to be the views of the National Health and Hospitals Reform Commission or the Australian Government.
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OTC</td>
<td>Over the Counter</td>
</tr>
<tr>
<td>PACS</td>
<td>Picture Archiving and Communications System</td>
</tr>
<tr>
<td>PBS</td>
<td>Pharmaceutical Benefits Scheme</td>
</tr>
<tr>
<td>PIP</td>
<td>Practice Improvement Program</td>
</tr>
<tr>
<td>SMR</td>
<td>Standard Mortality Ratio</td>
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<tr>
<td>UHI</td>
<td>Unique Healthcare Identifier</td>
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