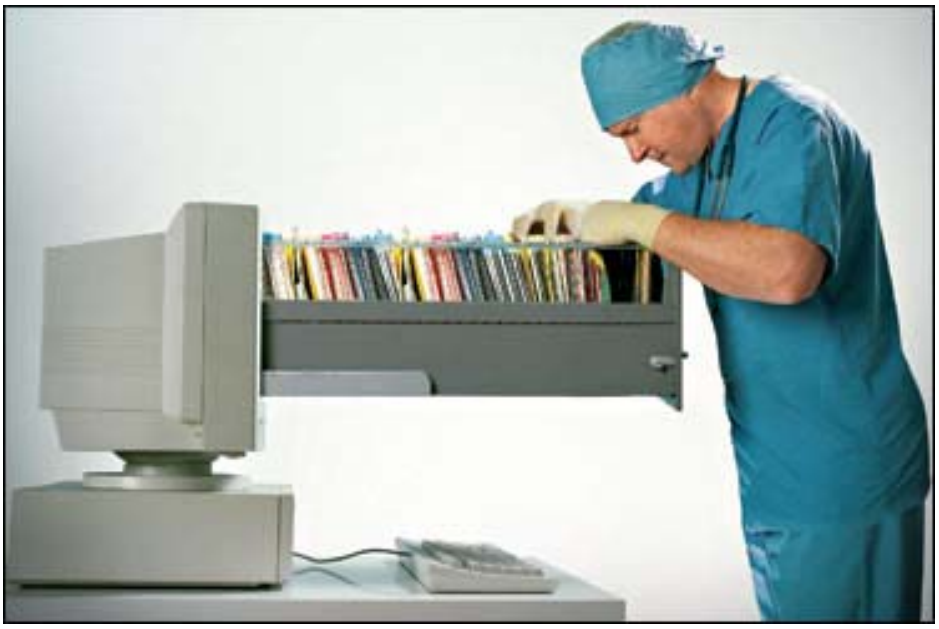
Deloitte.

National E-Health and Information Principal Committee

National E-Health Strategy

30th September, 2008



Contents

‘Deloitte’ refers to the Australian partnership of Deloitte Touche Tohmatsu and its subsidiaries. Deloitte, one of Australia’s leading professional services firms, provides audit, tax, consulting, and financial advisory services through more than 4000 people across the country. Focused on the creation of value and growth, and known as an employer of choice for innovative human resources programs, we are dedicated to helping our clients and our people excel. For more information, please visit Deloitte’s web site at www.deloitte.com.au.

Deloitte is a member of Deloitte Touche Tohmatsu (a Swiss Verein). As a Swiss Verein (association), neither Deloitte Touche Tohmatsu nor any of its member firms has any liability for each other’s acts or omissions. Each of the member firms is a separate and independent legal entity operating under the names “Deloitte”, “Deloitte & Touche”, “Deloitte Touche Tohmatsu” or other, related names. Services are provided by the member firms or their subsidiaries and affiliates and not by the Deloitte Touche Tohmatsu Verein.

Liability limited by a scheme approved under Professional Standards Legislation.

1 Introduction

1.1 The Need for E-Health

Australia has one of the best health systems in the world based on the health outcomes of its citizens. However, maintaining or improving the health outcomes of Australians will require a fundamental change in approach to the way health care is delivered in this country.

The Australian health care system is straining to deal with increasing cost and demand pressures and a shortage of skilled health care workers. Given this reality, we need to move to a system where every interaction between consumers and care providers achieves maximum impact on health outcomes and where scarce financial and human resources are deployed as effectively as possible. Most of all we must draw upon the latent capacity in the system represented by consumers themselves playing a more active role in the protection and management of their personal health outcomes.

This change will require a fundamental shift in the way information is accessed and shared across the health system. We have to move away from a reliance on tools such as pen, paper and human memory to an environment where consumers, care providers and health care managers can reliably and securely access and share health information in real time across geographic and health sector boundaries. The only way this can be achieved is through the implementation of world class E-Health capability.

The World Health Organisation defines E-Health as 'the combined use of electronic communication and information technology in the health sector.' In more practical terms, E-Health is the means of ensuring that the right health information is provided to the right person at the right place and time in a secure, electronic form for the purpose of optimising the quality and efficiency of health care delivery. E-Health should be viewed as both the essential infrastructure underpinning information exchange between all participants in the Australian health care system and as a key enabler and driver of improved health outcomes for all Australians.

1.2 Impact on Australian Consumers

The difference that world class E-Health capabilities can make to the delivery of care and the improvement in health care outcomes can be understood through consideration of indicative consumer care delivery scenarios .

Young Child Scenario

Seven year old Tom injured his arm in a Saturday afternoon game of football and was in pain. His mother took him to the emergency department of the local hospital, where the doctor arranged for an X-ray in the radiology department. The X-ray was made available electronically to the doctor who was promptly able to diagnose the injury as a fracture. The doctor applied a cast to the broken limb, and prescribed medication to assist with the management of Tom's pain.

When Tom was discharged, an electronic discharge summary was sent to his regular GP with information about when Tom was admitted and discharged, the nature and treatment of the injury, and the recommended follow-up.

This allowed Tom's GP to see when the injury needed to be re-assessed and an appointment was made accordingly. This meant that Tom and his family did not need to return to the hospital for additional injury assessment, only for the removal of the cast. It also informed the GP of which medications had been prescribed, reducing Tom's risk of receiving additional medications or medicines which might have an adverse reaction when used in combination.

Chronic Disease Scenario

Mrs Jones is a 68 year old lady who has been diagnosed with a chronic illness. Her GP determines that Mrs Jones would benefit from attending sessions with allied health professionals and educators who are able to assist with her condition. Mrs Jones' GP uses an electronic care planning system which assists in development of a team care plan tailored to her specific needs.

Through the care planning system, the GP has access to a registry of care providers and can search for suitable health professionals. During a consultation, Mrs Jones and her GP identify and discuss which care providers she would prefer to meet, taking into account geographic location. A printed map of each relevant location is then generated to assist Mrs Jones attend appointments.

The GP sends an electronic notice inviting each healthcare provider to participate in Mrs Jones' care. On acceptance of this invitation, and with Mrs Jones' permission, the GP sends relevant information from her electronic health record to each team member. When Mrs Jones arrives for her appointments she is not required to relay her medical history, provide paper documents or remember test results. For Mrs Jones, this may reduce unnecessary visits to healthcare providers and improve the effectiveness and timeliness of her care.

Aged Care Scenario

Mr Egan is a resident in a Residential Aged Care Facility that has been equipped with software enabling the electronic transfer of prescriptions.

As part of this system, Mr Egan's GP also has access to electronic decision support regarding the medicines prescribed. This alerts the GP to any potential adverse reactions between the multiple medications that may be prescribed.

Since the introduction of the software, Mr Egan is no longer required to travel from his residence to the pharmacy to collect his prescription medications, nor is he required to send a paper prescription with a resident carer. His prescriptions are sent electronically to the pharmacy, reducing possible errors caused by mis-reading handwriting or the re-keying of information. Mr Egan's carers and nurses also have real-time access to the status of his prescriptions, ensuring that they are aware of which medications have been ordered or dispatched.

Indigenous Scenario

An indigenous resident of a remote area of Northern South Australia, English is Sally's third language and she finds it difficult provide a full medical history when attending unfamiliar health care facilities.

Recently Sally had taken a trip from her home to a ceremony taking place 150 km away in the Northern Territory. While there, she was involved in an accident and badly sprained her ankle. Sally attended the local medical centre for assistance but had difficulty communicating to the attending healthcare provider that she had allergies to certain medications.

Sally was registered with the Northern Territory Electronic Health Record program, and her medical history was available immediately. The doctor was able to see that she suffered from an allergy to a common anti-inflammatory drug. Once this allergy was identified, her treatment was determined accordingly and Sally was able to avoid a potentially harmful administration of a routinely prescribed drug.

1.3 Recommended Actions

In order to build world class E-Health capability Australia should embark on a strategy of national E-Health coordination and alignment. This will involve the establishment of national frameworks and infrastructural components that can be leveraged at national, State and Territory, regional and local levels to deliver solutions that are able to be integrated and share data across geographic and health sector boundaries. The recommended strategy encourages national alignment and connectivity whilst providing the States and Territories, individual care providers and care provider organisations with the ability to take different approaches to solving their specific E-Health challenges.

National action should be focused in four key areas:

- **Implementing the national 'health information highway'** infrastructure and rules to allow information to be seamlessly accessed and shared across the Australian health care system
- **Stimulating investment in high priority computer systems and tools** that will deliver tangible benefits to consumers, care providers and health care managers
- **Encouraging health sector participants to adopt and use high priority systems and tools** as they become available
- **Establishing an E-Health governance regime** to enable effective coordination and oversight of national E-Health activities.

Summary of Recommendations

R-1 Implement a set of national E-Health foundations to provide a platform for health information exchange across geographic and health sector boundaries.

R-1.1 Design and implement a national solution to enable the unique identification and authentication of Australian consumers and care providers.

R-1.2 Design and implement a consistent national legislative framework for information protection, privacy and consent.

R-1.3 Design and implement national E-Health information standards for data and message structures, coding and terminologies and information display.

R-1.4 Establish mechanisms to encourage care providers to invest in the implementation and maintenance of an acceptable baseline of computing infrastructure.

R-1.5 Coordinate the rollout of appropriate national broadband services to all care providers.

R-2 Foster and accelerate the delivery of high priority E-Health solutions by vendors and care provider organisations in a nationally aligned manner.

R-2.1 Establish a national fund to encourage investment in the development and deployment of high priority, standards compliant and scalable E-health solutions.

R-2.2 Establish a national compliance function to test and certify that E-Health solutions comply with national E-Health standards, rules and protocols.

R-2.3 Adopt a nationally coordinated approach to the development of consumer and care provider health information portals and an electronic prescriptions service.

R-2.4 Adopt an incremental and distributed approach to development of national individual electronic health records (IEHRs).

R-3 Encourage health care participants to adopt and use high priority E-Health solutions and modify their work practices to support these solutions.

R-3.1 Design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers.

R-3.2 Establish financial incentive programs, targeted primarily at key private provider segments, to encourage the adoption and use of high priority E-Health solutions.

R-3.3 Facilitate changes to national care provider accreditation regimes to make the adoption and use of E-Health solutions a core accreditation requirement.

R-3.4 Implement changes to vocational and tertiary training programs to increase the number of skilled, nationally available E-Health practitioners.

R-3.5 Establish national E-Health stakeholder reference forums and working groups with cross sectoral representation and clearly defined objectives and goals.

R-4 Develop a governance regime which allows strong coordination, visibility and oversight of national E-Health work program activities.

R-4.1 Establish a national E-Health governing board that reports to AHMC, has an independent chair and has a breadth of cross sectoral stakeholder representation.

R-4.2 Establish an independent national E-Health regulation function to implement and enforce national E-Health regulatory frameworks.

R-4.3 Establish a national E-Health entity incorporating strategy, investment management, work program execution, standards development and compliance functions.

R-4.4 Leverage NEHTA to establish the new entity and undertake a transition process to address changes to accountabilities, brand, culture, resources and operating model.

2 The Australian Health Care System

2.1 Overview of the Australian Health Care System

2.1.1 Australia's Health

A healthy population underpins strong economic growth and community prosperity. Australians therefore have a strong incentive to ensure that our health system is operating efficiently and effectively, and continues to deliver a high standard of care that aligns with both community and individual priorities.

Australia's health care system services a diverse population of approximately 21.3 million residents across a very wide range of geographic and socio-economic settings. Against many key indicators of population health, Australia performs very well relative to its international peers. Organisation for Economic Cooperation and Development (OECD) and Australian Institute of Health and Welfare (AIHW) data indicates that at an average of 81.4 years, Australians enjoy one of the longest life expectancies in the world and falling incidences of many major diseases[1]. Whilst cardiovascular diseases, cancers and respiratory diseases remain the leading causes of death overall, death rates are falling for many of our leading health concerns, such as cancer, heart disease, strokes, injury and asthma.[2]

Australia's burden of disease has shifted from primarily demands for episodic and acute care towards chronic care, often as a result of preventable, illness. There is broad recognition from consumers, care providers and health care managers of the need for a health system that focuses on prevention and wellbeing management. Tobacco smoking, high blood pressure and overweight/obesity are the most significant prevention opportunities.[3] Incidence of diabetes has more than doubled in the past two decades. In 2004-05 approximately 7.4 million Australian adults were overweight and over a third of those were obese (based on self reports). [4]

2.1.2 Australia's Health Care System

Australia's health care system is comprised of a complex mix of public and private care providers, funded through a combination of payments by the Australian, State and Territory Governments, private health insurance and consumers.

The Australian health care system is one of Australia's largest and most complex industry sectors. In 2006, around 750,000 people were employed in the health services industry, including 39,000 general practitioners, 16,300 pharmacists and 12,700 dentists.. This equated to nearly $87 billion in that year, or approximately nine per cent of GDP.[5] In this year the Australian, State, Territory and Local Governments spent $58.9 billion on health services which represented 67.8 per cent of total health expenditure. The remainder was paid by

1 Australian Institute of Health and Welfare, *Australia's Health 2008: The eleventh biennial health report of the Australian Institute of Health and Welfare*, AIHW cat no. AUS 99, Canberra, 2008.
2 ibid.
3 ibid.
4 ibid.
5 ibid.

individuals, health insurance funds and workers compensation and compulsory motor vehicle third party insurance providers.[6]

Health care service is delivered via a complex network of public and private sector care providers. In 2008, the Australian health care system comprises more than 1,300 hospitals around Australia. On a typical day around 19,000 Australians are admitted to a hospital, with about the same number leaving, and there are almost 125,000 non-admitted services.

Australian, State and Territory Governments have respective (including joint) responsibilities for policy, funding and monitoring in key areas of health service delivery.

State and Territory Governments own and run public hospitals which provide services that are free at the point of delivery for all Australians. They are also responsible for delivering a range of community health, mental health, patient transport, dental and public health services, mostly at no charge for consumers.

The Australian Government has responsibility for policy development, health care funding and service regulation. The Australian Government provides funding to State and Territory Governments through Australian Health Care Agreements (AHCA) to help fund the delivery of public hospital services. It also provides rebates that assist patients to meet some or all of the costs of the medical services provided by independent, private sector providers such as GPs, pharmacists, radiologists, pathologists and private clinical specialists. The Australian Government has responsibility for administering and funding Medicare and the Pharmaceutical Benefits Scheme and for the regulation of the private health insurance industry.

2.1.3 Implications for E-Health

The nature of the Australian health care system has a number of implications for E-Health in this country. First and foremost the complex and fragmented nature of the service delivery landscape has resulted in the creation of a vast number of discrete silos or islands of information across all parts of the health system. This has created significant barriers to the effective sharing of information between health care participants and poses real challenges when trying to understand and report what is really happening in the Australian health care system.

The complexity of Australia's health funding and accountability arrangements also makes it very difficult to ensure effective collaboration between, and alignment of, the many largely autonomous public and private sector providers of Australian health care services. This manifests itself in the lack of a coherent and coordinated national strategy for health care which should ideally be in place to guide the development and prioritisation of a national E-Health Strategy. It also often results in political and governance barriers rather than technical barriers being placed in the way of national E-Health progress.

The increasing incidence of chronic disease is resulting in a shift from episodic, acute based care to an environment where the vast majority of care is being delivered in community settings. With the strategic emphasis changing to keeping people out of the acute sector as far as possible, there is an increasingly important need to better support primary and community care providers with the tools they need to access and share relevant health information.

[6] Productivity Commission, *Report on Government Services 2008*, Canberra 2008.

2.2 Health System Challenges

2.2.1 Health Sector Trends

The Australian health care system is facing a number of challenges that threaten its future sustainability if not addressed. These challenges are similar in nature to those experienced by other developed Western nations and include the following.

Increasing incidence of chronic disease - An estimated 25 per cent of all Australians currently suffer from a chronic illness, and this is projected to increase markedly over the next 20 years.[7] For example expenditure on treating diabetes is projected to increase by approximately 400% over the next 25 years.[8] The needs of patients with chronic disease are different from patient's requiring acute or episodic care. Patients with chronic conditions require health care management over an extended period of time, often across multiple care providers. The increasing incidence of chronic disease is driving, and will continue to drive, a need for better coordination of service delivery across different parts of the health sector.

Persistent health inequalities - Disadvantaged Australians have inequitable health outcomes when compared with those who have social and economic advantages. Socio-economically disadvantaged people, indigenous Australians, and those living in rural and remote areas typically experience poorer health outcomes when compared with other segments of the population. These groups are generally less healthy than other Australians, have poorer access to health care, die younger, have greater levels of disability and a lower quality of life[9]:

- Indigenous people have a burden of disease that is 2.5 times higher than the general population.[10]
- Remote and regional areas of Australia have lower life expectancies at birth than the major cities, and a greater number of years lost to death and disability.[11]

An ageing population - Over the next forty years, the number of people over 65 in Australia is forecast to almost double to a point where they comprise an estimated 25% of the population.[12] People over the age of 65 place higher demands on the health care system. Health expenditure on those aged over 65 is approximately four times higher than expenditure on those under 65, and rises to between six to nine times higher for the oldest age groups.[13] The increase in the ageing component of our population will also see a relative decrease in the working age population, reducing the available taxation base from which to fund health care and contributing to workforce shortages.

New technologies and increasing consumer expectations - Advances in medical technology coupled with increased consumer expectations have been a major driver of increased health spending in recent years.[14] Australians now expect access to more expensive and complex diagnostic and medical procedures and new (and more expensive) medications listed on the

---

7 Australian Institute of Health and Welfare. *Health System Expenditure on Disease and Injury in Australia, 2000-01*. AIHW cat. no. HWE 26 Canberra, 2007.

8 ibid.

9 Australian Institute of Health and Welfare, *Australia's Health 2008*.

10 Australian Institute of Health and Welfare, *The Burden of Disease and Injury in Australia 2003,* AIHW cat. no. PHE 82 Canberra, 2007.

11 ibid.

12 Commonwealth of Australia, *Intergenerational Report 2007*, Canberra, Part 2, 2007.

13 Productivity Commission, *Economic Implications of an Ageing Australia*, Research Report, Canberra, 2005.

14 Productivity Commission, *Impacts of Advances in Medical Technology in Australia*, Research Report, Melbourne, 2005.

Pharmaceuticals Benefits Scheme (PBS). They are also living longer which is increasing the demand for multiple interventions such as hip and knee replacements.[15]

Consistently rapid advances in medical research and technology are also creating a significant knowledge management challenge for health care professionals who are trying to keep up to date with new medical developments and the best available clinical evidence.

Health workforce supply and distribution - The performance of the Australian health care system is highly dependent on the presence of a skilled workforce with the appropriate capability and capacity to respond to health care needs. There is a range of health workforce shortages across the sector including medical, nursing, dental, ambulatory and allied health professionals. Health care workforce shortages are greater in rural and remote areas and in indigenous communities, due to the concentration of many highly trained professionals in urban and metropolitan areas.[16] The exact nature of the workforce shortage is difficult to quantify, however research has found:

- An estimated shortage of between 800 to 1,300 GPs in 2013 (or around 4 to 6 per cent of the current GP workforce)
- An estimated shortfall of between 10,000 to 12,000 nurses in 2006
- Current and emerging shortages in the majority of medical specialties.[17]

These factors are severely stretching the financial, physical and human resources of the Australian health care system and raising real questions about the future sustainability of this system in its current form. Health expenditure as a proportion of Australian GDP has more than doubled over the last four and a half decades, from 3.8% in 1960-61 to 9.0% in 2005-06.[18] Over the same period, constant health expenditure per person increased from $974 to $4,066.[19] The growth of health care spending as a proportion of GDP is expected to continue, increasing up to 16 to 20% of GDP projected by 2045.[20]

It is difficult to see how current health care demand, cost and workforce trends and pressures can be absorbed by the Australian health care system without significant reform. Better sharing and use of information across the health sector will directly contribute to safer, more efficient and more cost effective care delivery and hence should be viewed as an integral part of any national strategic response to this situation.

2.2.2 Current System Issues

In addition to these emerging challenges, there are issues that relate to the efficiency and effectiveness of the current operation of the Australian health care system. These issues can be expressed in terms of their impact on the three key groups of Australian health care stakeholders - consumers, care providers and health care managers. In every instance, they result directly from the poor quality and accessibility of health information across the Australian health care system.

---

15 Productivity Commission, *Impacts of Advances in Medical Technology in Australia.*.

16 Productivity Commission, AHWAC 2004 data in *Australia's Health Workforce*, Research Report, 2005.

17 ibid.

18 Australian Institute of Health and Welfare, *Health Expenditure Australia 2005–06*. Health and Welfare Expenditure Series no. 30. Cat. no. HWE 37. Canberra, 2007.

19 Australian Institute of Health and Welfare, *Interactive Expenditure Data: Health Expenditure Data Cubes*, <http://www.aihw.gov.au/expenditure/datacubes/index.cfm>, September 2008.

20 Productivity Commission, 'Technical Paper 4: Total Health Expenditure', *Economic Implications of an Ageing Australia:*, Research Report, Canberra, 2005.

.

Consumer Perspective

Effectiveness (quality and safety) challenges

Consumers have a very limited ability to access and share their health information as this information is stored in many different locations across the Australian health care system , typically in a mix of electronic and paper based forms. This places greater reliance on an individual consumer's knowledge of their health data and raises the very real risk of diagnosis or treatment errors due to incomplete or inaccurate information being provided at the point of care.

The fragmentation of consumer health information within the Australian health care system is particularly problematic for consumers with complex or chronic conditions who depend on health care management over an extended period of time, often across multiple care providers. Consumers in this category typically have to become the primary information source responsible for remembering and communicating their health information, including their medications, medical histories and treatment plans. They also have to personally manage their health care plans without the support of processes that remind them of their appointments or alert them to important changes in their condition that may require action.

Consumers are also increasingly using the internet for advice on health related matters. This introduces a new area of health risk as it is difficult for consumers to know what internet based health information they can rely on.

Efficiency (time and cost) challenges

Consumers currently waste time repeating the same information to different providers involved in the delivery of their care. They also often have to expend unnecessary time and effort coordinating different aspects of their care such as booking appointments and obtaining and providing relevant health results.

Care Provider Perspective

Effectiveness (quality and safety) challenges

The lack of access to timely, accurate and complete consumer health information limits the ability of care providers to make informed decisions at the point of care and increases the risk of diagnosis and treatment errors. Care providers also currently have limited access to clinical decision support tools and automated medications and test ordering solutions that would directly reduce the risks associated with prescribing and administering drugs and ordering diagnostic tests.

When dealing with consumers, particularly the elderly or those suffering complex or chronic conditions, care providers are often faced with the situation of having to piece information together from multiple fragmented sources in order to determine the most appropriate course of action. Such an environment exposes consumers with complex or chronic conditions that rely on the coordination of care across multiple providers to the increased risk of harm.

Care providers currently have a limited ability to monitor the effectiveness of their treatments in terms of consumer health outcomes as the data required to make these judgments is either not available, not up to date or too fragmented to be useful.

Efficiency (time and cost) challenges

Care providers face a serious risk of performing unnecessary or duplicated treatment activities including the re-ordering of costly diagnostic tests due to a lack of information regarding a consumer's health condition and history.

Care providers also have to spend significant time and effort manually coordinating care delivery and sharing information with other providers across the continuum of care.

Health Care Manager Perspective

Effectiveness (quality and safety) challenges

Policy makers, clinical managers, health service managers and researchers do not have access to health related information that is of sufficient quality, completeness and granularity to design and deliver improved treatment regimes and more targeted preventative health programs. Limited information relating to epidemiological trends and the effectiveness of interventions and prevention programs makes it difficult for health care managers to make informed decisions about:

- The design, development and implementation of more effective prevention programs that can reduce demand on the acute sector, delay the onset of preventable diseases, and improve health and well being of target population segments
- The effectiveness of public health programs
- Identifying at risk individuals and populations through an improved ability to conduct surveillance for acute, chronic and epidemic diseases
- Improving clinical practice and treatment design.

In addition to the above, the lack of access to up to date, comprehensive and accurate data on health system activities and outcomes makes it virtually impossible to undertake meaningful or rapid evaluation of the dangers of particular treatments or medications or to be able to assess in real time the spread of flu or other epidemics.

Efficiency (time and cost) challenges

Operationally focused health care managers have to rely on incomplete, fragmented and untimely information when trying to identify opportunities to improve the efficiency of the Australian health care system. Resource planning and scheduling systems are generally of a poor quality and not integrated across different parts of the health sector. Limited system performance information and poor quality operational systems directly impact the ability of health care managers to make informed decisions about where to best allocate funds and resources to improve the throughput and cost effectiveness of the Australian health care system.

Health care managers spend time trying to collect and integrate information from a wide range of non integrated paper and electronic data sources. It is also currently very difficult for operationally focused health care managers to share information on what works and hence to foster consistent sector wide efficiency improvements.

2.2.3 Impact of Current System Issues

Community expectations for a health system that is accessible, safe, high quality and sustainable is undermined by the limited support for health information flows and processes.

Poor quality care — Significant research has been undertaken in a number of care environments that has shown that poor information sharing is a major cause of preventable errors that compromise the quality and safety of patient care. For example, in 2005 NSW public hospitals were asked to report to the NSW Department of Health all serious incidents, mishaps or events resulting in preventable patient harm; poor communication was identified to be the root cause in 25% of all preventable errors.[21] Within intensive care units, an Australian study found that poor communication was the primary reason for errors in 37% of all cases.[22] A 1998 study of adverse events in Australia found that approximately 50% of all adverse events detected by general practitioners were associated with communication

[21] NSW Health, *Patient Safety and Clinical Quality Program: First Report on Incident Management in the NSW Public Health System 2005-2006*, NSW Department of Health, 2006.

[22] Donchin Y, Gopher D, Olin M, et al, 'A Look into the Nature and Causes of Human Errors in the Intensive Care Unit', *Crit Care Med,* 23: 294-300, 1995.

difficulties.[23] This was strongly supported by a 2002 study finding that up to 18% of medical errors are estimated to be due to the inadequate availability of patient information.[24]

Costly system inefficiencies — Poor communication also results in costly system inefficiencies that waste the time and resources of health care professionals and care providers. The Australian Audit Commission estimated that approximately 25% of a clinicians' time was spent collecting information rather than administering care[25] and, although a relatively old data point, there is little reason to assume matters have improved markedly in many parts of the health sector in the intervening years. An Australian study found that 2-4% of all hospital admissions, and up to 30% for patients > 75 years of age, are medication-related and up to three-quarters are potentially preventable.[26] The Australian Centre for Health Research found that between 30 and 50% of patients with chronic disease are hospitalised because of inadequate care management.[27]

Current care effectiveness and efficiency issues have real implications for patient safety and the costs of health care for Australian communities. The Australian Centre for Health and Research estimated that, in Australia, improved knowledge sharing and care plan management for patients with chronic disease would generate direct savings to the health care system of more than $1.5 billion per annum.[28] In 2002, the AIHW estimated that preventable medication prescribing errors alone cost Australian taxpayers at least $380 million per year in unnecessary spending in the public hospital system.[29] Similarly, some studies have estimated that adverse events more broadly account for as much as three per cent of total costs of care each year, or roughly $3 billion in avoidable expenditure.[30] To the extent that some proportion of these costs can be avoided through better sharing of information, significant improvements in the effectiveness and efficiency of the Australian health care system would be expected.

---

23 Bhasale AL, Miller GC, Reid S, *'Analysing potential harm in Australian general practice: an incident-monitoring study'*, Medical Journal of Australia, 169: 73-76, 1998.

24 Victorian Government Department of Human Services, *Sentinel Event Program – Annual Report 2006-07*, Melbourne, 2007.

25 Australian Audit Commission, *For Your Information,* 1995.

26 William B R, Elizabeth E R, Susan J S and Robert J A, *'Adverse drug events and medication errors in Australia'* International Journal for Quality in Health Care 15:i49-i59, 2003.

27 Australian Centre for Health Research Limited, *E-Health and the Transformation of Healthcare,* 2007.

28 ibid.

29 Australian Institute of Health and Welfare, *Australia's Health,* Number 8, 2002.

30 Health Group Strategies, '*Funding Real Health Security: Higher Transparency of Price and Quality of Care while Transforming Medicare Subsidies to Government and Households*', Third Menzies Foundation Winter Lecture Series, p 8.

2.3 Australian Health Care Reform

The challenges facing the Australian health care system cannot be solved by merely doing more of the same, particularly given the limited nature of available human and financial resources. A significant program of health care reform is required to drive systemic changes in the way Australian health care is delivered.

Australian, State and Territory Governments are attempting to drive change and reform within the health care sector in response to the challenges facing the Australian health care system. The Council of Australian Governments (COAG) has agreed to the implementation of a number of national initiatives to reform the health sector.[31] The National Health and Hospitals Reform Commission (NHHRC) was established to assist with the task of reform and it is envisaged that the NHHRC will develop a long-term health reform plan for a modern Australia. As part of this reform program, the NHHRC will address the need for fundamental redesign of our health system arrangements.

Despite progress towards a national health reform plan, there is a lack of clarity regarding the strategic objectives and priorities for health care in this country. This is an issue when attempting to link E-Health to a set of overarching health system goals; however these can be broadly derived from:

- the terms of reference for the NHHRC
- the National Health Performance Framework developed by the National Health Performance Committee
- the priorities emerging from the national Health and Ageing Working Group.

Based on a review of the key focus areas across these three groups, the priorities and objectives for Australian health care can be distilled into the following broad categories.

Effective - the delivery safe and high quality care which is personalised to an individual's needs and based on established standards.

Accessible - ability of people, particularly those in rural, remote and disadvantaged communities, to obtain equitable access to appropriate health care services at the right place and time.

Coordinated - ability to better integrate and coordinate care across all aspects of the health sector.

Prevention - have a greater focus on prevention through the promotion of healthy lifestyles and the early intervention in chronic illness.

Efficient - achieve desired results through the most efficient and cost effective deployment of resources.

Sustainable - ensure the health system is suitably equipped in terms of infrastructure and workforce to be able to respond to future health care needs.

From an E-Health perspective, it is difficult to see how meaningful improvements in any of these performance dimensions can be achieved without being enabled by significant improvements in the way that information is electronically collected, shared and used across the Australian health sector.

[31] Council of Australian Governments (COAG) 2008, Council of Australian Governments' Meeting, < http://www.coag.gov.au/coag_meeting_outcomes/2008-07-03>, August 2008.

3 E-Health

3.1 Current State of E-Health in Australia

In order to arrive at a picture of the current Australian E-Health landscape, Deloitte engaged in a national stakeholder consultation process, undertook literature reviews, and analysed information relating to the local E-Health environment. The national consultations have included Australian, State and Territory Government representatives, a range of clinical and consumer peak bodies, primary care providers, clinical specialists, pharmacists, radiologists, pathologists, aged care, community health and allied health care providers, health CIOs, private hospital staff and representatives from the health insurance industry.

3.1.1 Strong support for E-Health

The national consultation process established that there is a consistently strong level of support for the importance of E-Health across all parts of the Australian health care sector. Stakeholders clearly recognise the potential and need to better use IT (Information Technology) to improve the efficiency and quality of health care delivery and the pressing need to improve the flow of information across the health system. There is a strong view that, without national coordination, initiatives will only respond to localised needs and the broader benefits of E-Health on a national scale will not be realised.

3.1.2 Frustration at the pace of progress

Coupled with consistently strong support for the need for national action, there is widespread frustration and impatience at the pace of progress at a national E-Health level. Stakeholders are of the view that the current approach to E-Health is too piecemeal and fragmented and that there has been a lack of a coherent E-Health vision or a consistent understanding of what needs to be done. Where national plans have existed, stakeholders felt that they were too utopian and ambitious, and lacked the support of a broad enough range of health care participants. Stakeholders also consistently expressed frustration at the nation's inability to leverage and extend successful local initiatives due to a lack of core infrastructural building blocks.

3.1.3 Emerging signs of a stronger consumer push for E-Health

There are emerging signs of a stronger consumer push for E-Health due to increasing consumer technology sophistication and increased expectations of being able to access and share personal health information in an electronic form. Consumers expect to engage with health services the same way that they engage with any other service provider - by researching options and treatment effectiveness themselves, seeking communities of other patients for advice and support, and making an analytical reasoned decision between the available options. Consumers are also coming to expect that the health care system will have the same behind the scenes integration and data sharing that allows for seamless service in other industries.

Based on recent research undertaken by the Consumer Health Forum of Australia the priorities of Australian consumers include the ability to access to up to date medications information, electronic care plans and trusted health knowledge sources, enabling the improved sharing of discharge summaries between the acute and primary care sectors,

enabling care provider access to critical consumer health information in emergency situations, and ensuring providers can electronically order diagnostic tests and access test results.[32]

3.1.4 Increasing activity at the national level

There has been substantial E-Health activity at the national level across the areas of governance, standards development, IT capability development, adoption programs and network access.

- **National E-Health governance** - has been strengthened through the establishment of the National e-Health and Information Principal Committee (NEHIPC). NEHIPC advises the Australian Health Ministers' Advisory Committee (AHMAC) on E-Health and information strategies and facilitates collaboration between the Australian, State and Territory Governments to implement these strategies.
- **Standards development** - NEHTA has brought significant focus and increased the profile of E-Health in Australia. Since being formed in 2005, NEHTA has progressed the development of national E-Health foundation elements such as standards, identifiers and terminologies.[33]
- **IT capability development** - Medicare Australia is leveraging its existing databases to develop the Unique Health Identifier Service for NEHTA.
- **Adoption programs** - The Australian Department of Health and Ageing (DoHA) has supported the progress of a range of projects at the State, Territory, regional and local level through its Health*Connect* funding.[34] The *Broadband for Health* initiative is a key element in the implementation of the Health*Connect* strategy that has assisted eligible health organisations to experience the potential benefits of business-grade broadband connectivity.[35]
- **Network access** - The Australian Government has funded a plan to provide broadband internet access to over 98% of Australian businesses and residents.

3.1.5 Increasing activity at the State and Territory level

All State and Territory Governments are in the process of either defining or implementing some form of jurisdiction wide E-Health Strategy. These strategies typically involve substantial Government investment on the upgrading of core IT infrastructure, the upgrading or implementation of patient and clinical information systems across the acute sector, and the implementation of State or Territory wide strategies in relation to event summaries, electronic referrals, electronic prescription and electronic test ordering.

It should be noted that all Australian States and Territories are at different stages on their E-Health journeys and are taking different approaches to solving their specific E-Health challenges. However, these E-Health programs should result in the establishment of State and Territory E-Health platforms that provide a basis for integration into and information sharing with national E-Health infrastructure.

---

32 Consumer Health Forum, *CHF e-health industry and consumer workshop*: 'What's next in e-health' Workshop Report, <http://www.chf.org.au>, September 2008.

33 Boston Consulting Group, *NEHTA Review*, 2007.

34 HealthConnect, *'Health Information When You Need It'*, <http://www.health.gov.au/internet/hconnect>, August 2008.

35 ibid.

3.1.6 Significant number of initiatives occurring at all levels

There are a very significant number of uncoordinated E-Health initiatives being undertaken within local geographic regions, within acute and primary care settings, and across health sector disciplines and professions. Many of these initiatives are being driven by passionate members of the care provider community and are realising positive, albeit localised, benefits.

The initiatives span all sectors and levels, and range from infrastructural initiatives (such as desktop computer upgrades) to clinical information system initiatives (such as electronic prescription services). An indicative sample of E-Health projects is provided in Figure 3-1.

FIGURE 3-1: SAMPLE OF HEALTH IT INITATIVES

GP Partners in Brisbane Health eXchange - GP partners, one of the divisions of general practitioners in Australia offer a variety of services to GPs within its remit. One of these services is a health information exchange, offering connectivity between the 166 of the 800 GPs in the area, six local hospitals, allied care providers and residential care facilities. The GP partners Health eXchange offers automatic notification to GPs when a health record is checked or updated with results from an investigation by another care team member, and is integrated into GPs' clinical systems to minimise the disruption to GP work flows.[36]

EhealthNT Shared Electronic Health Record - The progressive implementation of a Shared Electronic Health Record across NT. In rural and remote communities implementation activities are being coordinated with the accelerated rollout of the Primary Care Information System. In urban communities activities are being focused on Aboriginal Medical Services and clusters of urban private GP practices. Feasibility is being assessed of expanding the Shared Electronic Health Record into regions of Western Australia and South Australia. A major new initiative is the implementation of a Current Health Profile, updated automatically when the consumer attends their principle primary care GP or health centre. Future plans include provision to store and update Health Care Management Plans and the capacity for a consumer to access to their Shared Electronic Health Record via the internet.[37]

Hunter Urban Division of GPs (HUDGP) - In 2003 the HUDGP entered into partnership with NSW Health to drive uptake of electronic (internet) communication across GPs. The HUDGP has undertaken a range of successful information technology and management initiatives for the purpose of supporting a more integrated model of care. Currently over 400 GPs and specialists are connected to the Hunter Urban Secure Messaging Program, with plans to extend this to nearly 2000 health professionals. This network will support clinical messages relating to consultation summaries and electronic referrals. There are plans to provide remote access to clinical data in the near future.[38]

Whilst there have been many small pockets of success across the country such as those above, it has historically been very difficult to leverage successful initiatives across geographic or sectoral boundaries. One of the key factors identified by stakeholders as a reason for this is the lack of national E-Health foundations such as unique identifiers, standards and data protection legislation. The other major factor is that, in most cases, these individual solutions have been designed to satisfy specific local needs and cannot be easily scaled to support larger consumer and care provider populations.

---

36 GP Partners, *Advancing General Practice: Programs and Initiatives,* <http://www.gppartners.com.au>, August 2008.

37 eHealth NT, *Shared Electronic Health Record,* <http://www.ehealthnt.nt.gov.au/>, August 2008.

38 Primary Health Care Research and Information Service, *Division Plans and Reports: HUDGP,* <http://www.phcris.org.au/divisions/>, August 2008.

3.1.7 Sectors are at different stages of maturity

There is a wide variation in the degree of computerisation and computer literacy across the health sector. For example, there has been a significant penetration of computing within the primary care sector in response to financial incentives provided by the Government - 94% of GPs are now computerised, up from 70% in 2000 and 15% in 1997. [39] The majority of GPs using a computer at work used it for electronic prescription printing (94.7%), ordering tests (82.2%) and keeping some patient data in an electronic medical record (79.5%).[40] Similar high levels of computerisation can also be found in parts of the sector such as community pharmacy, radiology and pathology.

This contrasts with lower levels of computing usage within the clinical specialist community and across community health, aged care and allied health. For many providers in these parts of the health sector the priority will be to upgrade or install core computing infrastructure and patient / practice management systems to a level that will enable meaningful participation in the E-Health agenda.

The information technology needs of the acute sector are particularly complex and it is no surprise that there is significant variability in the maturity of IT environments across this sector. Some acute health services have relatively sophisticated IT environments and are focused on using technology in a more innovative way to improve care delivery. However, in the majority of cases there is a need to invest in core IT infrastructure and patient and clinical systems in order to upgrade these to a basic level of capability.

3.1.8 Emergence of vendor led consumer health solutions

Studies show that the portion of population using the internet to research medical conditions and medications is increasing at a rapid pace.[41] This consumer push is being accelerated by internet based information sharing trends such as social networking (e.g. Facebook, YouTube), and the emergence of consumer health record solutions from organisations such as Microsoft and Google. These solutions will provide consumers with online access to their health data, ranging from test results to doctors' reports to daily measurements of weight or blood pressure as well as the patient provided narrative of their health journey to date.[42]

In the Australian market, the lack of enforceable standards for data and interoperability in the health sector has contributed to an environment of uncertainty for IT vendors. This has contributed to the implementation of vendor led E-Health solutions based on proprietary systems, with limited flexibility and interoperability. Whilst it is too early to determine the impact on the Australian vendor market, the emergence of solutions such as Microsoft's HealthVault and Google Health may trigger a new era where the vendor industry drives the standards for interoperability and connectivity in relation to consumer health data.

---

39 Australian General Practice Statistics and Classification Centre (AGPSCC), *The BEACH Project: Bettering the Evaluation and Care of Health,* < http://www.fmrc.org.au/beach.htm>, August 2008.

40 ibid.

41 McBride M, '*Google Health: Birth of a Giant'* in Health Management Technology*, May 2008,* 29, 5; ProQuest Health and Medical Complete pg. 8, 2008.

42 The Economist, *'The Vault is Open: Microsoft Makes its Big Move into Health Care'*, October 2007.

3.2 E-Health Opportunity

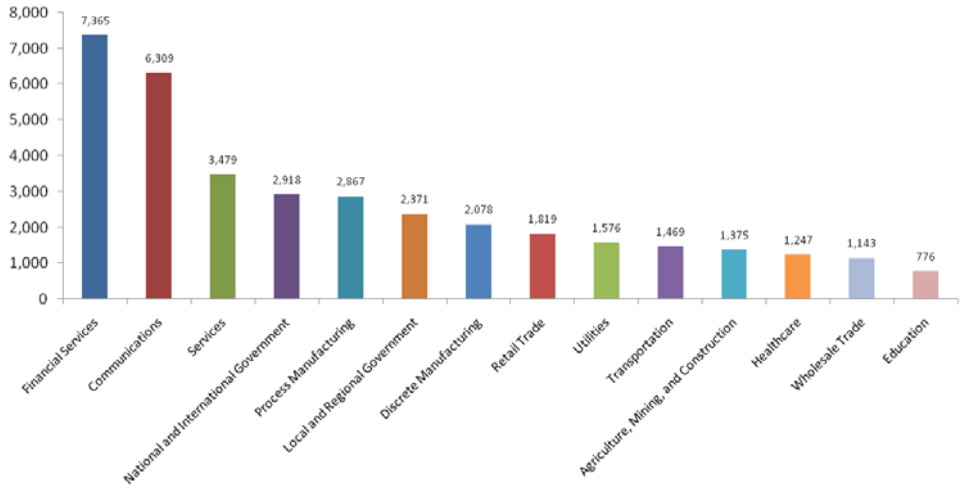
3.2.1 Health Information Technology Maturity

The size of the E-Health opportunity in Australia is largely due to the relative state of immaturity of information and communications technology (IT) within the Australian health sector.

Health is a sector where information is central to all aspects of care management and delivery. Despite this, spending on the underlying IT infrastructure required to support the electronic storage, sharing and use of information across the health sector has been significantly less than is the case for other information centric consumer industries such as the financial services and communications sectors.

A comparative representation of Australian IT spend by industry is represented in Figure 3-2.

FIGURE 3-2: SECTOR COMPARISON OF IT EXPENDITURE[43]



In 2007, estimated Australian IT spending in health care was $1.25 billion compared with $7.4 billion and $6.3 billion in the financial services and communications sectors respectively. Based on 2005-06 national health care expenditure of $86.9 billion, IT investment across the health sector represents 1.4% of total spend. This is far short of the estimated 9% invested by the Australian financial services sector and less than the 4 - 5% benchmarks for best practice IT spend in health care in regions of countries such as Canada.[44]

Information centric consumer industries such as communications and financial services have undertaken sustained investment in information technology over a 20 to 30 year period. This investment has enabled companies in these sectors to integrate systems and databases across all parts of their national and global businesses and business partner networks. As a result an Australian consumer can use an ATM anywhere around the globe to access their bank accounts. Similarly Australian consumers can seamlessly transfer their telephone and broadband services from one provider to another and can access global telecommunications networks from any point in the developed world.

In contrast, the core infrastructure and systems in many parts of the health system are relatively antiquated and poorly integrated. The reality is that the ability to effectively access and share information across different parts of the health sector effectively lags behind that of

43 Gartner, Inc, Global Industries *Worldwide Fall Forecast: 2002-2008*, December 2004.

44 Canada Health Infoway, *2015 Advancing Canada's Next Generation of Healthcare*, 2007.

these comparable industries by many years, in some cases decades. The Australian health information landscape is characterised by many thousands of discrete islands of information, many of which are paper based. This has created significant barriers to the effective sharing of information between health care participants, an issue compounded by Australia's multiple health service boundaries and geographic distances. It also poses real challenges when trying to understand and report what is really happening in the Australian health care system to support population health surveillance and guide policy, service planning, innovation and clinician and operational decision making.

The other side of this coin is that the extent of the opportunity for improvement is significant. Enabling relatively basic improvements in the way information technology is deployed across the health sector has the potential to realise substantial health care delivery efficiency and effectiveness benefits.

3.2.2 Global Comparisons

Australia is hardly unique in relation to the quality of its health IT infrastructure as most jurisdictions around the world have similarly under invested in E-Health over the past two plus decades. However, our current level of IT investment and functionality now trails behind many other countries that have recognised the important role that E-Health can play in health sector reform and have consequently embarked on national strategic E-Health work programs.

The table below highlights the relative amount of public spending on E-Health initiatives across a number of Western countries. With the exception of the USA, which has recently released a national E-Health Strategy in response to spiralling health care costs and the absence of a national approach, Australia has a significantly lower spend per capita than any of these countries on E-Health.

FIGURE 3-3: COUNTRY COMPARISON OF IT EXPENDITURE[45]

Country	Total Spending on specific E-Health initiatives (as of 2005) in '000,000	Per Capita Spending on specific E-Health initiatives
USA	$128.25	$0.44
Australia	$100.45	$5.06
Canada	$1,108.08	$32.68
Germany	$1,846.80	$21.75
Norway	$53.87	$11.73
United Kingdom	$11,337.30	$197.80

The UK 'Connecting for Health' program is the largest civilian IT project in the world with over 25,000 NHS broadband connections delivered, the creation of a whole of NHS email and provider directory, implementation of an E-prescription service with 80% of GPs and pharmacists connected up and initial implementation of the shared care records with the 'Spine' projected to be completed in 2008.[46] With a long term focus on delivering a comprehensive shared EHR, Canada has made significant progress through the delivery of shared diagnostic imaging between providers, a patient registry available to 71% of the population, made significant progress in the areas of provider registry, drug and laboratory capabilities and a unified push to advanced standards for messaging and language.[47]

Norway has a dedicated healthcare network which interconnects the five health networks and provides a number of basic services like email, web, catalogues and registries of personnel.

---

45 Anderson GF, Frogner BK, Johns RA, Reinhardt UE, *'Healthcare Spending and use of Information Technology in OECD Countries'*, Health Affairs, May/June, Vol. 25 Issue 3, p819-831, 2006.

46 Department of Health, National Audit Office, *The National Programme for IT in the NHS,* June, 2006.

47 Canada Health Infoway, *Business Plan 2008-09*, 2008.

Operational telemedicine solutions are in place for a variety of medical disciplines and care situations, GPs, specialists and 97% of hospitals have electronic patient records, and electronic information exchange covers a range of solutions.[48] Germany has a detailed specification of technical and organisational framework for IT, including aspects of information, communication, security and privacy in healthcare providing the basis for a significant national project culminating in the introduction of a citizen smartcard. [49]

E-Health has been viewed as an important enabler of health sector reform in many parts of the world for more than a decade. In dealing with the emerging and largely common challenges facing the national health systems, many countries have closely linked investment on IT to the implementation of health sector efficiency and effectiveness reform agendas.

Whilst there are benefits from E-Health investment in isolated projects, the returns from significant investment of scarce resources in E-Health appear to be maximised when they are aligned to a national health strategy or framework to support a broader health reform agenda.

Global examples of E-Health investment and the alignment with national agendas include:

- England developed a 2001 reform plan, the 'NHS Plan', which subsequently provided the framework for its National Programme for Information Technology strategy, which was launched in 2002. The NHS Plan set the context for the £12.8 billion E-Health programme proposed by the strategy, which is to be rolled out over more than a decade
- Based on the 2000 National Health Strategy, New Zealand began to invest heavily in E-Health through a devolved funding model led by the '2001 WAVE' initiative and the subsequent '2005 Health Information Strategy'
- Following the development of a '2003 Health Strategy in Scotland', a National E-Health/IM&T Strategy was launched in 2004 and redesigned in 2008, which consolidated the position of E-Health in delivering against the national reform agenda. Significant investment in E-Health aligned with reform priority areas is expected over the next decade
- Based on the 2002 'Healthy Throughout Life' national health strategy in Denmark, the 2003 National IT Strategy initiated the development of E-Health solutions to meet the national reform agenda
- Following an Advisory Council on Health Infostructure report on health in 1999, Infoway was established in 2001 as a national, independent, not-for profit organisation to facilitate the acceleration of E-Health in Canada. Since its inception, Infoway has approved $1.457 billion on E-Health investments which represents 89% of Infoway's $1.6 billion in capitalisation by the Federal Government. This investment brings the total number of E-Health projects underway to 254, representing a four-fold increase from the 53 projects that were underway in 2004.

48 European Commission Information Society and Media, *eHealth Priorities and Strategies in European Countries: eHealth ERA report,* March 2007.

49 ibid.

3.3 The Need for National E-Health Coordination

Overall the current Australian E-Health landscape is characterised by very strong support and impatience for national action and a large number of discrete E-Health initiatives simultaneously occurring across all parts of the Australian health sector. Given this situation Australia now faces an important choice - do we allow this inevitable and increasing E-Health activity to continue to progress in an unfettered manner or do we take action to more strongly coordinate and align activity on a national basis?

A number of Australian E-Health projects have already delivered promising results and have allowed individual parts of the health care system to address specific local needs. However, the reality is that in almost all cases these projects have produced IT solutions that cannot be easily connected with other health information systems or scaled to support larger consumer and care provider populations. This severely limits the ability for these solutions to provide more than a narrow, localised set of benefits and, at a systemic level, undermines the nation's ability to promote equity in health outcomes, drive meaningful safety and efficiency gains and ensure appropriate safeguards for personal health information.

Given the consistent strength of stakeholder support for E-Health across Australia, it is likely that activity will only accelerate as health care stakeholders take action into their own hands and seek to improve health outcomes through the better sharing and use of information. While the current discrete style of E-Health solution development may allow individual components of the health care system to meet their own E-Health needs, it is clear from both national and international analysis that the significant benefits from E-Health can only be realised when systems are integrated and data can be shared and aggregated.

The amount of dollars invested in E-Health by Australian, State and Territory Governments alone over the past ten years is estimated to be in excess of five billion dollars. Despite this investment Australia has only made marginal progress towards being able to electronically exchange information across different parts of the health sector due to the limited coordination of E-Health plans and investments.

Without some form of national coordination there is a very real risk of extensive duplication of E-Health effort and expenditure and the creation of a whole range of new solutions that cannot be integrated or scaled across the continuum of care. There is a point at which the number of these disparate systems will be so great, and integration so difficult, that the ability to realise the gains from creating an integrated system may be prohibitively risky and expensive to attain. This would represent a major lost opportunity for Australia to take a very significant, technology enabled step towards the delivery of safer, more efficient and sustainable health care services for all Australians. Given the amount of current and planned E-Health activity around the country, there is a real danger that this point may be reached within three to five years unless action is taken now.

3.4 Barriers to E-Health Adoption

Despite the significant amount of E-Health activity across the country and the strong emerging consensus for action, Australia has historically struggled to meaningfully progress with a national E-Health agenda.

The reasons for this are varied but at the core is the fact that Australia's health system is not a single, cohesive entity. It is inherently fragmented with disjointed service delivery processes as a consequence of the wide range of largely autonomous public and private sector parties involved in health care delivery across Australia. This fragmentation, which spans dimensions such as Australian, State and Territory Governments, the public and private sectors, and primary, acute and community health providers, has made it very difficult to effectively coordinate and align E-Health activities at a national level and will continue to be a significant challenge going forward.

Other historical barriers to the progression of the national E-Health agenda have included:

- **An inability to effectively justify the spend on E-Health to financial and political decision makers** who have traditionally prioritised investments in more tangible physical infrastructure, medical equipment and workforce matters ahead of IT. The weaknesses associated with a traditional return on investment E-Health business case model are primarily due to the difficulty in clearly isolating the benefits that will be realised by the E-Health component of a change program. In the Australian health care system this is complicated by a frequent lack of correlation between the parties required to fund E-Health and those that receive the benefits and the fact that E-Health programs typically require five to ten year investments, yet traditional funding only occurs in one to three year cycles.
- **The lack of continuity of key political and bureaucratic health sector leaders** across Australian, State and Territory Governments. Frequent changes to the identity of those Government leaders responsible for health system funding and policy has made it difficult to sustain a consistent long term plan for national E-Health investment.
- **An inability to effectively leverage the many disparate E-Health initiatives** being undertaken around the country. Most successful E-Health projects across the Australian health sector been implemented on a small, local scale due to a lack of funding or understanding of how they could be leveraged within a broader strategic framework. Effective leveraging of initiatives has been difficult in practice due to the lack of a national E-Health Strategy and absence of core E-Health building blocks such as nationally identifiers and standards.
- **The lack of engagement of key stakeholders** in the design and implementation of E-Health strategies and solutions. Up until very recently Australian consumers have not been meaningfully engaged in the E-Health debate and there has been consequent lack of pressure for action from this critical stakeholder group. Where E-Health has been successfully implemented in this country it has been typically led by pockets of the care provider community. In the majority of cases, however, there has been a consistent underestimation of the effort required to engage and support care providers in the adoption of E-Health solutions.
- **A shortage of health IT skills** within the sector required to deliver large scale E-Health programs of work. The combination and depth of skills required to effectively implement E-Health should not be underestimated given the complexity of the workplace and technological challenges involved. There is a relatively limited pool of resources within Australia with the required combination of health and IT skills to

deliver a national E-Health work program and this will need to be addressed through appropriate training and education programs.

- **The poor state of underlying health IT systems and infrastructure** due to a combination of historic underinvestment and the relative immaturity of the health IT vendor marketplace. Across many parts of the health sector there has been a historic lack of spend on IT computing and networking infrastructure which limits the ability for health care participants to readily implement and adopt new systems or technologies. In addition Australia is a relatively small market for IT vendors which has impacted the availability of world class health IT solutions that are functional, scalable, easy to use, and able to be seamlessly integrated with other systems. The capacity of the Australian health IT vendor community to be able to deliver robust solutions in a timely manner is considered a key risk in relation to the delivery of a national E-Health program.

4 National Vision for E-Health

4.1 E-Health Vision

Australia should aspire to continue to lead the world in health outcomes for its citizens. Central to the achievement of this will be a health system which protects and effectively responds to the health care needs of individuals and communities. Developing world class E-Health capability will provide new options for how people manage their own health and interact with the health system regardless of geographic and health sector boundaries.

E-Health will enable a safer, higher quality, more equitable and sustainable health system for all Australians by transforming the way information is used to plan, manage and deliver health care services.

E-Health will:

- *Ensure the right consumer health information is electronically made available to the right person at the right place and time to enable informed care and treatment decisions*
- *Enable the Australian health sector to more effectively operate as an inter-connected system overcoming the current fragmentation and duplication of service delivery*
- *Provide consumers with electronic access to the information needed to better manage and control their personal health outcomes*
- *Enable multi-disciplinary teams to electronically communicate and exchange information and provide better coordinated health care across the continuum of care*
- *Provide consumers with confidence that their personal health information is managed in a secure, confidential and tightly controlled manner*
- *Enable electronic access to appropriate health care services for consumers within remote, rural and disadvantaged communities*
- *Facilitate continuous improvement of the health system through more effective reporting and sharing of health outcome information*
- *Improve the quality, safety and efficiency of clinical practices by giving care providers better access to consumer health information, clinical evidence and clinical decision support tools*
- *Support more informed policy, investment and research decisions through access to timely, accurate and comprehensive reporting on Australian health care system activities and outcomes.*

The E-Health vision can also be expressed in terms of what it will mean for each of the three key groups of impacted stakeholders:

- **Consumers -** individuals who receive Australian health care services and the friends, family and carers who are directly involved in the care of the individual
- **Care Providers** - the individuals and organisations that provide Australian health care services
- **Health Care Managers** - Australian health sector clinical managers, health service managers, planners, researchers and policy makers.

Consumers will receive safer, better coordinated and more accessible care as a result of the improved accuracy, completeness and accessibility of personal health information and the ability to gain remote access to care delivery services. They will also be supported to stay healthy through access to reliable health information sources, tailored care plans and automated care provider monitoring of personal health status.

Current State	Vision
• Largely responsible for coordinating their own care delivery and acting as the integrator of health care information across the health system • Waste time repeating the same information to multiple care providers and/or receiving duplicate treatment activities • Poor, and in most cases zero, access to personal health information which is stored in multiple, fragmented silos across the health system • Limited security of personal health information or ability to control who accesses it • Heavily reliant on individual care providers for access to reliable health information • Unequal access to health care services, particularly in remote and rural communities • Receive limited assistance with adherence to referral instructions, medication regimes, or care plans	• When consumers interact with the health system, ***care providers will have access to information to allow them to know who they are*** and have access to relevant details of their health information • Consumers will rely on the ***health system to effectively coordinate*** their care regimes and treatment activities • Consumers will have an ability to ***access their own health records*** and maintain a personal health diary • Consumers will be able to ***control access to personal health information*** • Consumers will have confidence that their ***health information is managed securely and confidentially*** • Consumers will have the ability to ***better manage their own health*** through access to reliable and accredited sources of health information • Consumers will have technology enabled ***access to a broader and deeper range of health services from within rural and remote communities*** • Consumers will be supported in the management of their care through ***automated monitoring of their health status*** and ***access to individual risk assessments and care plans***

Care Providers will make more informed decisions at the point of care as a result of better access to accurate and complete consumer health information, the support of relevant decision support tools and access to an improved evidence base for treatment decisions. They will deliver care more efficiently and be able to more easily share information and coordinate care delivery with other providers.

Current State	Vision
• Work with incomplete and fragmented information when providing care to consumers • Waste time collecting consumer information and duplicating treatment activities • Manually coordinate care with other providers and exchange information in an inefficient, incomplete and ad hoc manner • Risk the occurrence of adverse events through incomplete information and a lack of access to decision support tools at the point of care • Limited ability to interact with consumers remotely • Risk avoidable care failures through difficulty in adequately monitoring consumer compliance with referral instructions, medication regimes, or care plans • Limited means to monitor effectiveness of service delivery outcomes	• Providers will have an ***integrated and complete view of consumer health information*** at the point of care • Multi-disciplinary provider teams will be electronically connected to enable ***the more effective coordination of care delivery*** • Providers will be able to ***share information electronically in a timely and secure manner*** across different geographic locations and all parts of the health sector • Providers will have access to data that allows them to ***more effectively monitor and evaluate service delivery outcomes*** • Providers will be able to ***electronically order tests, prescribe medications and refer individuals to other providers*** • Providers' care decisions will be supported by ***access to appropriate information sources and decision support tools*** at the point of care • Providers will be able to ***electronically interact with consumers regardless of where they are geographically located*** • Providers will be supported by the ***automated monitoring of consumer care plans and health status*** • Providers will be able to ***collaborate with other professionals*** by more easily sharing expertise and evidence • Providers will have ***easy access to clinical knowledge and evidence sources*** to assist with skill development

Health Care Managers will have access to a more robust, comprehensive and accurate body of data for the purposes of more effectively monitoring Australian health outcomes, prioritising clinical and administrative investment decisions, undertaking targeted research programs, and driving policy directions.

Current State	Vision
• Rely on incomplete, fragmented and untimely information when trying to assess what's really happening in the Australian health care system • Waste time trying to collect and manually integrate information from many different data sources • Limited ability to share clinical and administrative management information across the health sector • Data is collected in an ad hoc and inefficient manner from care providers • Significant risk of making of sub-optimal or flawed decisions based on incomplete and/or unreliable information • Very difficult to meaningfully understand the national impact of strategic, operational or clinical treatment (e.g. medication) decisions	• Health Care Managers will have ***access to timely and complete information about health system activities and outcomes*** • Health Care Managers will have a ***reliable and comprehensive evidence base*** to inform and monitor the impact of clinical, policy, investment and administrative decisions • Health Care Managers will be able to ***better respond in the case of emergencies*** through real time monitoring of public health indicators • Health Care Managers will be able to ***rapidly assess the national impact of particular treatment regimes*** via access to nationally aggregated and anonymised clinical datasets • Data collection and reporting will occur in a ***streamlined and automated fashion***, with minimal human intervention • Health Care Managers will be able to ***improve health care service quality*** through access to more reliable datasets of population health and treatment effectiveness • Health Care Managers will have access to quality data sources to ***inform service and workforce planning and to identify and address system throughput inefficiencies***

4.2 The E-Health Vision in Practice

In order to provide an understanding of the practical benefits that E-Health might provide consumers and care providers, the following is an example of an indicative patient scenario.

Sarah has recently been diagnosed with Type 1 diabetes. She went to see the doctor originally because her vision sometimes got blurry and this was affecting her ability to concentrate in school. This story describes Sarah's journey through the health system.

- It took Sarah a week to book an appointment with her GP because she could only call during office hours. Between school, debating and hockey training, remembering to call before 5pm was difficult. Meanwhile her blurry vision was occurring more often and this worried her.
- At the GP appointment, Sarah tells the doctor she has been constantly thirsty and hungry and that sometimes her vision blurs. The GP tells her that she will have to have some blood tests to be sure. After the GP takes her blood, she watches him manually transcribing her information from his computer records to the paper form that he needs for the blood test.
- Sarah gets a phone call asking her to come in to see the doctor again as the blood test results have come back. When she arrives, Sarah is told that she has diabetes. The doctor explains to her what this means, provides her with leaflets and discusses with her what she can do to control her blood sugar levels. He also gives her a prescription for insulin and a written referral to a dietician.
- Sarah sees the dietician, explains the background to this meeting, and together they develop an eating plan.
- Everything is going well for a while but her high school formal is coming up. Sarah has heard that by not taking her insulin she can drop kilograms fast and so she skipped her morning dose. Later that afternoon Sarah felt dizzy and unwell and fainted at school. They call an ambulance and she is taken to hospital.
- At the hospital, no-one is sure what has happened to Sarah and they order a series of tests which reveal that she is a diabetic. They stabilise her, ask her for her details and type up a discharge letter that she has to take to her GP.
- At her next GP appointment, Sarah presents the letter from the hospital to her doctor and explains what happened at the hospital. She could not remember all the details so her GP calls the hospital to be sure that she had not already been issued with another insulin prescription. Her GP issues her with a new insulin prescription and warns her about the dangers of skipping injections.

With the use of E-Health, the events that occurred in the above scenario would have been different in the following ways:

- **Pre-emptive care** - Sarah's hospitalisation could have been entirely prevented if her doctor had been able to remotely monitor her blood sugar levels and investigate the cause of fluctuations. This would have allowed her doctor to see a pattern of skipping insulin injections and allowed him to intervene and warn her of the danger she was placing herself in before her collapse.
- **Safer care** - Hospital access to Sarah's electronic health record with an up to date health summary and current medications list would have reduced the risk of incorrect or dangerous treatment decisions (e.g. doubling up of insulin prescriptions).
- **Less repetition of information** - With an electronic record that could be accessed by her care providers, Sarah would not have had to repeat her details multiple times to the GP, dietician and hospital clinical staff.

- **Better access to health information** - Sarah could have been directed by her GP to reliable online diabetes educational materials and support networks which would have reinforced the consequences of skipping injections.
- **More efficient use of a care provider's time** - Through access to electronic test ordering and electronic referral systems, Sarah's GP could have eliminated the time he spent transcribing her information to the test ordering form and creating a paper referral that she would take to the dietician. In addition, the hospital could have securely sent an electronic discharge summary directly to the GP that would have reduced the time spent typing up, sending and storing this paperwork.
- **Fewer calls required to confirm/chase up information** - With an electronic record that could be accessed by her doctor, the call to the hospital would not have been required as complete information could have been provided as part of an electronic discharge summary. This would have saved the time of both her GP and the hospital clinical staff responsible for having to find Sarah's record to answer her doctor's questions.
- **More efficient use of resources** - With secure access to Sarah's electronic health record, the hospital could have found out about her diabetes from her record and limited the number of tests that they would have administered to find out what was wrong with her. This would have resulted in less time and resources being expended to take care of Sarah.
- **Greater convenience** - Sarah would have been able to directly make an appointment on the GP's website out of hours rather than having to call him during business hours. This would have allowed her to be diagnosed more quickly.

4.3 Support for Health Care Reform

The Australian health care reform agenda needs be underpinned by the improvements in the way information is collected, used and shared across the Australian health care system . E-Health will directly support the major reform priorities and objectives of the Australian health care system in the following ways.

Effective:

- Enabling access to more reliable consumer health information across the continuum of care
- Giving care providers improved access to decision support tools and knowledge sources at the point of care
- Improving the reporting and the monitoring of care delivery outcomes.

Accessible:

- Improving access to appropriate health care services and advice from rural, remote and disadvantaged communities via electronic means such as telehealth
- Providing consumers with better visibility of the location of care providers, the services offered and their availability in order to promote choice and access.

Coordinated:

- Enhancing the collaboration and coordination of health care delivery across primary, community and acute care settings via secure and timely electronic information sharing.

Prevention:

- Enabling consumers to more pro-actively manage their own health through improved access to personal health information and trusted health knowledge sources
- Providing care providers with the ability to automatically monitor individual care plans and health status.

Efficient:

- Reducing the amount of manual time and effort involved in providing and coordinating treatment
- Reducing duplicated and unnecessary tests and treatment activities
- Reducing the incidence of avoidable health errors
- Improving the quality of operational performance data for decision making purposes.

Sustainable:

- Improving health worker satisfaction and enabling the more efficient and productive allocation of health workers and specific job roles across the health system
- Enabling health care managers to more effectively identify and address system throughput inefficiencies.

5 National E-Health Strategy

5.1 Strategy Overview

5.1.1 Key Strategic Principles

There are several key principles that underpin and inform the proposed strategy and approach.

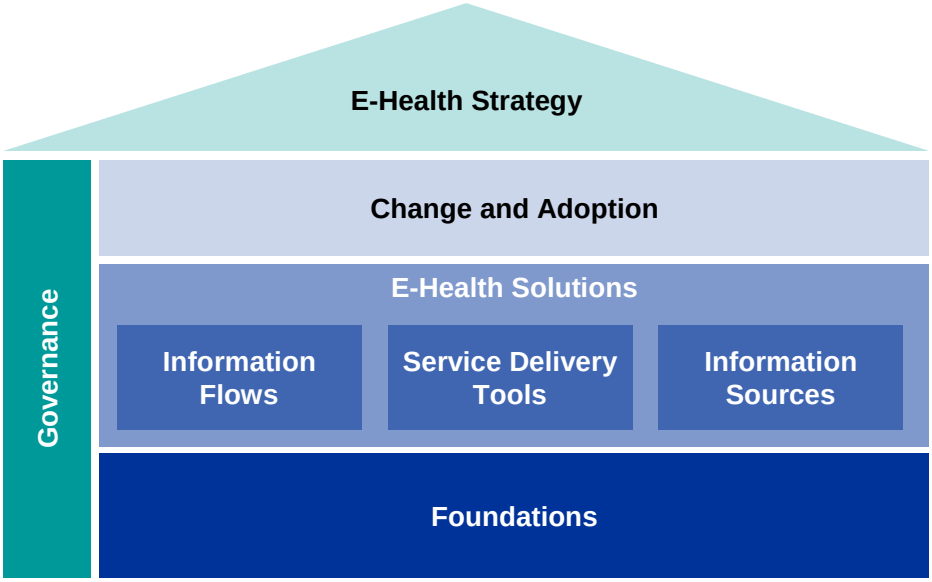
- **National infrastructure** - Deliver core elements of enabling national E-Health infrastructure once, rather than duplicating development costs and efforts and increasing the likelihood of rework
- **Stakeholder engagement** - Actively engage key health care stakeholders in the design and delivery of E-Health solutions
- **Incremental approach** - Build of long term national E-Health capability in an incremental and pragmatic manner, focusing initial investment in those areas that that deliver the greatest benefits for consumers, care providers and health care managers
- **Recognising different starting points** - Balance active support for care providers with less developed capability, while not constraining the ability for more advanced participants to progress
- **Leverage** - More effectively leverage and scale E-Health activity across the country
- **Balancing alignment and independence** - Drive alignment of national E-Health activities whilst not unnecessarily limiting the ability of health care participants and vendors to implement locally relevant solutions
- **Relevant skills** - Ensure sufficient numbers of skilled practitioners are available to support delivery of the national E-Health Strategy.

5.1.2 Strategic Work Streams

In order to address these principles four major strategic streams of activity have been identified.

- **Foundations** - Establishing the core foundations for electronic information exchange across the health sector. This work stream is fundamental as without the basic ability to securely share health information there will effectively be no national E-Health capability.
- **E-Health Solutions** - Stimulating the delivery of E-Health solutions to the key users of health information. This work stream will facilitate the delivery of specific computing systems and tools to address the high priority needs of consumers, care providers and health care managers.
- **Change and Adoption** - Fostering consumer, care provider and health care manager adoption of E-Health. The aim of this work stream is to focus effort on achieving a ‘tipping point’ of stakeholder adoption of E-Health solutions as quickly as required.
- **Governance** - Ensuring the effective leadership, coordination and oversight of the national E-Health work program. This work stream focuses on the establishment of appropriate national E-Health governance structures and mechanisms.

FIGURE 5-1: E-HEALTH STRATEGIC WORK STREAMS



5.1.3 The Approach to National Action

There is a very close relationship between each of the four strategic work streams, hence their implementation will need to be undertaken in a tightly coordinated and concurrent manner in order to effectively deliver the national E-Health work program. Each work stream is highly dependent upon the success of the others.

Foundations

Appropriate E-Health foundations, in the form of computing infrastructure and consistent information standards, rules and protocols, are crucial to effectively sharing information across geographic and health sector boundaries. These foundations represent the core infrastructure that will underpin the national E-Health work program and it is considered too risky and costly to try and establish this infrastructure other than by means of strong national coordination. In this regard E-Health foundations can be viewed as analogous to an 'information highway' - unless the system is connected up in some uniform and rules based way, then information cannot move across the network.

E-Health Solutions

Foundations alone will not be of any value unless consumers, care providers and health care managers have access to specific computing solutions or tools to enable them to view, use and share appropriate health information. E-Health solutions will be the tangible means by which users can benefit from the building of a connected information network.

The development of specific E-Health computing systems and tools that sit on top of this infrastructure should be allowed to occur in a more unfettered manner than the approach to establishing E-Health foundations. The Australian health care system comprises a complex mix of largely autonomous care provider individuals and organisations at widely differing stages of E-Health maturity. In this environment health care participants and vendors should have the ability to develop new and innovative E-Health solutions that meet their needs without being constrained by a centrally controlled purchasing or implementation model.

However, this activity also needs to be much more strongly aligned than at present to ensure the achievement of desired national E-Health outcomes. Accordingly there is a need for a national approach which encourages the development of E-Health solutions that support

national standards and priorities. This can be achieved through means such as targeted financial investments, adoption and change programs and a strong focus on solution compliance testing and certification.

Change and Adoption

The implementation of national E-Health solutions on top of the core foundations will similarly be pointless unless consumers, care providers and health care managers are motivated to use these solutions. This is a two way relationship as the quality of the underlying E-Health solutions will also play a critical role in driving stakeholder take-up and support of the E-Health agenda.

The majority of E-Health change and adoption activities will be undertaken and managed at local and regional levels across the Australian health care system . There is a need, however, for central coordination of those change and adoption activities that are national in nature and a need to ensure consistency and alignment between national, regional and local change and adoption activities. These include national consumer and care provider E-Health awareness and education campaigns, the establishment of national E-Health stakeholder reference groups, the creation of stakeholder adoption incentive regimes, and the strengthening of national health IT vocational and tertiary training programs.

Governance

Finally it is unlikely that any of the strategic work stream outcomes can be achieved unless supported by a governance regime which provides appropriate coordination, visibility and oversight of national E-Health work program activities and outcomes.

5.2 Foundations Work Stream

R-1 Implement a set of national E-Health foundations to provide a platform for health information exchange across geographic and health sector boundaries

5.2.1 Overview

The Foundations work stream focuses on implementing the basic infrastructural building blocks required to enable the effective electronic sharing of information across the Australian health sector. These include the implementation of consumer and care provider identifiers, the establishment of standards, rules and protocols for information exchange and protection, and the implementation of underlying physical computing and networking infrastructure.

Why do we need national action?

There is a need to address these foundations a national level for the following reasons:

- It will be significantly more cost effective to develop these foundations once at a national level rather than duplicating effort and expenditure across Australian States and Territories
- National consistency of standards, protection legislation and identifiers is required to ensure that information can be effectively shared and protected anywhere across Australia. Any deviations in approach across the country will pose a direct risk to the nation's ability to seamlessly and securely exchange health information
- There is strong international evidence that nations such as New Zealand, England, Scotland, Denmark and Canada have only made significant E-Health progress at a national level once they have established appropriate E-Health foundations
- Unless action is taken in the near future to implement national E-Health foundations, the cost and effort required to integrate systems in the future is likely to be prohibitive.

What can we leverage?

The importance of establishing these foundations is widely recognised as evidenced by the formation of the National E-Health Transition Authority (NEHTA) in 2005. Since 2005, NEHTA has had responsibility for developing core foundations for a national E-Health system. Work to date includes defining clinical terminologies and information messaging standards, and designing unique consumer and care provider identifiers for use in Australia. NEHTA's recent work program has also involved the development of a national medicines terminology standard, a national product catalogue, draft standards for IEHRs and the design for a National Authentication Service for Health (NASH) to support secure transfer of health information.

There has also been work to develop a nationally consistent regulatory regime that will provide effective, streamlined and transparent privacy arrangements for health information within an E-Health environment. The National E-Health and Information Principal Committee (NEHIPC) has established a working group to progress, in collaboration with NEHTA, the development of a consistent national regulatory framework for health information privacy and protection.

The aim of the Foundations work stream is to leverage to the fullest extent possible the work that has been undertaken by NEHTA and NEHIPC's regulatory working group as a basis for building the foundations for E-Health. The actions in this work stream are focused on accelerating the implementation and adoption of the standards and infrastructure components that have already been, or are in the process of being, developed. There is also a focus on

developing the next wave of E-Health standards and on establishing a consistent process for future definition of national E-Health standards.

What do we need to do establish the foundations?

To build the foundations for E-Health there are five key areas that need to be focused on:

- **Identification and authentication -** Design, build and implement a national solution to enable the unique identification and authentication of Australian consumers and care providers
- **Information protection -** Design and implement a consistent national legislative framework for information protection, privacy and consent
- **National E-Health information standards -** Design and implement national E-Health information standards for data and message structures, coding and terminologies and information display
- **Computing infrastructure -** Allocate funding for State and Territory health departments to invest in the establishment and maintenance of an acceptable baseline of computing infrastructure
- **National Broadband Services -** Coordinate the rollout of appropriate national broadband services to all care providers.

Adoption of the E-Health foundations will be driven by actions outlined in the E-Health Solutions and Change and Adoption work streams.

5.2.2 Recommendations

R-1.1 Identification and Authentication

Design and implement a national solution to enable the unique identification and authentication of Australian consumers and care providers

Description

There is a need to design, build and implement an identification and authentication regime for health information as soon as possible as this work will be absolutely fundamental to the nation's ability to securely and reliably access and share health information. This requires:

- **Identification -** the provision of functions to uniquely identify consumers, care providers and care provider organisations to ensure that information about the right person is going to be sent to the right care provider. Identification services should include the allocation and management of unique identifiers and the provision of directories that allow care providers to be located by name and by the type of services they provide.
- **Authentication -** the provision of functions to securely address, authenticate and transfer messages from one care provider to another to ensure that the information gets to the right provider in a secure manner.

A recent part of the NEHTA Work Program has focused on the design and specification of the Unique Health Identifiers (UHI) infrastructure that will provide a capability to uniquely identify all consumers, care providers and provider organisations in Australia. The UHI infrastructure is also intended to provide Provider Directories and Services Directories that will provide the equivalent of a white and yellow pages for care providers. NEHTA have contracted Medicare Australia to develop the UHI service and development of the detailed design is under way.

International experience shows that identification is most effective when universal and Australia should therefore seek, as far as possible, to make the allocation of the consumer and care provider national identifiers universal and automatic.

NEHTA has also undertaken the design and specification of a National Authentication Service for Health to provide the infrastructure required to enable authentication of care providers in a consistent manner. Given the tight coupling that will be required between the identification and authentication services, there is a strong case for utilising the same organisation for development and operation of both services.

In the area of secure messaging, there are a range of solutions in use by different care provider networks across Australia, each of which is based on proprietary and incompatible technologies and provides variable levels of security. There is a need to establish and implement national secure messaging standards for health information to ensure care providers utilising different messaging solutions are able to communicate with each other and utilise the UHI and NASH services. These standards should be developed through the E-Health standards program described in Section R-1.3.

The important work undertaken to date by NEHTA in the areas of identifiers and secure messaging has necessarily focused on the design and development of these capabilities. The aim of this set of actions to review the work undertaken by NEHTA to date, complete the remaining stages of design and move rapidly into the build, implementation and adoption stages of these programs to put these capabilities into use.

Specific Actions

To establish an Identification and Authentication Regime for Australia it is recommended that the following actions be undertaken:

Implement the UHI service - Complete the design, build and implementation of the unique health identifiers (UHI) solution. This will include the following actions:

- Resolve any outstanding design issues for the UHI Service and complete design and build of the UHI solution.
- Contract Medicare Australia as the service provider to take responsibility for operation of the UHI Service based on confirmation of Medicare Australia's capability and capacity to operate and maintain the service in a satisfactory manner. Establish a services contract and service level agreement with Medicare Australia for the operation of the UHI Service.
- Establish a governance arrangement for oversight of the UHI Service operation in accordance with the UHI Operational Model defined by NEHTA.
- Make the allocation of the consumer and care provider national identifiers universal and automatic as far as possible and mandate their use for the provision of government funded health services.

Implement the NASH service - Complete the design, build and implementation of the National Authentication Service for Health (NASH) solution. This will include the following actions:

- Resolve any outstanding design issues and complete design of the NASH solution.
- Assess Medicare Australia's capability and capacity to build, implement and operate the NASH Service. If the assessment is positive, contract Medicare Australia as the service provider to build, implement and operate the NASH Service.
- Establish a governance arrangement for oversight of the NASH Service operation.

Implement secure messaging standards - incorporate standards for secure messaging in the E-Health standards development program. Complete, and endorse these standards to ensure that secure messaging solutions for health use in Australia are interoperable.

R-1.2 Information Protection

Design and implement a consistent national legislative framework for information protection, privacy and consent

Description

The implementation of a national data protection legislative framework is a critical foundation for ensuring private and confidential information exchange across the Australian health sector. This task is complex and appears to be very firmly on the national E-Health work program critical path.

A national approach to data protection legislation is required to ensure that information can be shared appropriately across geographic and health sectoral and to ensure that data protection, privacy, access and consent is managed consistently across all states and territories.

Proposals to provide both legal authority for specific E-Health initiatives and a nationally consistent regulatory regime for health information are being developed to provide the required basis for consistent data protection legislation. NEHIPC has established a working group which, in conjunction with NEHTA, has been working to progress development of the regulatory framework and to determine the most appropriate means of implementing this framework nationally. There is a need to focus on completing development and acceptance of these proposals and deploying the resulting framework in a timely manner across the country.

Specific Actions

To establish an Information Protection regime for Australia it is recommended that the following actions be undertaken:

Agree and adopt a nationally consistent regulatory framework for health information protection - Support the existing working group established by NEHIPC to complete development of its proposed regulatory framework and then focus on the endorsement and adoption of this regulatory framework. This will include the following actions:

- Support the working group to resolve any outstanding issues and complete development of the proposals for legal authority for specific E-Health initiatives and a nationally consistent regulatory regime.
- Engage with key stakeholder representatives and key decision makers including Australian, State and Territory Governments, care providers, consumers and privacy advocates, NEHIPC and AHMAC/AHMC to seek endorsement and agreement of the regulatory framework.
- Utilise the Awareness and Engagement activities described in Section R-3.1 to raise awareness in consumers, care providers and health care managers of the regulatory framework and its implications for health information sharing and management.

R-1.3 National E-Health Information Standards

Design and implement national E-Health information standards for data and message structures, coding and terminologies and information display

Description

There is a need for a national program of E-Health information standards definition to underpin the consistent and accurate collection and exchange of health information.

Across the Australian health sector the standards landscape is patchy with some areas and disciplines having effective standards that have been defined and adopted, other areas having inconsistent and overlapping standards with partial adoption and some areas having no

standards at all. The result is an environment in which information is not collected consistently, is open to misinterpretation and is often unable to be shared due to incompatibilities in data structures and terminologies.

The categories of standards that are required for E-Health are:

- **Common terminologies -** standards that enable information communicated electronically to utilise a common language for describing symptoms, diagnoses and treatments.
- **Data representation -** standards to govern the way health information datasets are stored using consistent data structures and can be presented in a consistent manner in software solutions to ensure that information is not misinterpreted or overlooked.
- **Standard messages -** standardised message structures, developed in coordination with the data representation standards, to allow key datasets to be sent and received through the secure messaging infrastructure from one care provider to another.
- **Secure messaging standards -** standards for the secure transmission and delivery of messages and the appropriate authentication of the message receiver to ensure that information is transmitted in a secure manner and is delivered to the correct recipient.
- **Message acknowledgement standards -** standards that define the acknowledgements that should be provided when a message is delivered or opened and what warnings should be generated if the message is not delivered or opened. The types of acknowledgements required may vary depending on the type of message being send and may include acknowledgement that a message has been sent, has been received, has been viewed by the receiver, and confirmation whether a care provider has accepted or declined a referral.

There has been strong focus in some sectors in recent years on the development of standards by organisations such as NEHTA, National Prescribing Service (NPS) and National Pathology Accreditation Advisory Council (NPAAC). This work has resulted in the selection of SNOMED/CT as the standard for clinical terminologies, the development of a national medicines terminology standard and the development of consistent data structures for pathology orders and results. Additionally, NEHTA has progressed the development of standards for information representation and display, structured health messages and draft standards for IEHRs.

While these efforts have concentrated primarily on the definition of standards there has been little coordinated effort focused on the adoption of these standards by care providers and solution vendors to cement their use in the health sector.

The aim of the E-Health Standards component of the strategy is to provide a focused effort on the implementation and adoption of standards that have already been defined and to coordinate the development of standards that are still outstanding such as data presentation and data structures for key information flows. To facilitate this outcome a consistent, robust and inclusive process for standards development, endorsement and implementation should be established. Using this process, development of outstanding standards should be completed through coordination of the appropriate professional organisations and working groups and standards should be agreed and published through collaboration with Standards Australia. To support visibility of standards development and to allow vendors and care providers to plan solution design and development activities, a rolling three year plan of standards development should be maintained and published.

Standards adoption will be driven through the activities of the E-Health Solutions and Change and Adoption work streams.

Specific Actions

To establish the standards for E-Health it is recommended that the following actions be undertaken:

- Establish a consistent, robust and inclusive process for the development, endorsement and implementation of national E-Health standards.
- Complete the development and implementation of E-Health standards that NEHTA has commenced for common terminologies, information representation and display, and structured health messages.
- Accelerate endorsement and adoption of these existing E-Health standards through engagement with vendors, care provider organisations and professional bodies.
- Identify and prioritise the next tranche of required national E-Health standards covering areas such as defined data structures for key information flows and standards for data presentation. This will require engagement with national health information, professional and standards bodies.
- Develop and publish a three year rolling national E-Health standards implementation plan.

R-1.4 Computing Infrastructure

Establish mechanisms to encourage care providers to invest in the implementation and maintenance of an acceptable baseline of computing infrastructure

Description

A key barrier to E-Health take-up is the relatively poor quality of computing infrastructure (PCs, network connectivity and core patient, clinical and practice management systems) across many parts of the Australian health sector. Computing infrastructure is one of the most basic foundations required for collecting, recording and sharing electronic information across the health sector.

The health sector has traditionally under invested in computing infrastructure compared with other information intensive industries over the last twenty years with the result that much of required infrastructure is either ageing and inadequate or non-existent. The primary reason for under investment in computing infrastructure across the health care sector is a preference to give funding priority to resources that will have a more tangible and immediate impact on health care delivery such as additional practitioners, beds and medical equipment. The impact of quality computing infrastructure on health care service delivery is seen to be less tangible and immediate and hence is consistently given a lower priority.

To provide the infrastructure foundations to support E-Health there is a need to encourage care provider organisations and care providers to invest in the establishment and maintenance of an acceptable baseline of computing infrastructure.

This is a particular challenge for Commonwealth, State and Territory Governments which have historically struggled to invest sufficient funds in the upgrading and maintenance of underlying E-Health computing infrastructure. Accordingly there is a need for funding mechanisms that encourage a more balanced Government investment in health IT.

Funding for Government care providers should be augmented by a broader strategy of linking care provider accreditation to the implementation and maintenance of acceptable levels of E-Health computing infrastructure.

Specific Actions

To encourage care provider investment in computing infrastructure it is recommended that the following actions be undertaken:

Commonwealth, State and Territory Governments to invest sufficient funds in the establishment and maintenance of an acceptable baseline of computing infrastructure.

Funding sources for may be varied and could include AHCA funding and the national Hospital Infrastructure Fund. Funding should be linked to the achievement of specific E-Health targets within defined timeframes.

Consideration will need to given to the appropriate amount of funds that should be invested. Given the relatively low investment in IT in health care compared with other information intensive industries (refer Section 3.2.1) it is suggested that the equivalent of an additional 1% of the value of the funds provided to State and Territory health departments under the AHCA agreements should be allocated for computing infrastructure investment. This would result in the Government care provider health IT budgets moving directionally towards the level of IT expenditure undertaken by other information intensive industries such as financial services and telecommunications.

Link care provider accreditation to computing infrastructure investment.

Introduce accreditation requirements for care providers that require appropriate levels of computing infrastructure to be put in place, maintained and refreshed on an ongoing basis. This is a long-term approach that should be applicable to all care providers and can be utilised to encourage initial investment in computing infrastructure as well as ongoing infrastructure maintenance and enhancement.

R-1.5 National Broadband Services

Coordinate the rollout of appropriate national broadband services to all care providers

Description

Broadband connectivity is one of the key foundations for sharing electronic information between care providers. The *Broadband for Health* initiative[50] which forms part of the Health*Connect* strategy has assisted some health organisations to experience the potential benefits of business-grade broadband connectivity however broadband access has not been universally adopted across the health sector.

The Australian Government has a funded plan to provide broadband internet access to over 98% of Australian residents. There is therefore a need to engage and collaborate with relevant government and telecommunications organisations to extend planned broadband connectivity infrastructure to all Australian care providers as soon as possible.

As part of this process, there should be a focus on ensuring that broadband communications infrastructure made available to care providers will be technically fit for E-Health use. Efforts should also be made to ensure that initial and long term broadband services costs are priced in a manner that does not discourage the sharing of health information across geographic and health sector boundaries.

Specific Actions

To coordinate the rollout of suitable national broadband services to all care providers it is recommended that the following tasks be undertaken:

[50] HealthConnect, *'Health Information When You Need It'*, <http://www.health.gov.au/internet/hconnect>, August 2008.

- Engage and collaborate with communications authorities and service providers to extend the broadband communications infrastructure coverage and capacity to make E-Health suitable broadband services available to all care providers as soon as possible.
- Negotiate initial and long term pricing arrangements for care provider broadband services that do not discourage the take up and use of broadband services for sharing health information.

5.3 E-Health Solutions Work Stream

R-2 Foster and accelerate the delivery of high priority E-Health solutions by vendors and care provider organisations in a nationally aligned manner

5.3.1 Overview

The E-Health Solutions work stream focuses on the national actions that are required to encourage the development and use of high priority E-Health systems that improve the efficiency and effectiveness of Australian health care delivery. These E-Health solutions represent the tangible means by which consumers, care providers and health care managers will electronically interact with the health system.

A great number of individual E-Health solutions have been implemented, or are in the process of being implemented, across the Australian health sector to date with limited coordination, standardisation or integration. Many of these solutions are built on incompatible and often proprietary technologies, utilise inconsistent data structures and representations, and have not been built in a manner that supports information sharing or leverage by other care provider organisations. The focus of this work stream should be to harness and align this significant national E-Health activity to drive towards a desired set of national outcomes.

Why do we need national action?

The intent of this work stream is not to constrain market freedom through centrally controlled purchasing policies and implementation models, or to assume responsibility for the commissioning and directing of E-Health solutions development. The reality is that it would be extremely difficult, and of questionable value, to try and centrally manage the vast amount of disparate E-Health activity occurring across the Australian health sector.

However, there is a strong recognition that this activity needs to be much more strongly aligned than at present to:

- Avoid the costly duplication of solution development activities
- Enable the more effective leveraging and scaling of successful solutions
- Improve the ability for E-Health solutions to exchange information across geographic and health sector boundaries.

This can be achieved through a nationally coordinated focus on mechanisms such as targeted financial investments, stakeholder change and adoption programs and solution compliance testing and certification regimes.

Where should we focus?

At a national level, there is a need to encourage the development of solutions in priority areas that will provide the greatest tangible benefits to Australian consumers, care providers and health care managers. These are solutions that enable improved quality, safety and effectiveness of care and care decision making and solutions that can improve the efficiency of care delivery processes. National consultation and international research have identified the following set of high priority E-Health solutions in three categories - electronic information sharing, service delivery tools and health information sources. These solutions are summarised in Figure 5-2 and described in more detailed in Appendix B.

FIGURE 5-2: PRIORITY SOLUTIONS SUMMARY

E-Health Solution Category	Priority Solutions	Description
Electronic Information Sharing	• Referrals • Event summaries including discharge summaries, specialist reports and notifications • Prescriptions • Test orders and test results • Care plans	Improving the capability of patient, clinical and practice management systems to support key electronic information flows between care providers. These key information flows provide a basis for improved care planning, coordination and decision making at the point of care.
	• Consumer demographics • Current health profile • Current medications list	The key datasets that provide the summary of a consumer's key health data and their current state of health, treatments and medications. These datasets will improve the quality of service delivery and will ensure that consumers do not have to remember or repeat this information as they navigate the health system.
Service Delivery Tools	• Decision support for medication management • Decision support for test ordering	Encouraging the development of specific tools that improve the quality of clinical decision making and can reduce adverse events and duplicated treatment activities.
	• Chronic disease management solutions. • Telehealth and electronic consultation support	Encouraging development of specific tools that improve the management of chronic disease and the accessibility of care delivery. Chronic disease management solutions enable the identification and monitoring of chronic disease sufferers and support management of their condition by providing automated reminders and follow-ups. Telehealth and electronic consultation tools will enable improved rural, remote and disadvantaged community access to health care services.
Information Sources	• Health care reporting and research datasets • Health information knowledge bases	Implementing improved datasets for health care management that provide access to longitudinal and aggregated information for analysis, reporting, research and decision making. Providing access to a set of nationally coordinated and validated health knowledge sources for consumers and care providers.
	• IEHRs	Implementing IEHRs that provide consumers with access to their own consolidated health information and provide care providers with a means to improve the coordination of care between multi-disciplinary teams. The IEHR can also support the collection and reporting of aggregated health information.

These priority E-Health solution sets are not intended to be exhaustive, however they do represent the areas that should be given national funding and resource priority due to the tangible nature of the care delivery and coordination benefits they can provide. In order to progress activity as quickly as possible, it is envisaged that national progress towards the development of richer and more scalable E-Health solutions in each these areas will occur in a concurrent rather than sequential manner.

What can we leverage?

There are a large number of E-Health initiatives underway across Australia that provide a foundation of research, experience and potential solution models that could be leveraged to inform the development of high priority E-Health solutions. Key areas of potential leverage include:

- **Information flows -** there are existing patient management, practice management and clinical management systems that have strong market share within Australian care provider organisations. Coordination and engagement activities should focus on encouraging the vendors of these solutions to incorporate support for key information flows into these solutions. In addition, a range of care provider organisations including eHealthNT, DHS Victoria, GP Partners, DVA, NSW Health and

Queensland Health have solutions in place under development to support key information flows. The knowledge and experience from these projects together with any relevant standards, designs and solution components could be leveraged to accelerate the development of standardised solutions.

- **Service delivery tools -** the National Prescribing Service has developed a framework for the Quality Use of Medicines that should be leveraged as a key input into the design of national decision support framework. A number of organisations have existing telehealth experience and/or solutions that could potentially be leveraged including eHealthNT, Queensland Health, NSW Department of Health, and the Department of Broadband, Communications and the Digital Economy.
- **Information sources -** Medicare Australia is planning the establishment of a national consumer access portal that provides consumers with access to information such as demographics, immunisation history and Medicare event history. GP Partners in Queensland, HealthELink in NSW and eHealthNT all have in place solutions that provide some form of individual electronic health record that can be shared between care providers. In addition, NEHTA has undertaken extensive research into the design and structuring of IEHRs and IEHR repositories. This work should inform the approach to implementing national IEHR capability.

5.3.2 Recommendations

R-2.1 Create a National E-Health Solutions Investment Fund

Establish a national fund to encourage investment in the development and deployment of high priority, standards compliant and scalable E-Health solutions

Description

The Australian health IT marketplace is characterised by the proliferation of a multitude of different software solutions. Many of these solutions have been designed to satisfy specific local needs and cannot be easily integrated or scaled to support larger consumer and care provider populations. There is a need to encourage the development and implementation of high priority E-Health solutions that support national standards and that can be effectively scaled and leveraged across the Australian health sector.

While market demand is one force that will encourage vendors to develop scalable, standards compliant E-Health solutions there may be areas in which it is not economically viable for vendors to develop such solutions given the relative size of the Australian health care market. In such instances there will be a need to offer incentives to stimulate the development the required solutions. More generally there is likely be a need to seed development of specific high priority solutions to encourage the market to move in the required direction. There may also be a need to foster innovation by providing funding for the investigation and development of high potential innovative ideas for E-Health solutions and methods of care provision.

The development of high quality, scalable Australian E-Health solutions should be stimulated via tightly governed access to a national E-Health solutions investment fund. This fund should be used to support the funding of promising E-Health solution developments in high priority areas. Establishment of this fund will involve the development of rules and criteria to guide the allocation of investment funds and the definition of appropriate governance, processes and control mechanisms. Access to investment funds should be judged on the basis of a set of criteria that include:

- Solution scalability and leveragability
- Solution robustness and quality

- Compliance with national E-Health standards
- Alignment of the proposed solution to one of the high priority domains.

Specific Actions

To stimulate development of high quality, scalable Australian E-Health solutions, it is recommended that the following actions are undertaken:

- Establish a national E-Health solutions investment fund to support the funding of promising E-Health solution developments in high priority areas.
- Develop the rules and criteria to required guide the allocation of investment funds and establish the appropriate investment fund governance, processes, control mechanisms and functions.

R-2.2 Establish a National Compliance Function

Establish a compliance function and associated compliance processes and procedures to conduct testing and certification of E-Health solutions for compliance with E-Health standards

Description

A compliance regime is a key mechanism for driving adoption of standards within E-Health solutions. A key requirement for a compliance regime is the establishment of a compliance function that is responsible for testing E-Health solutions and certifying their compliance with Australian E-Health standards.

There is a need to establish a national compliance function to drive the development of national E-Health solutions that comply with E-Health standards and can be integrated and scaled across the Australian health sector. A national compliance function will allow vendors and care providers to ensure that E-Health solutions that are developed and purchased are compliant with Australian E-Health standards.

Establishment of the compliance function will require the formation of an organisation with sufficient mandate and authority as well as the development of appropriate testing processes, procedures and testing criteria. The compliance function should also have responsibility for liaising with vendors together with development and publication of testing criteria, a testing schedule and progressive targets. Adopting a progressive approach to compliance testing will allow vendors to incrementally enhance their products as the use of E-Health in the Australian health sector matures.

NEHTA has undertaken some research into different models that can be used for compliance functions. This research should be considered together with existing local and international compliance models such as the TGA (Australia), the FDA and the Certification Commission for Health Information Technology (USA), and Infoway (Canada) in determining the design of the E-Health compliance function.

Specific Actions

In order to establish an E-Health solutions compliance function it is recommended that the following actions be undertaken:

- Establish a compliance function that has sufficient authority, funds, infrastructure and resources to conduct an effective national E-Health solutions testing and certification program.
- Design and implement appropriate compliance testing processes and technical environments.

- Develop and publish the set of criteria against which IT systems will be certified as being E-Health compliant. These criteria should be based on the principle of setting progressive targets to be achieved over a rolling three year timeframe.

R-2.3 National Priority E-Health Solutions

Adopt a national coordinated approach to the development of consumer and care provider health information portals and an electronic prescriptions service

Description

This strategy is advocating a market driven approach to E-Health solutions development, however there are two pieces of high priority E-Health solutions infrastructure where a national approach to implementation appears worthy of serious consideration. These are a set of health knowledge portals and a national prescriptions service.

Health knowledge portals - The implementation of separate internet based portals for consumers and care providers that will provide access to a set of nationally coordinated, validated and appropriately focused health knowledge sources. Although many knowledge sources exist in some form today, they are fragmented, not always consistent or up to date and involve significant duplicated effort and investment to maintain.

There are a range of existing best practice health knowledge sources across the country such as HealthInsite and Better Health Channel for consumers and the National Health Call Centre Network and MIMS for care providers that could be included in the set of knowledge sources that are made available through the separate knowledge portals. Additionally, Medicare Australia has in place and under development online infrastructure that could potentially be leveraged to provide the underlying computing platform that is used operate the portals.

Operation of the health knowledge portals will also require the establishment of a national health knowledge management function that is responsible for validation and coordination of the knowledge sources that are provided through the health knowledge portals. This function will need to be supported and guided by an appropriate governing and review forum that can provide the required expert input from care providers and consumers. This is an approach consistent with the National Library for Health in the UK and the National Library for Medicine in the US. Consideration should also be given to this group having responsibility for establishing and managing national sourcing contracts for commercial health knowledge and reference sources that may be made available through the health knowledge portals

Prescriptions service - The implementation of a service to support the electronic transfer of prescriptions between care providers and community and hospital pharmacies. Establishment of a nationally integrated service will allow consumers the freedom to fulfil medication scripts at a community pharmacy of their choice, regardless of location.

International evidence suggests that electronic transmission of prescriptions can lead to a significant reduction in adverse events relative to the costs involved. Potential benefits include the virtual eradication of lost prescriptions, a significant reduction in prescribing errors by removing reliance on hand-written scripts and the ability to track whether prescriptions have been filled to determine whether patients actually receive the medication they need. Such a service would also enable the easier detection of ‘doctor shopping’ or prescription drug abuse.

It is recommended that electronic prescribing should be addressed through the development of a nationally integrated ‘store and forward’ e-prescribing network where once a prescription is finalised by the practitioner the electronically signed prescription is transmitted, in secure fashion, to a central e-prescribing hub. At the same time the consumer is provided with a printed prescription (or equivalent token) to take to the pharmacy of their choice. The

electronic prescription is then retrieved from the central hub and the medicine dispensed to the consumer.

Recognising the potential return on investment in this area, early movement on a national scale should be seriously considered. To establish support for an electronic prescriptions service there are at least two broad national approaches that can be taken.

1. Encourage the development of electronic prescriptions services and medication management as a priority component of IEHR repository solutions (recognising that information on medicines prescribed and dispensed will be a key component of such records). Under this scenario the approach to prescription services development would match that adopted for IEHRs (Refer R-2.4).
2. Establish one or more standalone prescription services, accessible by any prescriber or dispenser nationally, which could eventually be integrated with IEHR services. This option has the potential to enable the quicker delivery of national electronic prescriptions services as there is no need to wait until there are IEHR repositories available.

With regard to the latter option, Medicare Australia should be assessed as a potential service provider along with other private sector operators. Medicare Australia has established electronic links with 98% of community pharmacists for the purpose of electronic claiming for PBS subsidised prescriptions. This is also an area where a number of private sector providers have shown an interest in offering services.

EhealthNT in the Northern Territory have undertaken significant research into electronic transfer of prescriptions and are in the process of piloting a solution for the Northern Territory. This research and experience should be leveraged in the design, development and implementation of future electronic prescription solutions.

Specific Actions

Establish national health portals - review existing consumer and care provider health knowledge sources and identify best practices and areas of duplication. Design and build a national Consumer Health Portal and a national Care Provider Portal. Utilise the portals to provide each group of stakeholders with a single point of access for national coordinated and validated health care information. Establish a national health knowledge management function and an appropriate governing and guiding body to review, validate and coordinate health knowledge sources nationally and make them accessible through the national health portals.

Establish an electronic prescriptions service - Determine the most appropriate approach to the development and implementation of electronic prescription services. Depending on the approach adopted, electronic prescription services should either be incorporated into future IEHR specifications or proposals should be sought and evaluated for the delivery of national electronic prescription services. In either case, services will need to be compliant with relevant E-Health standards to ensure access by prescribers and dispensers to all required information and compatibility with IEHR services.

R-2.4 Individual Electronic Health Records

Adopt an incremental and distributed approach to development of national individual electronic health records

Description

An IEHR is a secure, private electronic record of an individual's key health history and care information recorded by themselves and the health system. The purpose of Individual Electronic Health Records is to provide a consolidated record of an individual's health information for consumers to access and as a mechanism for improving care coordination

between care provider teams. The IEHR can also be used as a key information source for longitudinal and aggregated health information, in conjunction with other health sector data sets, to support more informed health care reporting and research.

As part of the national E-Health Strategy it is recommended that Australia adopt an incremental and distributed approach to the development of IEHRs. This is a pragmatic approach that:

- Focuses initial effort on enabling the flow of quality and relevant health information across the Australian care provider network
- Supports more effective management of IEHR implementation costs and risks
- Reflects the complexity and fragmentation of the Australian health care system and the relatively early stages of IEHR development in Australia
- Supports the timely delivery of IEHR capability in those parts of the health sector that are ready to move more quickly.

The recommended approach is based on the principle of ensuring that the most granular level of health information is made available to the consumer and care provider at the point of care through care provider systems. At the IEHR level information becomes more summarised and aggregated to provide a consolidated summary of an individual's care history.

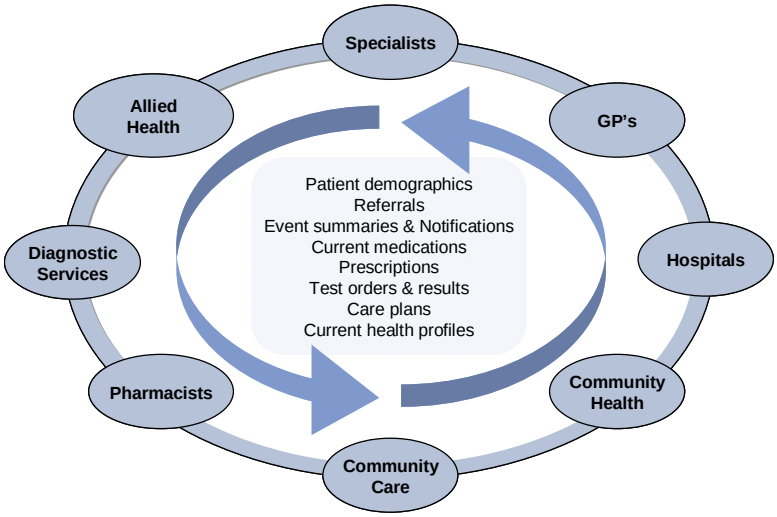
1. Connect care providers

The first step in the journey towards the building of national IEHR capability is to connect care providers across the Australian health care system so that they can effectively access and share consumer health information. This step requires the implementation of national E-Health foundations such as consumer and care provider identifiers, standards, rules and protocols for information exchange and protection, and underlying physical computing and networking infrastructure. Current plans are to implement an initial set of these core information exchange building blocks at a national level by 2010.

2. Enable key information flows

The next step should be to enable the flow of priority sets of information between care providers to provide a base of comprehensive and reliable information on which IEHRs can be built. These priority information flows include referrals, event summaries, prescriptions, test orders/results and care plans and should incorporate consumer health datasets such as demographics, current health profiles and current medications lists. This step will involve the definition of national standards to facilitate the exchange of this information and changes to patient, clinical and practice management systems to support the flow of these priority information sets between care providers.

FIGURE 5-3: KEY INFORMATION FLOWS



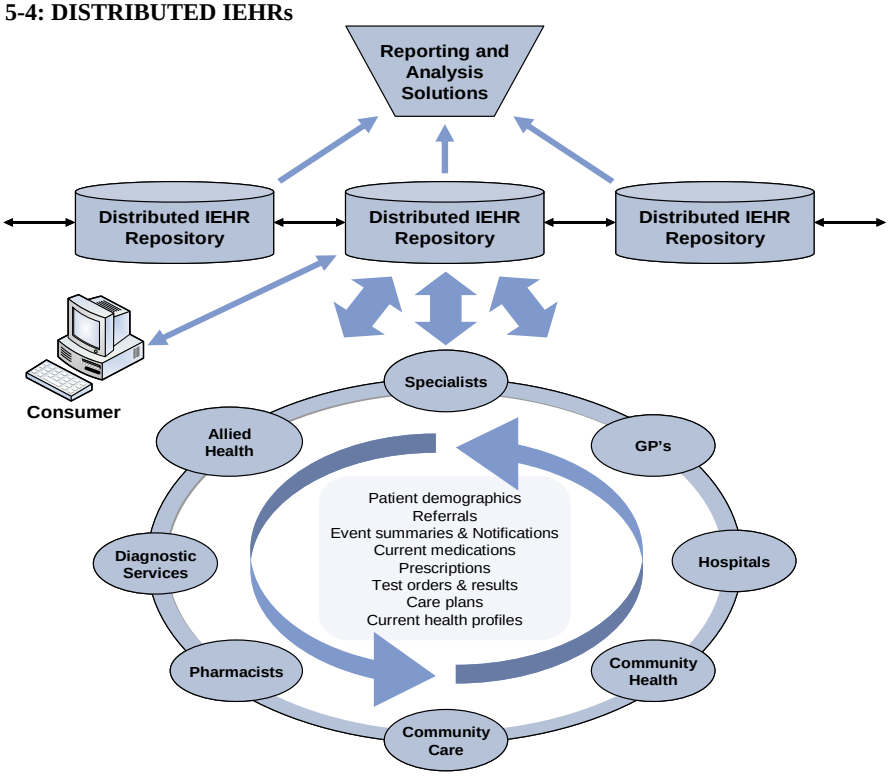
3. Facilitate the development of distributed IEHRs

Once some of these key information flows are established between groups of care providers, secure repositories can be developed in a distributed manner across the health system that can accumulate the information in these flows into a consolidated record for each individual. As additional information flows are established, these can be incrementally added into the consolidated record to increase the richness of information available in the IEHR.

IEHRs can be used to provide consumers with access to their own personal health information and a personal health diary that they can use to record observations on their state of health. Personal health records could also incorporate individual risk assessments and tailored behaviour management plans.

Reporting and analysis tools can also be built to support analysis of de-identified and aggregated datasets based on the information contained in these repositories.

FIGURE 5-4: DISTRIBUTED IEHRs



4. Review and consolidate

Over time, where practical, consolidation of the IEHR record repositories could be considered to reduce operating costs, rationalise infrastructure and simplify operational management.

What are the implications of this IEHR approach?

Adopting an incremental and distributed approach will allow different care provider networks to progress towards the establishment of IEHR repositories at different rates based on the extent to which infrastructure foundations and key information flows are in place. Distributed repositories will most likely be developed across geographic regions by large care provider organisations and care provider networks. However, this strategy also recognises the potentially important role that non direct care delivery organisations such as Microsoft, Google, Medicare and health insurers might play in creating IEHR repositories that allow consumers to access their personal electronic health information. To ensure that IEHR records are available to all consumers including the socially and economically disadvantaged, there may need to be for government organisations such as Medicare or State and Territory

Government health departments to implement universally accessible repositories that act as 'providers of last resort'.

The key challenge associated with a distributed IEHR strategy is ensuring that the health information contained in these repositories is consistently secure, private and accurate and can be found, shared, transferred and reported on across multiple national repositories. Accordingly all IEHR repositories must be based on consistent national data standards and fully comply with data protection legislative requirements. This may need to be supported by the establishment of a formal licensing regime to regulate the operators of IEHR repositories to ensure that they comply with standards for information integrity, privacy and protection, mobility, and accessibility for reporting and research.

Individual's health records will need to be accessible from anywhere in Australia and components of these health records may reside in one or more repositories. There will therefore need to be a central indexing or addressing mechanism established that allows E-Health solutions to determine in which repository an individual's IEHR, or components thereof, are located.

5.4 Change and Adoption Work Stream

R-3 Foster and accelerate the delivery of high priority E-Health solutions by vendors and care provider organisations in a nationally aligned manner

5.4.1 Overview

The Change and Adoption work stream focuses on what needs to be done to encourage and enable participants in the health care system to adopt E-Health solutions and to change their work practices to be able to use them effectively. The aim of this work stream is to enact national strategies to drive the adoption of E-Health in Australia to a self sustaining tipping point as quickly as possible.

The majority of E-Health adoption and change activities will be undertaken and managed at local and regional levels across the Australian health care system . There is a need, however, for national strategies to accelerate the adoption of E-Health in Australia to a self sustaining tipping point as quickly as possible. This will require a coordinated program of awareness, training and education, and incentive and compliance programs. The targets of these programs will be consumers, care providers, health care managers and vendors, with a particular focus on driving the adoption of E-Health solutions across Australian consumer and care provider communities.

Why is change and adoption important?

Global and Australian experiences clearly demonstrate the critical role health care participants play in determining the success of E-Health initiatives. These experiences also show that realisation of care delivery benefits is directly related to the extent that participants are willing to use E-Health solutions to interact with the health system.

Evidence suggests that early attempts at E-Health have placed too little emphasis on the changes people need to make, focusing instead on technology. The National Audit Office review of the NHS Connecting for Health program identified the lack of provider involvement in solution specifications as a significant challenge to successful implementation. This led to strengthened arrangements for engaging healthcare providers and involving them in the development of solutions.[51] An evaluation of E-Health in the European Union identified the need for support from consumers, care providers, health care managers, industry, authorities, and third party payers across all stages of development, implementation and deployment.[52]

Assessment of the current state of E-Health in Australia emphasises the need for the E-Health agenda to place a significant focus on addressing people related issues. Stakeholders agreed that technology solutions alone will not deliver change, rather success of E-Health will primarily be determined by the extent to which care providers and consumers accept and adopt E-Health. This has been evidenced through a significant number of E-Health initiatives such as GP Partners that have been successfully led by passionate leaders championing the change and taking people with them.

Although unlikely to happen in the short term, there is global evidence emerging that consumer demand for access to better health information may end up becoming the real driver for the adoption of E-Health solutions in Western democracies. Until very recently Australian consumers have not been meaningfully engaged in the E-Health debate and there has been

[51] National Audit Office, *The National Programme for IT in the NHS: Progress Since 2006*, United Kingdom, 2008.

[52] Stroetmann KA, Jones T, Dobrev A, Stroetmann VN, 'An Evaluation of the Economic Impact of Ten European E-health Applications', *Journal of Telemedicine and Telecare*;13:62-64, 2007.

consequent lack of pressure for action from this critical stakeholder group. It is apparent that Australian consumers will choose the nature and timing of their own involvement in the E-Health agenda and won't utilise solutions unless they are accessible, user friendly, trustworthy and clearly add value to their lives.

Where E-Health has been successfully implemented in this country it has been typically led by pockets of the care provider community. In the majority of cases, however, there has been a consistent and significant underestimation of the effort required to engage and support care providers in the adoption of E-Health solutions. These E-Health initiatives have demonstrated that care providers will not adopt E-Health without clearly understandable benefits to themselves and to their patients, or if any solution imposes inefficiencies within the care delivery process.

Based on this experience, there is an emerging realisation that winning the hearts and minds of Australian health care participants will be a critical factor in determining the ultimate success of the national E-Health agenda. An appropriate mix of change mechanisms will be required to create initial momentum until change becomes self sustaining and a tipping point is reached. People are the essential ingredient needed to create the tipping point - the moment when an idea, trend or social behaviour crosses a threshold, tips, and spreads like wildfire.[53]

What are health care participants adopting?

E-Health solutions are the tangible IT systems and tools that consumers, care providers and health care managers will use to interact with the health system. It is through the adoption and use of these E-Health solutions, and the redesign of care practices and processes enabled by the use of these solutions, that benefits will directly accrue to health care participants. The efforts of this work stream therefore need to focus on ensuring that consumers, care providers and health care managers are aware of these solutions, are educated in their use, are encouraged and motivated to adopt them and are supported in making the changes required to utilise them effectively.

What do we need to do to drive change and adoption?

A strongly coordinated focus on the people dimension of the national E-Health deployment should be supported by the following mechanisms:

- **National awareness campaigns** - Design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers.
- **Financial incentive programs** - Establish financial incentive programs, targeted primarily at key private provider segments, to encourage the adoption and use of high priority E-Health solutions as they become available.
- **Care provider accreditation** - Facilitate changes to national care provider accreditation regimes to make the adoption and use of E-Health solutions a core accreditation requirement.
- **Education and Training** - Implement changes to vocational and tertiary training programs to increase the number of skilled, nationally available E-Health practitioners.
- **Stakeholder engagement forums** - Establish national E-Health stakeholder reference forums and working groups with cross sectoral representation and clearly defined objectives and goals.

[53] Gladwell, M, *The Tipping Point*, Little Brown, 2000.

5.4.2 Recommendations

R-3.1 Awareness campaigns

Design and implement national awareness campaigns that focus on communicating the scope and benefits of high priority solutions to consumers and care providers

Description

A key mechanism for driving change and adoption is making participants aware of the E-Health solutions that are available to them and the benefits that use of these E-Health solutions may provide. This may involve mechanisms such as media campaigns, solution demonstrations and web based communication of E-Health status and success stories.

From a care provider perspective these campaigns should focus on driving adoption of E-Health solutions that are standards compliant, scalable and address nationally identified priorities. In the design of these campaigns it should be recognised that the benefits that care providers will receive from using specific E-Health solutions will be most effectively promoted by peers.

From a consumer perspective, these campaigns should seek to raise consumer awareness of E-Health and the tangible solutions becoming available for their use. As part of this process consumers should be actively encouraged to access and use emerging individual electronic health record solutions with a particular focus on those segments of the population that interact frequently with the health system such as mothers and infants, the elderly and those with chronic disease.

Specific Actions

The design and implementation of national awareness campaigns will require the following activities to be undertaken:

- Identify key consumer, care provider and health care manager stakeholder segments that should be targeted for E-Health adoption and assess their readiness to adopt specific E-Health solutions and the opportunities to build momentum
- Develop and implement awareness campaigns utilising appropriate communications mechanisms and forums to promote awareness of E-Health solutions and their benefits
- To evaluate the effectiveness of engagement and awareness activities, periodically measure progress against the targets defined for the advancement of E-Health adoption across consumers, care providers and health care managers over the next 10 years
- Support awareness campaigns with a national, web-based knowledge repository that captures E-Health project successes and enables the sharing of learnings across the health care community.

R-3.2 Incentive Programs

Establish financial incentive programs, targeted primarily at key private provider segments, to encourage the adoption and use of high priority E-Health solutions

Description

One of the barriers to broad adoption of E-Health solutions is the lack of incentives for care providers to actually purchase and use these solutions. Whilst care providers increasingly understand the link between E-Health solutions and improved patient outcomes, the costs of

implementing E-Health solutions are typically higher than the direct benefits that care providers will initially receive.

Awareness and education campaigns should therefore be supported by an appropriate time-limited incentive program to actively encourage care providers to purchase and implement high priority E-Health solutions as they become available. It is recommended that incentives be based on financial payments which are linked to the actual use of E-Health solutions and targeted at key private sector care providers (e.g. GPs, clinical specialists, community pharmacists, and diagnostic service providers). Incentives should be funded nationally and, where possible, should use existing national funding mechanisms such as MBS and PBS claiming through Medicare Australia.

Specific Actions

The establishment of an appropriate incentive program for E-Health in Australia will require the following actions to be undertaken:

- Establish design principles for determining the allocation of incentive funds.
- Conduct modelling to determine the funding levels, the participant allocation and model scenarios to test that demand will not outstrip available funding.
- Establish the incentive program including the conditions of funding, eligibility criteria, application/approval processes, funding administration, and roles and responsibilities.
- Develop communication strategy and materials to publicise incentives and put in place necessary mechanisms including funding guidelines and application forms.
- Monitor adoption of E-Health solutions in target stakeholder segments over time and scale back incentives as adoption reaches a tipping point.

R-3.3 Care Provider Accreditation

Facilitate changes to national care provider accreditation regimes to make the adoption and use of E-Health solutions a core accreditation requirement

Description

While incentive mechanisms may be used as a short term mechanism to drive E-Health adoption, in the longer term focus should be on embedding the use of E-Health solutions into the day to day operating practices of care providers. A key means by which this can be achieved over time is by making adoption and use of E-Health solutions a national requirement for professional accreditation of care providers. This will involve liaising with care provider professional bodies to define appropriate E-Health accreditation criteria such as the establishment and maintenance of acceptable levels of computing infrastructure and the use of high priority, standards compliant E-Health solutions.

Changes to accreditation regimes should also involve the development, adoption and implementation of appropriate professional practice standards for care providers. These professional practice standards should define the expectations and obligations of care providers to collect, store and share high quality electronic care information in a timely, appropriate and secure manner.

Specific Actions

Facilitating changes to national care provider accreditation regimes will require the following actions to be undertaken:

- Establish a professional practice standards working group with appropriate cross sectoral representation to guide the development of a professional practice standard for care providers. These standards should define the expectations and obligations of care providers to collect, store and share high quality electronic health care information in a timely, appropriate and secure manner.
- Establish a professional body working group to determine and oversee the changes required to professional accreditation programs for care provider organisations and individuals.
- Liaise with the Health Workforce Taskforce and care provider professional bodies to define appropriate E-Health accreditation criteria such as the establishment and maintenance of acceptable levels of computing infrastructure and the use of high priority, standards compliant E-Health solutions.
- Agree and implement refined accreditation requirements for care provider organisations and individuals.

R-3.4 Education and Training

Implement changes to vocational and tertiary training programs to increase the number of skilled, nationally available E-Health practitioners

Description

There is a clearly identified need to support the national E-Health Strategy with sufficient numbers of skilled health IT resources as this is looming as a critical barrier to the successful implementation of a national E-Health work program. The building of Australia's E-Health skills capacity and capability will require the national coordination of changes to vocational and tertiary training programs.

The emphasis of these changes should be to strengthen the understanding of the importance and use of health IT as part of care provider training programs to equip the workforce of the future with the skills, experience and knowledge to apply E-Health solutions in everyday practice. Changes to education, training and skilling programs need to be based on national agreement and consistency around what constitutes E-Health from a competency and skills perspective in the form of a national competency framework. This will provide a common structure and language to guide the enhancement of education and training programs and the definition of professional standards. It will also provide care providers with an understanding of the continuum of E-Health skills and capabilities required within their practice settings.

There is also a clearly defined need to increase the number of trained health informatics practitioners as this has been clearly identified as a necessary but scarce resource. This should involve consideration of the establishment of nationally recognised tertiary qualifications in health informatics in a similar manner to countries such as the US.

Specific Actions

The establishment of an appropriate E-Health workforce for Australia will require the following actions to be undertaken:

- Define a standardised E-Health competency framework for health workers and health IT practitioners providing an understanding of required E-Health knowledge, skills and attributes for each professional group.
- Determine the education and training course changes required to ensure the development of E-Health workforce capabilities.
- Work with post secondary educational institutions such as Universities, vocational training institutions and professional bodies to embed E-Health into their curricula.

- Conduct an assessment of the current state of health informatics in Australia and consult with relevant academics and health informatics practitioners (private and public sector) to understand industry and sector requirements.
- Establish a nationally recognised tertiary qualification in health informatics and implement formalised training/education programs designed to recognise and promote the spread of the specialist skill.
- Strengthening the position of existing professional bodies such as Health Informatics Society of Australia (HISA) and Australian College of Health Informatics (ACHI) to provide ongoing promotion and professional accreditation services for the profession.

R-3.5 Stakeholder Reference Forums and Working Groups

Establish national E-Health stakeholder reference forums and working groups with cross sectoral representation and clearly defined objectives and goals

Description

Stakeholder consultations identified the lack of meaningful engagement of health care participants as a significant barrier to progressing the national E-Health agenda. The best E-Health outcomes will result from the continuous engagement of a broad range of interests representing public and private care providers, professional, Government, vendor and community groups.

To achieve this, it is recommended that stakeholder reference groups be established to provide input into the appropriateness and completeness of E-Health foundations, to prioritise E-Health solutions activity and to provide insight into the effectiveness of change and adoption approaches. In addition it is recommended that professional body working groups be established to determine and oversee the changes required to professional education, training and accreditation programs and to undertake development of professional practice standards.

The key challenge with the establishment of such forums is to try and avoid the creation of groups that discuss a lot of issues but don't achieve tangible outcomes. Accordingly stakeholder reference and professional body working groups should be subject to a clearly defined charter with specific goals, objectives and timeframes.

Specific Actions

The establishment of appropriate stakeholder engagement forums for E-Health in Australia will require the following actions to be undertaken:

- Design targeted engagement forums with clear goals, objectives and deliverables. Identify participants ensuring broad and appropriate representation across providers, professionals, governments, vendors, consumer and community groups.
- Establish processes and guidelines for conducting consultation and engagement to ensure that the inputs are used to shape and influence the direction of the E-Health Strategy and work streams.
- Establish professional body working groups with clear goals, objectives and deliverables to determine and oversee the changes required to professional education, training and accreditation programs and to undertake development of professional practice standards.

The establishment of stakeholder reference forums and working groups should be based in the first instance on leveraging existing groups that have appropriate representation and traction.

5.5 Governance Work Stream

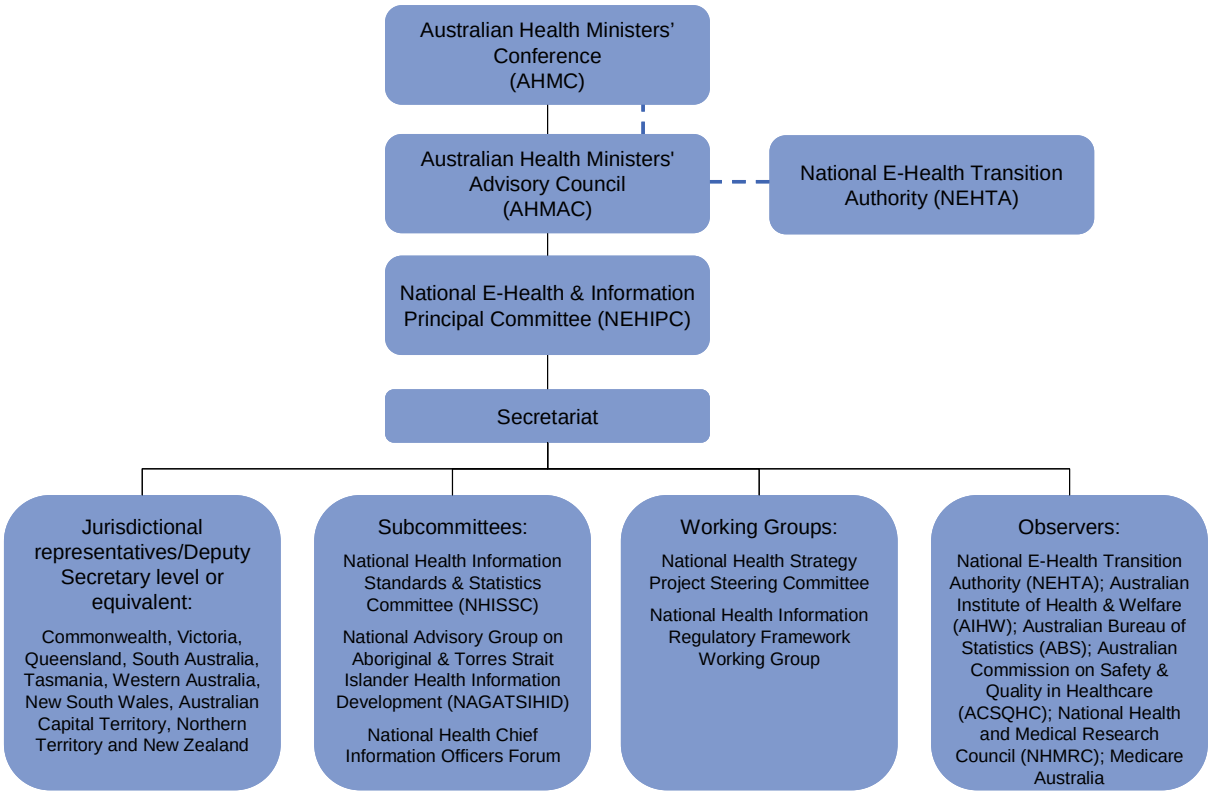
R-4 Develop a governance regime which allows strong coordination, visibility and oversight of national E-Health work program activities

5.5.1 Current E-Health Governance

Existing Governance Arrangements

The National E-Health and Information Principal Committee (NEHIPC) has been established to advise the Australian Health Ministers' Advisory Council (AHMAC) on E-Health and information strategies and to facilitate collaboration between the Australian, State and Territory Governments to implement these strategies. NEHIPC reports to the Australian Health Ministers' Conference (AHMC) via AHMAC and oversees a number of subcommittees and working groups that have been established to progress E-Health nationally. The National E-Health Transition Authority (NEHTA), the national body that has been developed to implement national standards and identify priority E-Health investments for Australia, also reports to AHMC via AHMAC.

FIGURE 5-5: CURRENT GOVERNANCE ARRANGEMENTS



Assessment of Current Governance Arrangements

The current governance arrangements reflect the degree of ultimate accountability that Australian Governments have for national health care funding and the delivery of national health care outcomes. They also support improved coordination between the Australian, State and Territory Governments in the oversight of their respective health information management responsibilities. However, there are significant limitations associated with the current arrangements. The principal limitations are as follows:

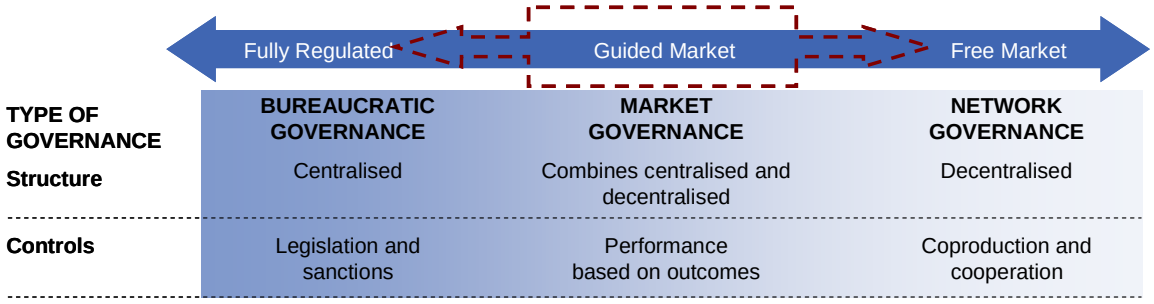
- The NEHIPC committee structure does not have the organisational capabilities or capacity required to deliver the national E-Health Strategy and work program
- There is a high reliance on collaboration between disparate committee, sub-committee and working groups
- The NEHIPC committees have no authority to direct action at the national, State and Territory or local level
- NEHIPC committees do not involve strong representation or engagement of key health stakeholders such as consumers, care providers, academics/researchers and professional bodies
- NEHTA does not have clear accountability for execution, has not historically strongly engaged with the care provider or consumer communities, and has limited capacity to direct or enforce specific courses of action.

5.5.2 Governing the E-Health System

Governance Approach

There is a continuum of models that can be considered when evaluating the most appropriate approach for governing the national E-Health Strategy and associated work program.

FIGURE 5-6: GOVERNANCE CONTINUUM



At one end of the continuum is the centralised bureaucratic governance model under which decisions are mandated, rules and protocols are defined centrally, and there is a heavy reliance on direct supervision to ensure enforcement and adherence. If applied to E-Health, the centralised bureaucratic governance model would drive E-Health adoption from a central mandate and all aspects of E-Health would be implemented through large scale national or State and Territory Government projects.

At the other end of the continuum is the free market governance model in which there is no clear central authority and a reliance on external parties such as customers, care providers and suppliers to cooperate with each other to collaboratively produce outcomes. The free market governance model would support strong collaboration and innovation, allowing existing grass-roots E-Health initiatives to continue with little or no intervention from a central authority.

Between these two extremes lies the guided market model which balances the need for local initiative and innovation against the need to centrally coordinate specific aspects of implementation. The guided market model is characterised by central coordination in areas of national significance, combined with greater flexibility and reduced central control and regulation in areas where the market is best positioned to play a role. The model relies on competition and the use of incentives, funding and compliance mechanisms to drive outcomes in the market place.

Recommended Approach

Analysis of the current state and progress to date of E-Health in Australia, together with the outcomes of the national consultation process, highlighted a consistent view that the guided market governance model is the most appropriate for Australia to adopt.

Based on the national track record to date, and also the inherently fragmented nature of the Australian health care system, it is considered extremely unlikely that a free market model will result in anything other than a significant amount of uncoordinated, non integrated E-Health activity occurring across the country. Given a lack of any national coordination, a free market approach is likely to further exacerbate the proliferation of disconnected information systems and databases across the health sector.

Conversely, a centralised bureaucratic governance model does not appear a realistic option given the virtual impossibility of centrally controlling activity across such a wide range of largely autonomous care provider individuals and organisations. Such an approach would unnecessarily stifle local innovation and activity and place too high a reliance on the delivery of large scale, high risk centrally driven projects.

Guided Market Model

The key consideration when designing a guided market governance model is to clearly distinguish between those elements requiring national coordination and those elements that should be driven by the market. With respect to E-Health, the design and implementation of national E-Health foundations such as standards, identifiers and data protection legislation should be centrally managed and coordinated to avoid duplicated cost and effort and to ensure that information is able to be exchanged across the health sector in a consistent manner.

By contrast, the development of specific E-Health solutions that sit on top of these foundations should be predominantly driven by the health care participant and vendor market. This approach reflects the reality that it would be extremely difficult, and of questionable value, to try and centrally manage the vast amount of disparate E-Health activity occurring across the Australian health sector. Within such an environment, health care participants and vendors should have the ability to develop E-Health solutions that meet their specific needs without being unduly constrained by a centrally controlled implementation model.

However, there is also a strong recognition that this activity needs to be much more strongly aligned than at present to ensure the achievement of desired national E-Health outcomes. Accordingly there is a requirement for a national approach that encourages the market to develop solutions that support agreed E-Health standards and priorities. This can be achieved through a nationally coordinated focus on targeted financial investments and incentives, regulatory frameworks, stakeholder change and adoption programs and solution compliance testing and certification.

Role of Government

Australian Governments have ultimate accountability for national health care funding and the delivery of national health care outcomes. Government should therefore have overall responsibility for setting national E-Health objectives and priorities, funding the national components of the E-Health work program, and measuring progress against agreed E-Health Strategy deliverables and outcomes.

In a guided market model, Government will be responsible for the implementation of national E-Health foundations and for the establishment of appropriate policy and regulatory frameworks to protect the integrity, privacy and security of personal health information. Government should also ensure that appropriate national education and training programs are in place to support the building of national health IT skills capacity and capability.

Government has an important role to play as a provider of a range of health care services. In this role Government will be responsible for directly funding, implementing and operating E-Health infrastructure and solutions in a manner consistent with overall national E-Health priorities and standards.

Beyond these specific responsibilities, the key role of Government will be to stimulate and encourage the market to develop quality E-Health solutions that are scalable, standards compliant and aligned with national priorities. This will involve responsibilities such as overseeing:

- The design and implementation of national incentive regimes
- The design and rollout of national awareness and education campaigns
- The establishment of a national E-Health solution compliance function.

Governance Principles

There are a set of governance principles that should underpin the design of a national E-Health governance structure.

FIGURE 5-7: GOVERNANCE PRINCIPLES

Governance Principle	Description
Clarity of accountability	Ensure clear decision making accountability and provide all stakeholders with clarity regarding their roles and responsibilities
Transparency	Provide widespread visibility of the progress of Australian E-Health activities
Appropriate stakeholder representation	Provide a forum for representation across all key stakeholder groups Ensure broad ownership and a balanced approach to the delivery of E-Health
Sustainability	Implement a governance model that will not be unduly impacted by changes to the political or stakeholder environment
Support for activity at multiple levels	Recognise that E-Health governance will need to support initiatives that deliver E-Health capability at differing levels of granularity
Effective leadership and coordination	Enable effective leadership and coordination of the range of activities that need to occur across all work streams to ensure the aligned delivery of E-Health outcomes across Australia
Balance local innovation and national outcomes	Continue to encourage local innovation while ensuring that the development of E-Health solutions supports national E-Health outcomes

Governance Functions

In developing the proposed governance structure, it is necessary to consider how the core operating functions - strategy, execution, investment, standards development, solutions compliance and regulation should be organised. As in any operating model, it is recommended that there is clear delineation between these functions. This delineation supports a structured and balanced approach to assessing the implications of changes in policy, strategy, funding mix or execution priorities.

The strategy and investment functions must be sufficiently strong to guide the way in which the E-Health Strategy is executed. The execution function must be distinct from, yet clearly accountable for the delivery of outcomes set by the strategy function and within the financial budgets set by the investment function. Given the closeness of these relationships, it is recommended that the E-Health execution function resides within the same organisation as the strategy and investment functions. Any greater separation, such as having these functions

reside in separate organisations, has the potential to create disconnects between E-Health strategy, investment and execution and would likely impede progress of the E-Health agenda in Australia.

It is recommended that the E-Health standards development and solutions compliance functions, whilst distinct, should initially reside under the same organisational construct to ensure the close alignment of standards setting and testing regimes. Over time, as the compliance function matures, consideration should be given to the establishment of a separate compliance entity in a similar manner to countries such as the US.

The one function that should be organisationally separated from the functions described above is the regulation function. From a regulation perspective, separation is required to ensure that national E-Health activities can be overseen by an independent and at arms length regulatory body. The regulatory function will be accountable for the implementation of a national legislative framework that is required to support the E-Health Strategy. This function should also monitor and enforce adherence to the national E-Health legislation.

5.5.3 Governance Recommendations

R4.1 Establish a national E-Health governing board that reports to AHMC, has an independent chair and has a breadth of cross sectoral stakeholder representation.

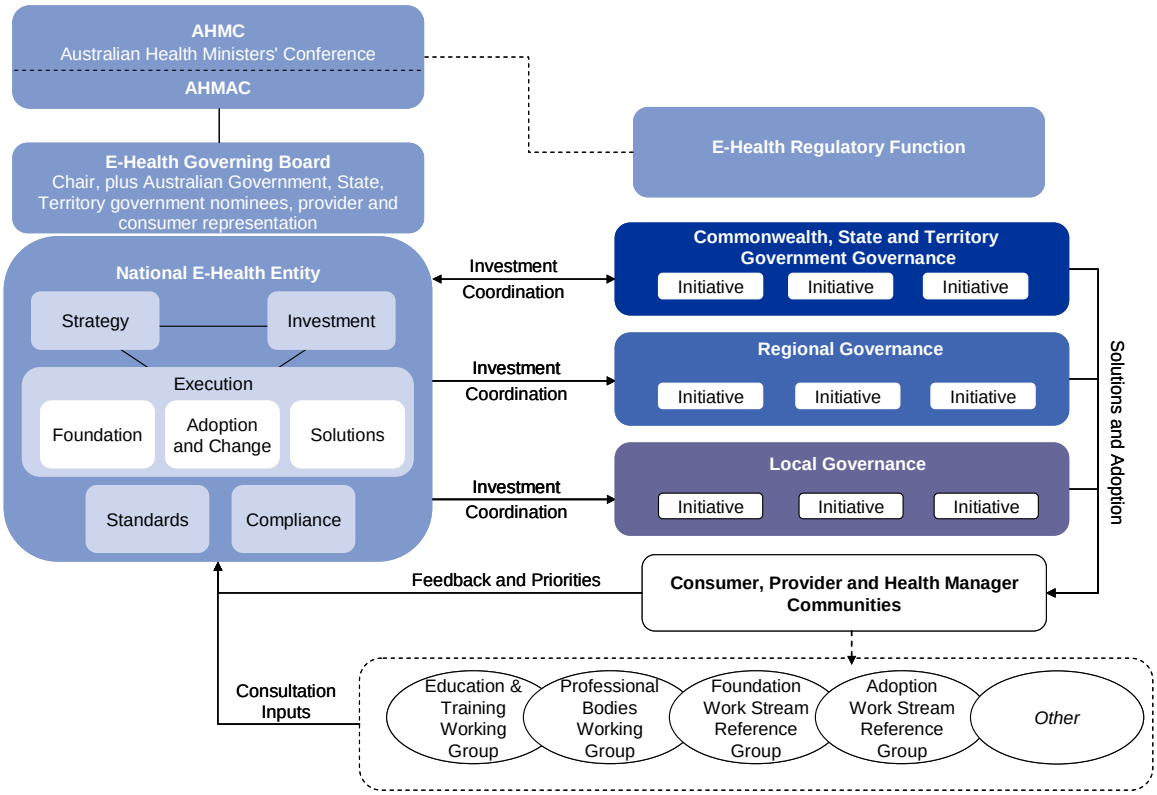
R4.2 Establish an independent national E-Health regulation function to implement and enforce national E-Health policy and regulatory frameworks.

R4.3 Establish a national E-Health entity incorporating functions for strategy, investment management, work program execution, standards development and compliance.

Proposed Governance Structure

The proposed governance structure is shown in Figure 5.8.

FIGURE 5-8: GOVERNANCE STRUCTURE OF THE NATIONAL 'E-HEALTH ENTITY'



The key features of the proposed governance model are as follows:

- Recognition that all Australian Governments, through the Australian Health Ministers' Conference (AHMC), have ultimate accountability for national health care funding and the delivery of national health care outcomes.
- Formation of a national E-Health governing board, reporting to the AHMC via AHMAC, chaired by an independent chair and comprised of a mix of Government, care provider, health care manager and consumer representatives. The board will have accountability for setting overall national E-Health direction and priorities, for reviewing and approving E-Health Strategy and funding decisions and for the monitoring of national E-Health Strategy progress and outcomes.
- Establishment of an E-Health Entity to coordinate and oversee E-Health Strategy, investment and the execution of the national components of the E-Health work program.
- Governance of E-Health initiatives and the delivery of specific E-Health solutions should continue to be undertaken at national, state, territory, regional and local (e.g. hospital, GP practice) levels. The role of the national E-Health Entity in this instance will be to support relevant initiatives with targeted investment funding, to help identify solution leverage and coordination opportunities, to encourage the adoption of quality E-Health solutions and to test the compliance of E-Health solutions with national E-Health standards
- There should be a number of representative stakeholder reference and working groups that provide focussed input in to the strategy, investment and execution functions of the E-Health Entity
- A separate and independent national E-Health regulation function should be established to implement and enforce national E-Health regulatory frameworks. These frameworks should cover topics such as:
  - The establishment and implementation of unique health care identifiers for individuals, care providers and care provider organisations
  - The integrity, privacy and security of personal health care information
  - The compliance arrangements for IEHR repository operators.

  This function will need to coexist with existing regulatory and privacy bodies and should have an independent reporting relationship to AHMC.

The New 'National E-Health Entity'

The key responsibilities of the new E-Health Entity will include:

- Review, updating and monitoring of the national E-Health Strategy
- Development of investment cases and management of the deployment of national E-Health investment funds
- Development and maintenance of national E-Health standards
- Management of the delivery of specific national E-Health infrastructure foundations including identification and authentication services and national E-Health standards
- Establishment and operation of a national E-Health solution compliance testing and certification function
- Coordination of national stakeholder adoption, change and training programs
- Recommendation and monitoring of stakeholder adoption incentive regimes
- Evaluation and prioritisation of proposed investments in E-Health infrastructure and solutions.

In order to fulfil these responsibilities there are a number of discrete functions that need to be supported within the organisational structure of this entity.

Strategy - this function will be responsible for the periodic review and monitoring of E-Health Strategy outcomes and the development of strategic recommendations and priorities for consideration by the E-Health Governing Board.

Investment - this function will be responsible for the budgeting and tracking of investment funds associated with implementation of the national E-Health work program. The investment function will also be responsible for development of E-Health investment submissions and business cases for consideration by the E-Health Governing Board.

Execution - this function will be responsible for managing delivery of the national components of the E-Health work program. This will require a robust program management office to oversee and coordinate specific project initiatives across the foundations, adoption and change and E-Health solutions work streams. The focus of the execution function will be on the delivery of on time and on budget projects, the reporting of project progress, and the management of project dependencies, risks and issues.

Foundations - responsible for the management of the delivery of specific national E-Health foundations and solutions and the establishment and management of outsourced IT service provider arrangements.

Change and Adoption - responsible for the coordination of national stakeholder change and adoption programs and the oversight of changes to national training and professional accreditation programs.

Solutions - responsible for the evaluation of investment cases for high priority E-Health solutions for consideration by the E-Health Governing Board, the monitoring of funded projects and the liaison with vendors to encourage the on-going development of high priority, standards compliant solutions.

Standards Development - this function will be responsible for the definition, maintenance and enhancement of national E-Health standards. As part of this role, the standards function will be responsible for reviewing and recommending E-Health standards definition priorities for consideration by the E-Health Governing Board, establishing a robust, consistent and inclusive national standards setting process, and liaising with relevant standards setting, national health information and professional bodies. Given the importance of this role, serious consideration should be given to the national E-Health Entity becoming an accredited Standards Development Organisation (SDO).

Solutions Compliance - this function will be responsible for testing and certifying the compliance of E-Health software products and solutions with nationally agreed criteria and standards. The compliance function will be responsible for developing criteria for software compliance (in areas such as quality, security and interoperability), defining certification processes and timings, establishing a robust testing function and laboratory, and liaising with vendors and care providers to schedule compliance testing.

It is recommended that these functions are initially created within the one E-Health entity to allow their scope and operating processes to be established in a coordinated manner. Once operation of the functions has been established and matured, consideration can be given to the requirement to separate out those functions that may best operate as separate entities in the longer term.

Impact on Existing Governance Arrangements

R4.4 Leverage NEHTA to establish the new entity and undertake a transition process to address changes to accountabilities, brand, culture, resources and operating model.

Impact on NEHTA

The establishment of a national E-Health Entity will directly impact the role of NEHTA. NEHTA, a collaborative enterprise owned by Australian, State and Territory Governments, was established to identify and jointly develop foundations for E-Health such as the definition of an agreed set of key national E-Health standards and specifications. This constitutes a subset of the functions proposed for the E-Health Entity. NEHTA's organisational charter expires in June 2009 and hence there is an increasingly urgent need to address the future of the organisation.

In light of the proposal for the establishment of a national E-Health Entity with a significantly broader set of accountabilities and functions than NEHTA in its current form, there are three implementation options that have been considered:

1. NEHTA to form the basis of the new E-Health Entity with a broader remit
2. Establish a new legal E-Health Entity and integrate NEHTA's current execution functions into its structure
3. Establish a new legal E-Health Entity and allow NEHTA to operate as a separate organisation with accountability for the delivery of core E-Health foundations.

The first option is for NEHTA to form the organisational basis of the new E-Health Entity. This would require the existing NEHTA organisation to extend its accountabilities and functions to allow effective governance of the national E-Health Strategy and the execution of the national components of the three strategic work streams. This option would necessitate changes to NEHTA's constitutional basis to extend the range of organisational responsibilities and to end the transitional nature of the authority. It would also require changes to the organisation's brand and operating model.

The advantage of this approach is that the existing NEHTA organisation including legal structure, resources, capabilities, funding and governance arrangements, could be relatively quickly leveraged to support the establishment of the new E-Health Entity. One disadvantage is the extent of work required to restructure, refocus and reskill the organisation. The other is the need to overcome the historic and reasonably widespread perception in parts of the health sector that NEHTA's progress to date has been too slow and not inclusive enough of the care provider community.

The second option is to establish a new legal E-Health Entity that would integrate NEHTA's existing execution functions into its structure. The advantage of this option is the establishment of a new national E-Health Entity with a clear set of accountabilities and which is unencumbered by history. The key disadvantage is that the structure and constitutional and legal basis for this organisation must be designed and created from scratch which is likely to be a lengthy exercise and therefore could delay meaningful progress towards national E-Health outcomes.

The third option is to establish a new legal E-Health Entity and allow NEHTA to operate as a separate organisation with accountability for design and execution of national E-Health foundations. In this option, NEHTA would report in to, and seek strategic direction and funding from, the E-Health Entity. This option will minimise impacts to the existing NEHTA work program, but will also create delays associated with the establishment of the new entity. It will also create the significant potential for overlap, duplication and poor coordination between the two organisations, ultimately risking the coordinated delivery of national E-Health outcomes.

Specific Actions

Given the strong national consensus for action and the amount of E-Health activity occurring at a national, State and Territory, regional and local level around the country, there is the need to move quickly to establish an appropriate long term E-Health governance regime. A pragmatic option is to leverage the existing NEHTA organisation and legal structure as the basis for creating the new E-Health Entity. In NEHTA, Australia has created and invested in a vehicle for the progression of the national E-Health agenda and, whilst the journey to date has at times been problematic, it represents the best foundation upon which to build momentum behind a national E-Health work program.

This recommendation will require changes to NEHTA's constitutional basis to extend the range of organisational responsibilities and to end the transitional nature of the authority. It should also involve changes to the organisation's brand, culture and operating model and the creation of a revised operating structure supported by appropriately qualified leadership and specialist resources.

In order to ensure there is a clear distinction between the new entity and NEHTA, there is a need for a formal transition process which should be completed over an estimated six to nine month time period.

Impact on National Governance Boards and Committees

Establishment of the recommended E-Health governing board will impact existing E-Health national governance committees, in particular the National E-Health and Information Principal Committee (NEHIPC) and the NEHTA board. It is recommended that the NEHTA board be reconstituted to form the new E-Health governing board. NEHIPC will need to work closely with this new governing board (possibly through cross-membership) to inform and manage policy issues, and facilitate the alignment of national E-Health and information management priorities and initiatives. Clarification of the roles, communication and reporting relationships between the NEHIPC and E-Health governing board should be addressed once the charter of the new governing entity has been defined.

5.6 E-Health Architecture

The E-Health Vision articulates a fundamental shift in the way that health care will be managed and delivered and identifies the impacts on the three major stakeholder groups - consumers, care providers and health care managers.

A similar approach can be taken to the definition of the national E-Health Architecture which in essence is a model that logically represents and categorises all of the components required to deliver a national E-Health solution.

The E-Health Architecture represents a translation of health care activities such as referring a patient or prescribing medication into a set of functions that E-Health solutions can support. The purpose of the E-Health Architecture is to identify all the components that are required to deliver a national E-Health solution and to represent their relationships and interdependencies.

The first step in defining the E-Health Architecture is to consider the ways in which each of the key stakeholder groups may utilise electronic health information and E-Health capabilities.

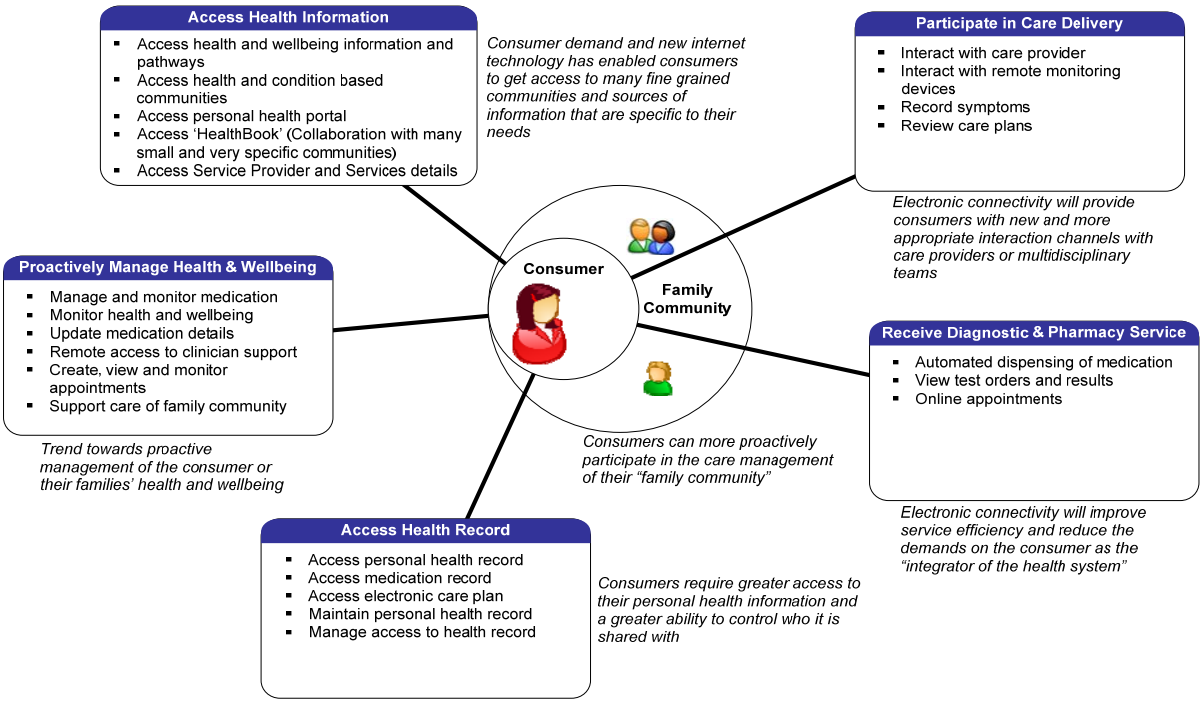
5.6.1 Stakeholder Perspectives

Consumer Perspective

The consumer of health services includes the individual who is directly receiving services from the health sector as well as the natural community of friends and family who may be responsible for the care of the individual.

E-Health has the potential to fundamentally change the way in which consumers interact with the health sector. The potential impacts of E-Health on consumers and the associated E-Health components that need to be supported can be seen in the following diagram.

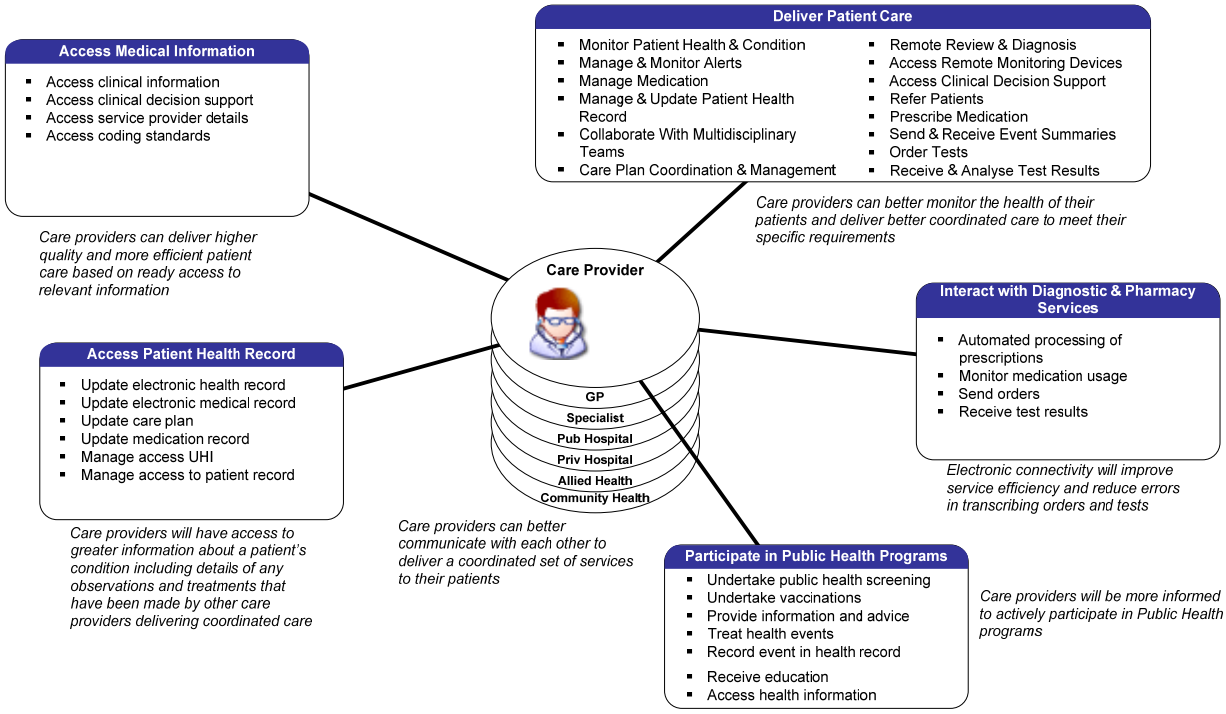
FIGURE 5-9: CONSUMER PERSPECTIVE



Care Provider Perspective

Care providers will be at the core of E-Health adoption and use. The potential impacts of E-Health on care providers and the associated E-Health components that need to be supported can be seen in the following diagram

FIGURE 5-10: CARE PROVIDER PERSPECTIVE

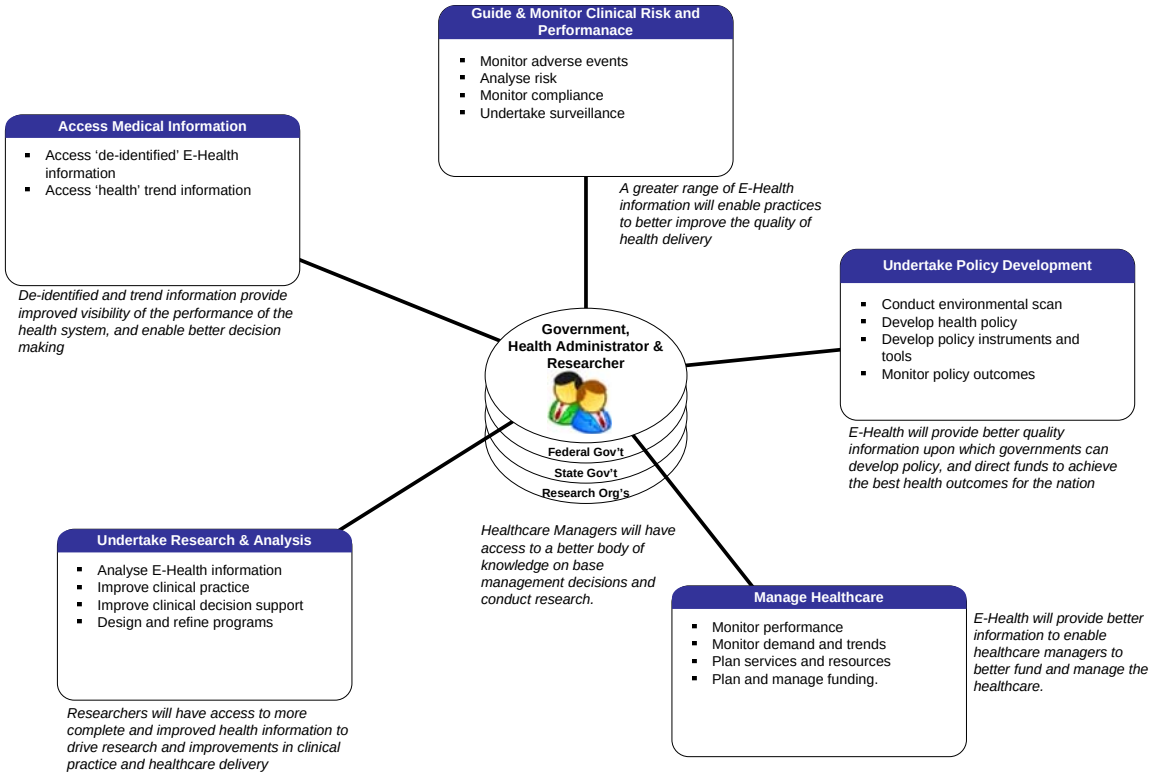


Health Care Manager Perspective

The health care manager view is intended to cover a number of different roles in the health sector including policy makers, researchers, clinical managers and operational managers. While these roles are diverse in nature, they each have a common interest in the granularity and accuracy of information available to support credible, quality decision making.

The potential impacts of E-Health on health care managers and the associated E-Health components that need to be supported can be seen in the following diagram

FIGURE 5-11: HEALTH CARE MANAGER PERSPECTIVE



5.6.2 E-Health Architecture

Through analysis of the three stakeholder perspectives it possible to define an E-Health Architecture that identifies all the components that are needed to deliver the E-Health Vision for Australia. The E-Health Architecture provides a logical system wide view of these components and their contextual relationship to each other.

The E-Health Architecture is not static. Advances in information management technologies, medical technologies, and clinical practices will inevitably lead to the development of new and different components that will be needed to deliver E-Health in the future.

The E-Health Architecture is structured into three segments that contain related components:

- **E-Health Solutions** describes the systems and tools that consumers, care providers and health care managers will use to interact with the health system
- **E-Health Infrastructure** describes the specific E-Health computing infrastructure components required to support and underpin the collection and sharing of structured and meaningful information across the health system
- **E-Health Enablers** describes the enablers that must in place or addressed to support the delivery of the overall E-Health Strategy

E-Health Solutions

The E-Health Solutions segment describes the set of systems and tools that will be required to enable health care participants to collect, store, share and utilise electronic health information. These are the tools that will support the functions required to deliver health care activities. The solutions can be grouped into the following categories - solutions that:

- Deliver an individual electronic health record to support the collation, presentation and management of a single view of a consumer's health information. It is envisaged that both consumers and care providers will be able to interact with a consumer's individual electronic health record
- Support the activities involved in direct health care service delivery. These include those capabilities required to perform and support care delivery activities such as ordering tests online and managing/updating a patient's health record
- Provide consumers and care providers with access to health information sources to support their own knowledge and decision making
- Support the management of health care service delivery at an operational, regional and national level. These solutions support activities such as monitoring of adverse events and compliance, conducting research and analysis to support continuous improvement across the health sector and providing data to support health policy decision making.

E-Health Infrastructure

This segment of the E-Health Architecture contains those elements of IT infrastructure that will be required to support the operation of the E-Health solutions described above. These include core computing and networking infrastructure and the IT components required for identifying health care participants, locating health care services and care providers, transmitting information securely and storing key datasets of information.

E-Health Enablers

This segment of the E-Health Architecture contains the enablers that must in place or addressed to support the delivery of the overall E-Health Strategy. The enablers have been categorised as follows:

- Those regulations and policies that will be required to provide a privacy framework under which information will be stored, managed, shared and used

- The set of standards that will provide guidance to those seeking to implement E-Health solutions within the health sector
- The activities that will need to be performed to drive adoption of E-Health across each of the stakeholder communities within the health sector
- The workforce development initiatives that will be required to ensure that the workforce has the required health IT skills to make the E-Health vision a reality.

E-Health Architecture Models

The following two diagrams describe:

- The E-Health Architecture incorporating the key functions and capabilities required to implement world class E-Health capability
- A view of the E-Health Information Network that will be established by successful execution of the national E-Health work program.

FIGURE 5-12: E-HEALTH ARCHITECTURE

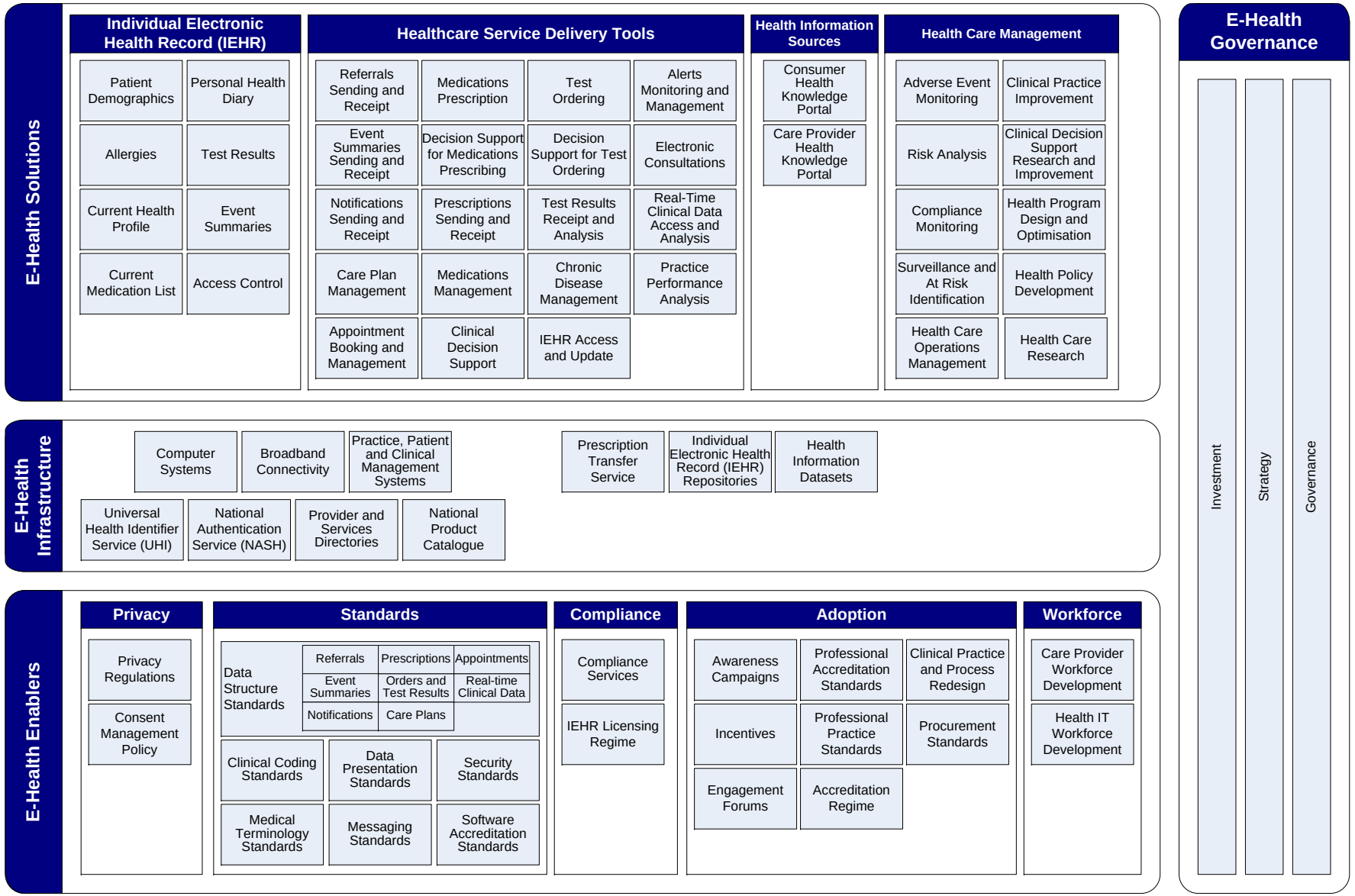
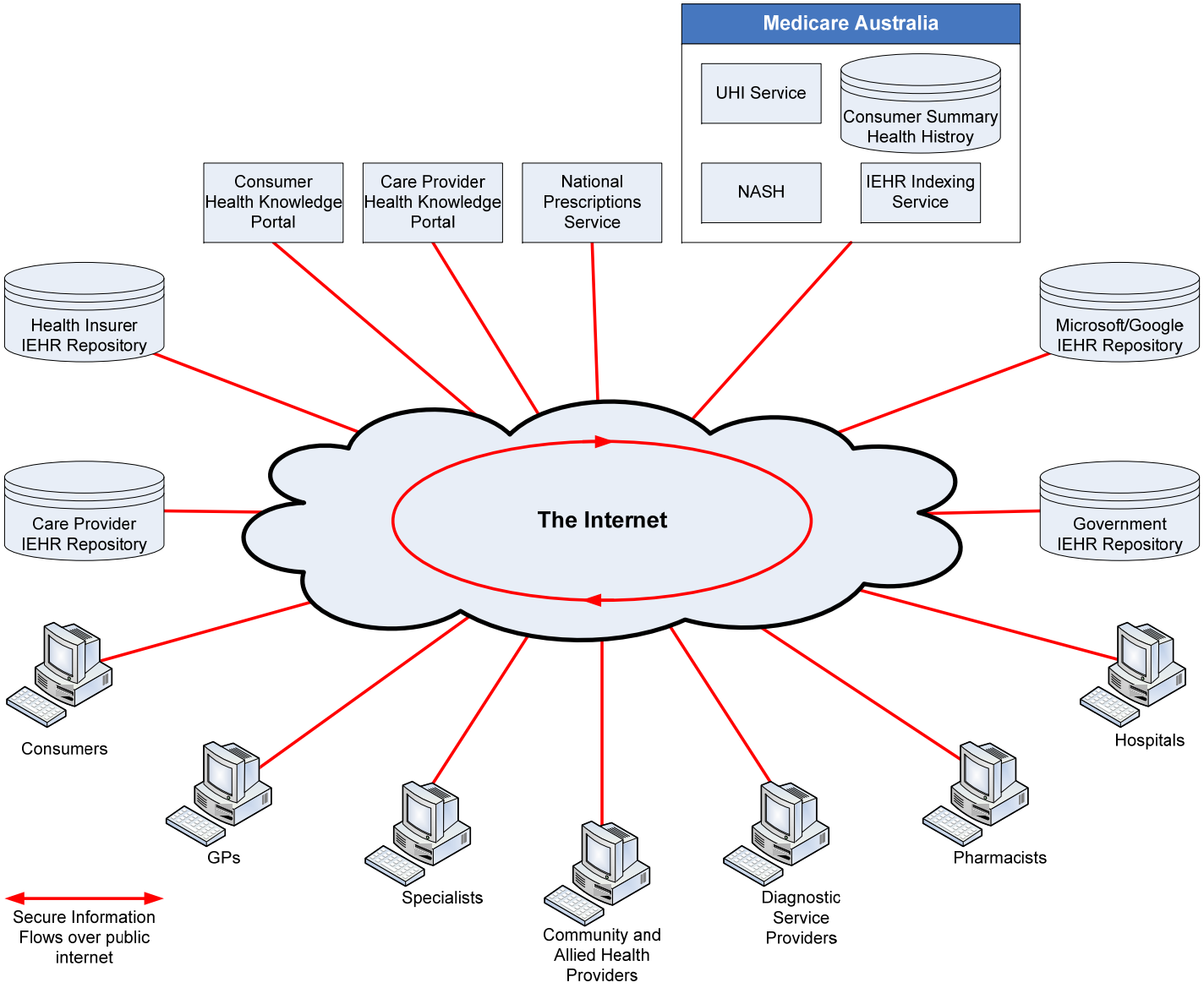


FIGURE 5-13: THE E-HEALTH INFORMATION NETWORK



The E-Health Information Network supports the key information flows between each key health care participant group, shown in Figure 5-14.

FIGURE 5-14: KEY INFORMATION FLOWS

	Information Flows
Consumers	• Seek health knowledge from the Consumer Health Knowledge Portal • Make appointment bookings • Access IEHR repositories to view their IEHR and update their personal health diary • Send queries to care providers and receive replies • Participate in electronic consultations • Send real-time clinical data to care providers • Search provider and services directories
Care Providers including: • **GPs** • **Specialists** • **Community and Allied Health** • **Hospitals**	• Seek health knowledge from the Care Provider Health Knowledge Portal • Receive, respond to and make appointment bookings • Access the IEHR Indexing Service to find a patient's IEHR • Access IEHR repositories to view and update patient IEHRs • Receive queries from consumers and send replies • Participate in electronic consultations • Receive real-time clinical data from remote monitoring devices • Send and receive referrals • Send test orders and receive results • Send and receive event summaries and notifications • Send prescriptions • Search provider and services directories • Search the UHI service for a patient or care provider identifier • Access the NASH to authenticate secure messages • Send and receive care plans
Diagnostic Service Providers	• Receive test orders • Send test results • Seek health knowledge from the Care Provider Health Knowledge Portal • Receive and respond to appointment bookings • Access the IEHR Indexing Service to find a patient's IEHR • Access IEHR repositories to view a patient IEHRs
Pharmacists	• Seek health knowledge from the Care Provider Health Knowledge Portal • Receive prescriptions • Access the IEHR Indexing Service to find a patient's IEHR • Access IEHR repositories to view a patient IEHRs

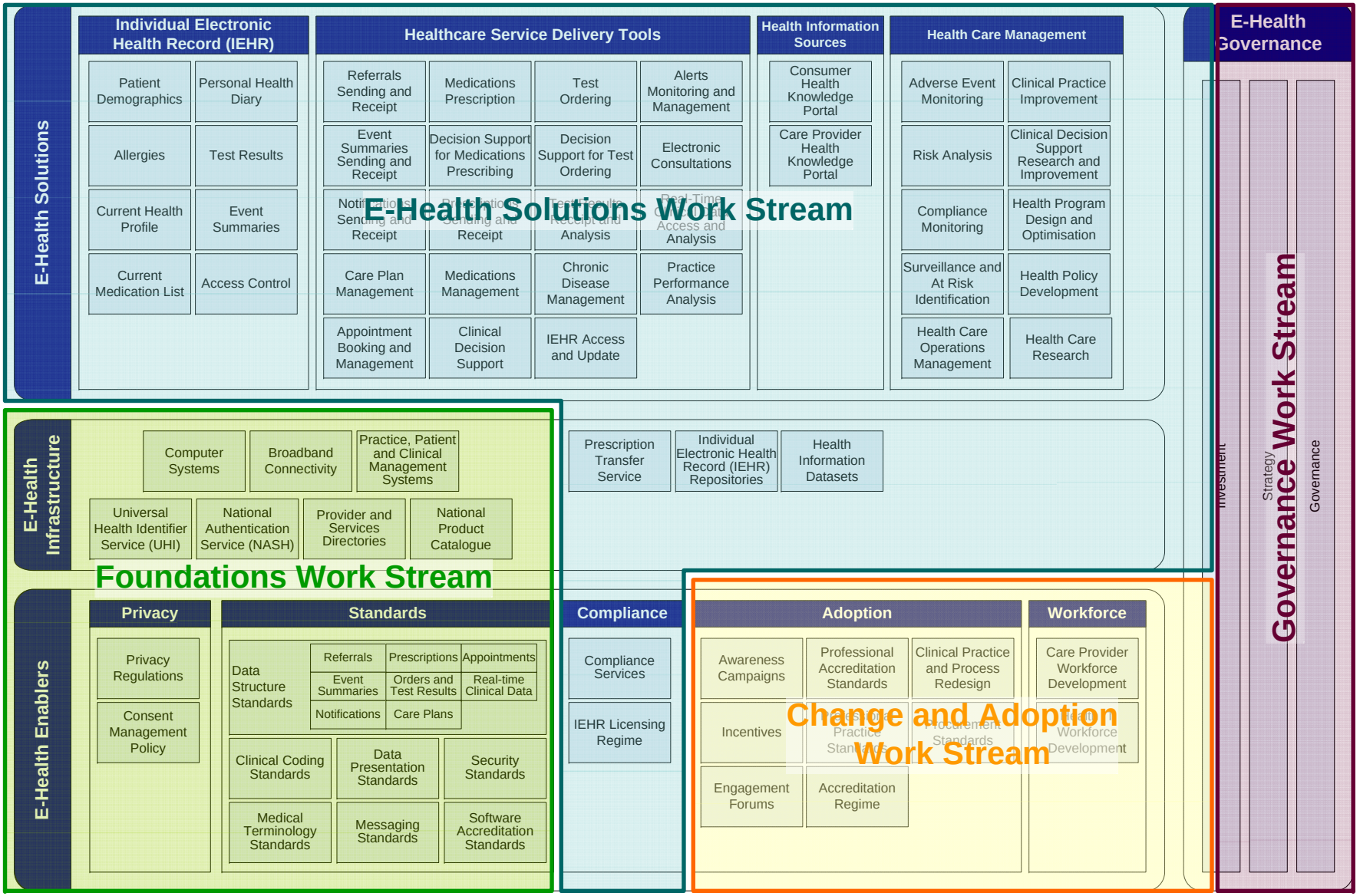
5.6.3 Support for the E-Health Vision

The National E-Health Strategy describes the set of national actions that are required to realise the E-Health vision. Understanding how the strategy underpins the realisation of the vision is best done by considering the E-Health Architecture defined in Figure 5-10.

It is possible to map the E-Health Strategy work streams onto the E-Health Architecture to understand the coverage and focus of the E-Health Strategy. The mapping between the E-Health Architecture and the National E-Health Strategy is shown in the following diagram.

It can be seen from the mapping that work streams of the National E-Health Strategy are aligned with, and provide complete support for, development of the components required to deliver the E-Health vision for Australia.

FIGURE 5-15: STRATEGY WORK STREAMS MAPPED TO E-HEALTH ARCHITECTURE



6 E-Health Implementation Roadmap

6.1 Implementation Overview

The first step in defining an implementation roadmap for the National E-Health Strategy is to define the planning horizons. While there is strong pressure from passionate and committed stakeholders for tangible E-Health action, international experience consistently points to a journey of 10 years or more to deliver a national E-Health Strategy. This is driven by factors such as the:

- Complexity of the environment into which E-Health must be implemented
- Relative immaturity of information system use within the sector
- Degree of integration between systems that must be enabled
- The extent of stakeholder change that must be effected.

Given the long time horizon over which E-Health will need to be delivered and the realities of Australia's 3-4 year political cycles, breaking the journey down into 3, 6, and 10 year planning horizons will provide the program with an ability to remain focused by delivering incremental and tangible blocks of capability.

These planning horizons are focused on achieving three progressive states of maturity in information sharing:

- **Connect and Communicate -** in which the focus is on establishing the foundations for E-Health and providing basic connections that allow information sharing to occur between care providers and across the health sector
- **Collaborate -** in which the focus shifts from basic communication to collaboration, joint care planning and multi-disciplinary care delivery through more extended information sharing
- **Consolidate -** in which E-Health becomes part of business-as-usual for health care provision. In this stage there is a focus on maintaining and enhancing a sustainable health information sharing environment that supports ongoing innovation and the development of future models of care based on rich and extensive information sharing.

The following sections describe the work plans for the Foundations, E-Health Solutions and Change and Adoption work streams as well as the interim states to be achieved for each planning horizon.

6.2 Implementation Roadmap

The following diagram summarises the national E-Health Strategy work program over these three, six and ten year planning horizons. These Gantt charts summarise the major activities to be undertaken in each of the three strategic work streams and the associated projected timing and duration of these activities.

FIGURE 6-1: E-HEALH IMPLEMENTATION ROADMAP

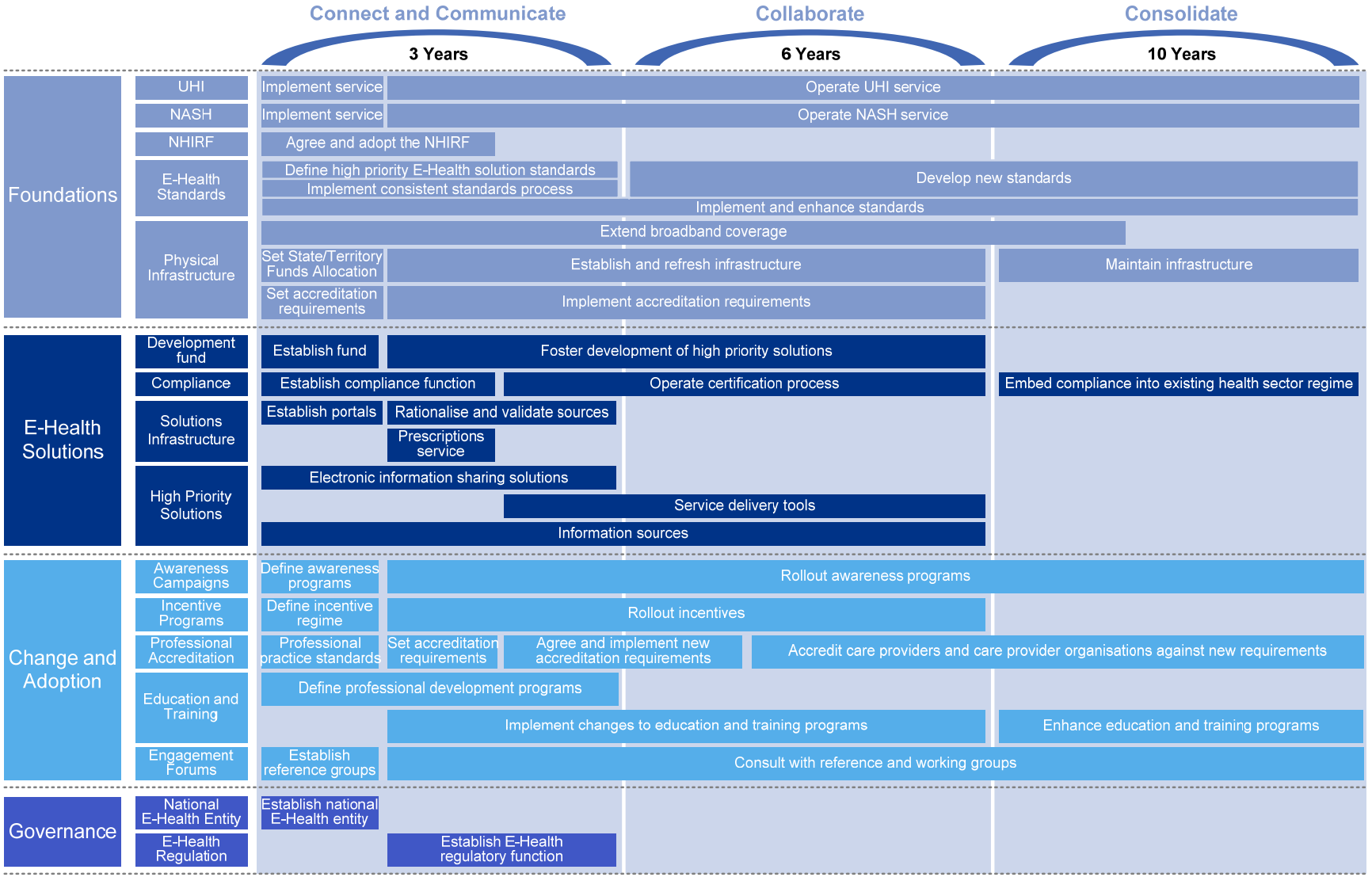


FIGURE 6-2: FOUNDATION WORK STREAM PLAN

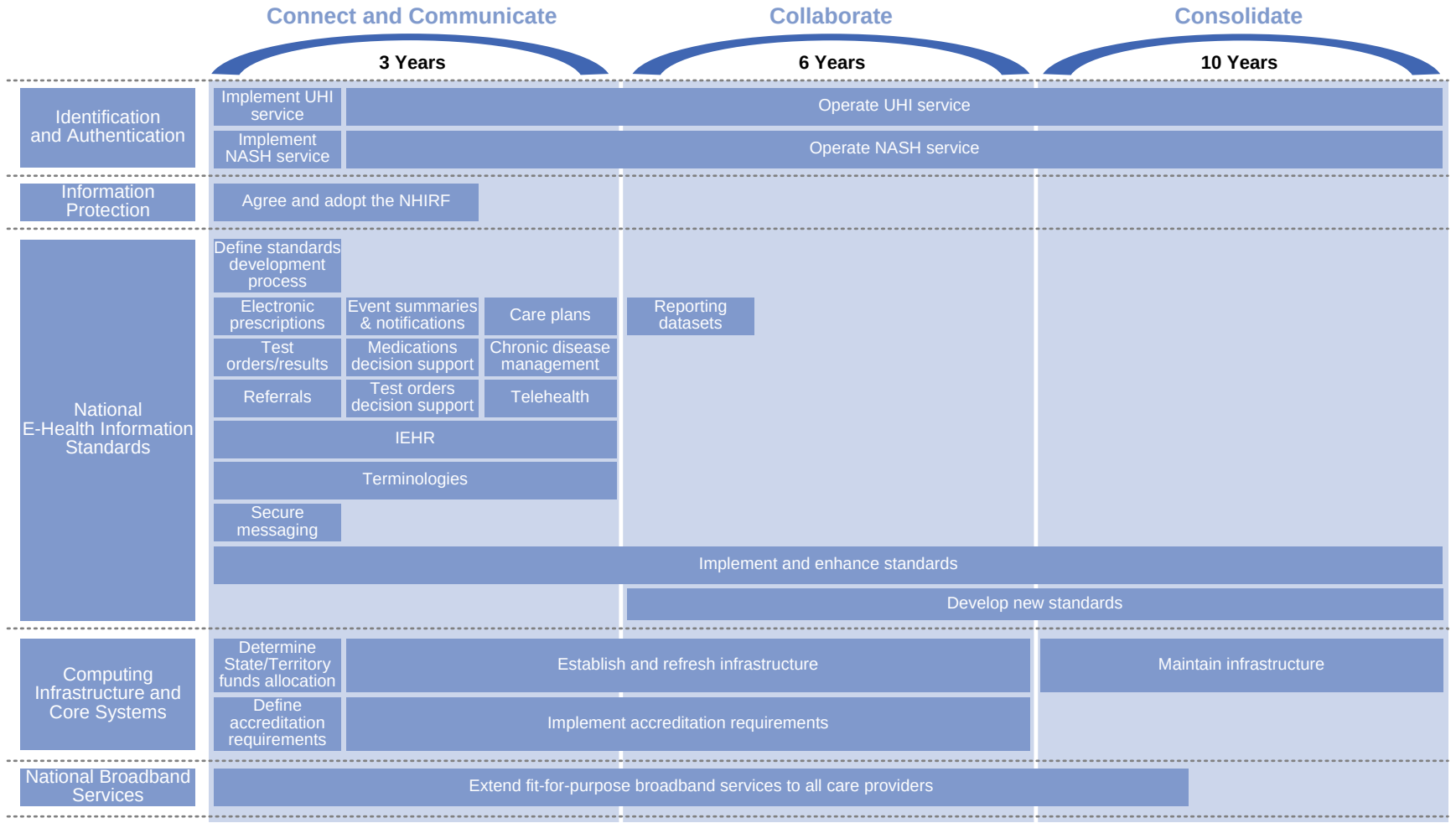


FIGURE 6-3: E-HEALTH SOLUTIONS WORK STREAM PLAN

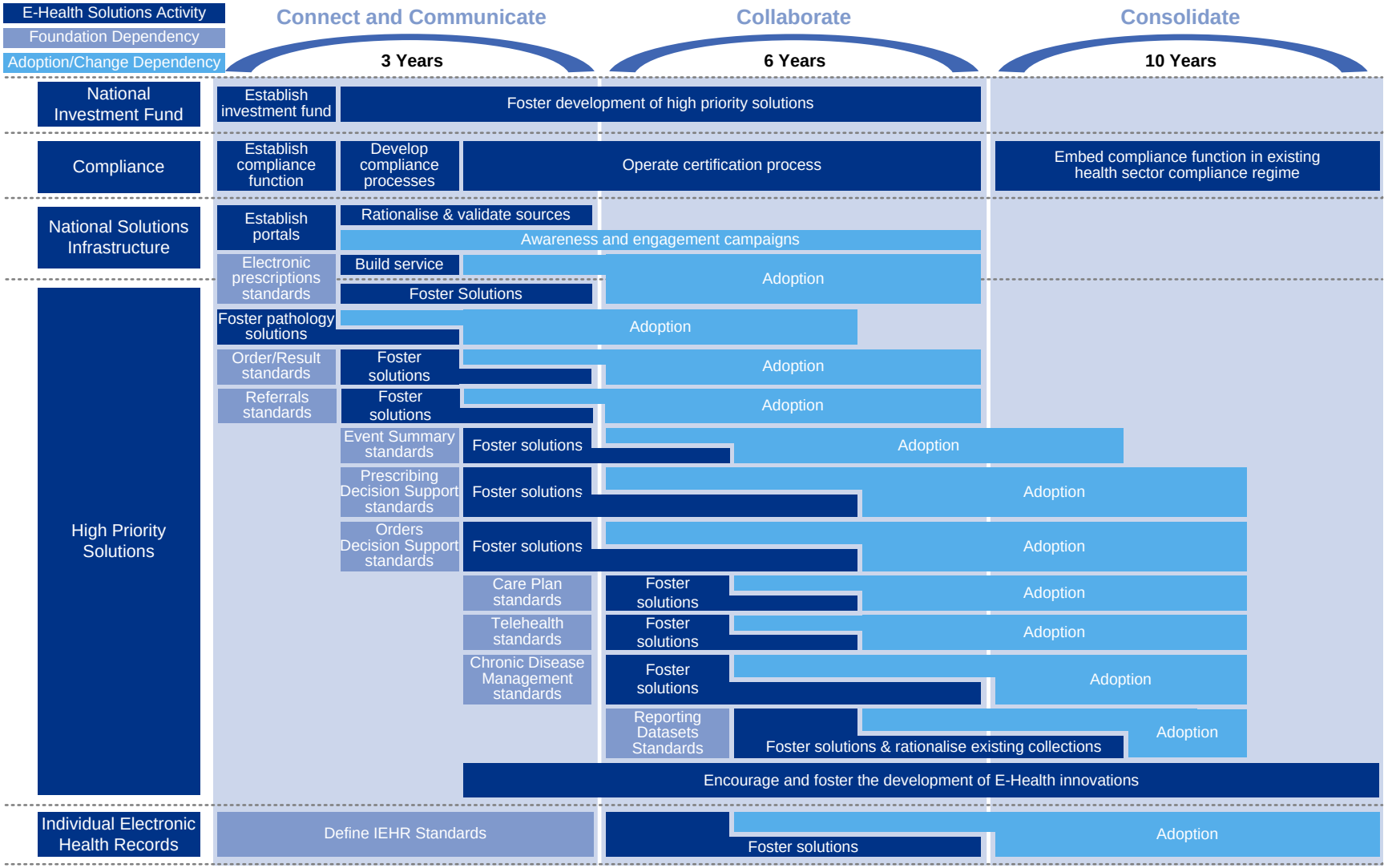
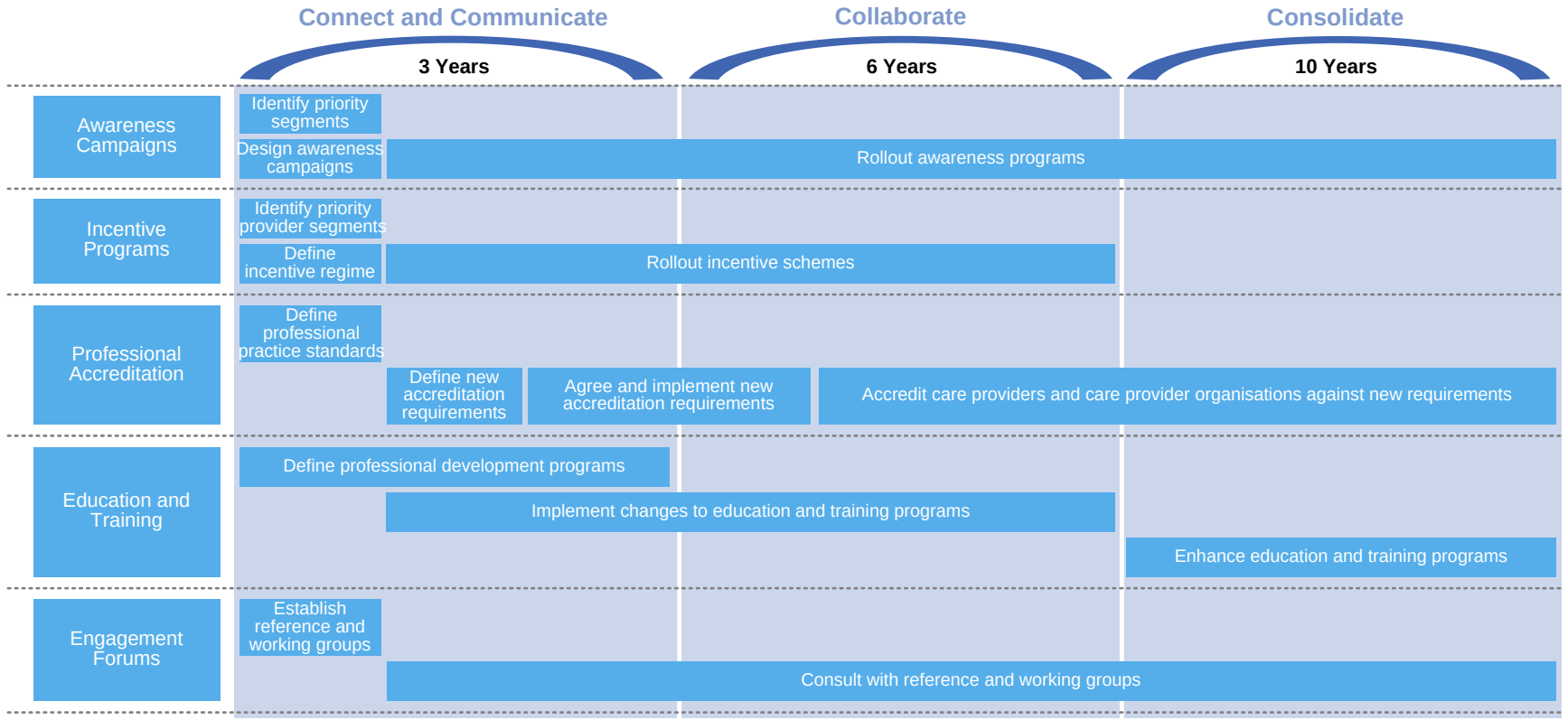


FIGURE 6-4: CHANGE AND ADOPTION WORK STREAM PLAN



6.3 E-Health Implementation Targets

The national E-Health Strategy identifies specific targets for the advancement of E-Health adoption across consumers, care providers, health care managers and vendors over the next 10 years. Achieving these targets will mean that Australia will have realised substantial improvements in the way health information is used to deliver safer, more effective and more efficient health care.

As the national E-Health work program progresses, the following describes the indicative outcomes that will be experienced by key stakeholder groups at the three, six and ten year time horizons.

6.3.1 Connect and Communicate (1-3 years)

In three years time, we will be able to measure the progress of the national E-Health Strategy for each of the key stakeholder groups as follows.

Consumers

- Consumers will begin to be able to be uniquely identified by the health sector through the rollout and initial adoption of the Unique Health Identifiers.
- Broadband connectivity is available to a vast majority of Australian consumers
- The national Consumer Health Portal has been implemented and consumers are beginning to use this as one of their primary online sources of health information to assist in management of their health care
- Consumers are seeing early releases of new E-Health solutions that allow them to begin interacting with care providers through online channels. Prescriptions are being transferred electronically for 10% of the population and 30% of pathology tests are being ordered electronically
- 20% of consumers of access to a limited form of electronic health record and 2-5% of consumers begin to access personal health information from initially available IEHR solutions.

Care Providers

- Care providers are seeing increasing use of E-Health capabilities in care provision. Unique identifiers have been provided to all care providers and increasingly, care providers are using the UHI to identify consumers
- Care providers are being made aware of their professional responsibilities in relation to E-Health and are working to adopt new processes
- Broadband connectivity is available to the vast majority of care providers and provider organisations are investing in new infrastructure
- Care provider adoption of E-Health is increasing with key care provider segments becoming more computerised (95+% of GPs, 60+% of specialists, 95+% of pharmacists and 95+% of pathologists / radiologists)
- Increasing numbers of care providers are adopting and utilising E-Health standards compliant systems that support electronic transfer of prescriptions and electronic test orders/results (50% of GPs, 20% of specialists, 70% of pharmacists and 70% of pathologists / radiologists)
- Care provider incentives to use high priority, standards compliant E-Health solutions have been implemented

- Standards compliant solutions are starting to appear that support electronic referrals and electronic event / discharge summaries
- Care providers have access to engagement forums and the opportunity to participate in national E-Health working groups. An investment grants program is operating through which care providers can seek support for development of new E-Health solutions.

Health Care Managers

- Health Care Managers are gaining increasing awareness and understanding of the benefits of E-Health and the potential for improved reporting and research datasets
- Small amounts of improved reporting data, primarily relating to prescriptions and test ordering is starting to become available to health care managers for analysis
- Health Care Managers, particularly those in target segments are investing funds in IT infrastructure to provide base computing and systems capability which will support E-Health.

Vendors

- Vendors are engaged and are focusing on the development of high priority solutions.
- Seed funding is available to provide incentives for the development of high priority, standards compliant E-Health solutions
- Vendors see the emergence of clearly defined national E-Health standards and can rely on these standards when enhancing existing, or developing new solutions
- Vendors are starting to receive tenders that request that E-Health solutions be compliant with national standards
- Vendors are engaged around the E-Health software compliance process and timelines have being agreed for high priority solution compliance.

Background Activities

- Behind the scenes, development of E-Health standards is continuing with a focus on completing standards for high priority solutions including decision support for medications prescribing and test ordering, chronic disease management systems and reporting datasets. A consistent privacy and information protection regime has been agreed and implemented across all States and Territories. Standards for secure messaging and acknowledgement, key terminology sets and professional practice have been agreed and are being adopted by vendors and care providers. Standards for electronic prescriptions, test orders/results, IEHR, care plans and telehealth have also been defined and are being used as the basis for solutions by vendors
- A national E-Health entity has been established with responsibility for developing and maintaining the national E-Health Strategy, sourcing and managing E-Health investment, managing the delivery of national E-Health infrastructure components, encouraging the development and use of high priority E-Health solutions, testing E-Health solution compliance with defined standards and regulations, and designing and overseeing national stakeholder adoption, incentive, change and training programs
- Within this entity a solutions testing and compliance function has been established and is operating. Compliance criteria, processes and timings have defined and agreed with reference group members
- Reference groups with broad stakeholder representation have been established and are involved in providing input into the appropriateness and completeness of E-Health foundations, prioritising E-Health solutions activity and providing insight into the effectiveness of adoption and change approaches

- Professional body working groups have been established to define and oversee the changes required to professional education, training and accreditation programs and have started actioning specific recommendations in these areas.

6.3.2 Collaborate (4-6 years)

In six years time, we will be able to measure the progress of the national E-Health Strategy for each of the key stakeholder groups as follows.

Consumers

- Online interaction with the health sector has become commonplace. Rollout out of identifiers is complete and broadband connectivity is available to 98% of consumers
- Consumer adoption is focused on driving adoption to a tipping point among high priority consumer segments - mothers and infants, the elderly and those suffering chronic disease. 50% of consumers will have access to some form of individual electronic health record and 10-20% of consumers or their carers (30-40% of consumers among high priority segments) are accessing personal health information to manage personal health care
- Consumers increasingly find their interactions with care provider are supported and facilitated by E-Health. Electronic communication of health information is commonplace with over 60% of prescriptions, test orders/results and referrals being performed electronically. Care planning is increasingly managed electronically, solutions to assist the management of chronic disease are emerging and 5-10% of consultations occur using electronic consultation or telehealth capabilities
- More mature functionality is available in the National Consumer Portal with richer information from health service provision being incorporated such as access to IEHR information from organisations such as Medicare.

Care Providers

- The rollout of national identifiers is complete and they are being used for the vast majority of interactions between consumers and care providers
- Broadband connectivity is available to all care providers and major infrastructure refresh projects have been completed
- Maintenance of appropriate physical infrastructure has been made a care provider accreditation requirement with criteria and accreditation processes in place
- Professional responsibilities for electronically collecting and sharing health information have been fully adopted by practices and organisations. Professional responsibilities have been embedded in professional accreditation requirements and accreditation processes are in place
- Provider incentives for GPs, clinical specialists, laboratories and pharmacies are winding back in favour of compliance mechanisms intended to drive late adopters towards E-Health adoption. Accreditation of care providers is tied to having E-Health capabilities in place
- Computerisation of care providers is high (100% of GPs, 80+% of specialists, 100% of pharmacists and 100% of labs). The majority of care providers have adopted and are utilising standards compliant care systems that support E-Health priority solutions such as electronic prescriptions, electronic test orders/results, electronic referrals and electronic event summaries (90+% of GPs, 60+% of specialists, 90+% of pharmacists and 90+% of labs)
- In addition, 30+% of community health care providers and 20+% of allied health providers have access to electronic referrals and electronic care planning.

Health Care Managers

- Health Care Managers have electronic access to improved quality and more comprehensive sets of longitudinal and aggregated data to support improved reporting, analysis, operational and clinical decision making and research
- Data is increasingly being captured as part of health service delivery and there is a concerted effort being made to rationalise extraneous data collections.

Vendors

- Generation of ideas in the marketplace is being translating into innovative new E-Health compliant solutions that are being brought to market more rapidly. Grants continue to be available to support development of innovative ideas and solutions
- Vendors have a clearly defined and stable set of national E-Health standards on which to base product development
- All major tenders for health software specify the requirement for solutions to be compliant with national E-Health standards
- High priority solutions have been and continue to be delivered and vendors are engaged to deliver new solutions and innovations. Vendors are delivering compliant solutions and compliance is being confirmed through testing by the E-Health solutions compliance function.

Background Activities

- Processes are in place for identifying, defining, agreeing and implementing new standards that are required. These processes are utilising the E-Health engagement groups for stakeholder input and guidance
- Care providers are actively driving the ongoing evolution of E-Health solutions as a result of their experiences with the use of technology
- There is beginning to be a shift in focus from delivery of well understood solutions to supporting more innovative uses of technology
- Reference groups have matured and are working closely with the E-Health entity to accelerate the development and adoption of new E-Health solutions
- Changes have been made to national vocational and training programs to improve the depth of health IT skills available in the marketplace. Specific qualifications are recognised for health informatics professionals.

6.3.3 Consolidate (7-10 years)

In 10 years time, we will be able to measure the success of the national E-Health Strategy for each of the key stakeholder groups as follows.

Consumers

- Consumer adoption of IEHRs has been driven to a tipping point, particularly among high priority consumer segments such as mothers and infants, those suffering chronic disease and the elderly. Over 90% of consumers, or their carers, have access to an individual electronic health record and over 50% actively access and use these records to manage their health and interact with the health system
- Consumers increasingly find their interactions with care provider are supported by E-Health. Electronic communication of health information is commonplace with over 80% of prescriptions, test orders/results and referrals being performed electronically
- Up to 20% of consultations use electronic consultation or telehealth capabilities

- The National Consumer Portal is viewed as a world class source of comprehensive and up to date health information and also provides access to IEHR information from organisations such as Medicare.

Care Providers

- The rollout of national identifiers is complete and they are being used for over 90% interactions between consumers and care providers. Broadband connectivity is available to all Australian care providers
- Over 95% of Australian care providers have appropriate levels of computing infrastructure in place to support the electronic exchange of health information. Maintenance of appropriate physical computing infrastructure has been made a care provider accreditation requirement with criteria and accreditation processes in place
- Professional responsibilities for electronically collecting and sharing health information have been fully adopted by care provider practices and organisations and have been embedded in professional accreditation requirements
- Over 90% of care providers have adopted and are utilising standards compliant patient, clinical and practice management systems that support E-Health priority solutions such as the electronic transfer of prescriptions, test orders/results, referrals and event summaries
- The National Clinician Portal is viewed as a world class source of comprehensive and up to date clinical treatment and evidence information
- Care provider IT and health informatics education programs have been established and are producing a new breed of technology aware health care practitioners who understand the value and use of E-Health solutions.

Health Care Managers

- Health Care Managers have access to high quality, comprehensive longitudinal and aggregated datasets for improved analysis, decision making and research
- Health Care Managers utilise sophisticated data reporting and analysis tools which support the real time monitoring of Australian health care system activities and outcomes
- The vast majority of reporting data is collected through normal E-Health enabled care delivery processes and a significant consolidation and rationalisation of data collections has been completed.

Vendors

- Vendors have a clearly defined and stable set of national E-Health standards on which to base product development. 100% of vendors in the Australian marketplace are delivering E-Health standards compliant solutions
- Vendors actively engage with care providers to design ways to innovatively improve and extend existing E-Health solutions
- Vendors are bringing scalable and E-Health standards compliant solutions to market more quickly. The majority of vendors have twice yearly enhancement cycles that are aligned with national E-Health standards and priorities.

7 E-Health Costs and Benefits

7.1 Costs

Implementation of the national E-Health Strategy will require incremental investment to fund the Foundations, E-Health Solutions, Change and Adoption and Governance work streams. The strategy has been designed to be affordable and not to unduly rely on the delivery of large, expensive and risky national IT implementation projects.

The key components of the E-Health Strategy that require funding can be summarised as follows. Note that the cost estimates are indicative in nature and will require further refinement through the development of more detailed investment business cases.

7.1.1 Foundations

To establish specific E-Health foundations within Australia, funding will be required to cover the costs of staffing and operating an E-Health standards group within the E-Health entity and the costs to complete design, build, implementation and operation of the national UHI and NASH services. The estimated costs for the E-Health Foundations work stream are shown in Figure 7-1.

FIGURE 7-1: ESTIMATED COSTS FOR THE E-HEALTH FOUNDATIONS WORK STREAM

Cost Element	Estimated 5 Year Cost	Estimated 10 Year Cost
E-Health Standards	$100M	$160M
Unique Health Identifier (UHI) Solution	$190M	$400M
National Authentication Service for Health (NASH)	$80M	$200M
Total	***$370M***	***$760M***

The cost estimates for these foundations draw on relevant components of the NEHTA IEHR Business Case cost model. Costs for the E-Health foundations are based on the following assumptions consistent with the NEHTA cost modelling for the IEHR Business Case:

- Build, implementation and operation of the UHI and NASH Services will be outsourced to a service provider
- Costs for the UHI service include provision to consumers of a token in the form of a card or smart device that contains their unique identifying number.

7.1.2 E-Health Solutions

For the E-Health Solutions work stream, funds will be required to cover the costs of establishing the national E-Health solutions investment fund and the compliance function. Funds will also be required for the design, implementation and maintenance of national consumer and care provider health knowledge portals and, potentially, the national electronic prescriptions service. The estimated costs for the E-Health Solutions work stream are shown in Figure 7-2.

FIGURE 7-2: ESTIMATED COSTS FOR THE E-HEALTH SOLUTIONS WORK STREAM

Cost Element	Estimated 5 Year Cost	Estimated 10 Year Cost
National E-Health solutions investment fund	$500M	$800M
E-Health compliance function	$50M	$120M
Consumer and Care Provider Health Knowledge Portals	$20M	$30M
National Prescription Service	$60M	$90M
Total	***$630M***	***$1040M***

The cost estimate for the E-Health compliance function draws on relevant components of the NEHTA IEHR Business Case cost model. Costs estimates for the Health Knowledge Portals and the National Prescription Service have been based on NEHTA IEHR Business Case costs for IEHR solution components that have a similar scope, technology requirement and scale of ongoing operational support functions.

To estimate the size of the national E-Health Solutions investment fund, a different approach has been taken. The provision of incentives has been a hallmark of other productivity enhancing reform programs. Under the Agreement to Implement the National Competition Policy (NCP) and Related Reforms, NCP payments were distributed to the States and Territories as a financial incentive to implement the NCP and related reform program, with funding being contingent on the States and Territories demonstrating progress against the reform agenda. The size of the incentive payments was determined by estimating the net economic impact of the reforms and providing for a proportion of the national benefits to be used as incentives.[54]

The development of E-Health solutions also represents a productivity enhancing reform to the Australian health care system, and thus the size of the benefits to be distributed can be developed using the broad NCP approach. The direct benefits in terms of time and cost savings has been estimated to be approximately $5 - 6 billion over 10 years (refer Section 7.2 below). Taking a conservative 15 per cent of this would provide for an investment pool of approximately $800 million.

7.1.3 Change and Adoption

For the Change and Adoption work stream funds will required for the design and implementation of change and adoption programs including awareness campaigns, targeted financial incentives and changes to professional training and accreditation regimes. The estimated costs for the E-Health Change and Adoption work stream are shown in Figure 7-3.

FIGURE 7-3: ESTIMATED COSTS FOR THE E-HEALTH CHANGE AND ADOPTION WORK STREAM

Cost Element	Estimated 5 Year Cost	Estimated 10 Year Cost
National Awareness Campaigns	$60M	$100M
Care Provider Incentives	$400M	$600M
Professional Accreditation and Training Changes	$10M	$20M
Total	***$470M***	***$720M***

The cost estimate has been based upon analysis of other change and adoption work programs of similar scope. For example, Infoway in Canada allocated $60m of their total budget to support end-user adoption education and training activities. In Australia, the introduction of GST through

54 Council of Australian Governments (COAG), *Communiqué,19 August 1994,* <http://www.coag.gov.au/coag_meeting_outcomes> September 2008.

the 'The New Tax System' campaign can serve as a reasonable proxy of the introduction and adoption of a complex concept with substantial operational impacts for organisations. The cost of this campaign was $430m in total.[55]

As described in Section 7.1.2 above, the E-Health Strategy can be considered a productivity enhancing reform. On this basis similar techniques to that used for the estimation of incentives for the National Competition Policy can be used to estimate the quantum of the incentive pool required to drive care provider adoption of E-Health solutions. If a conservative 10-12% of the estimated benefit pool of $5 - 6 billion is allocated to funding care provider incentives, this equates to an indicative estimate of $600M over a ten year period.

7.1.4 Governance

To provide governance required to oversee the E-Health Strategy, funds will be required for the establishment and operations of the E-Health entity, E-Health governing board, and E-Health regulatory function. The estimated costs for the E-Health Governance work stream are shown in Figure 7-4.

FIGURE 7-4: ESTIMATED COSTS FOR THE E-HEALTH GOVERNANCE WORK STREAM

Cost Element	Estimated 5 Year Cost	Estimated 10 Year Cost
National E-Health Entity and Governing Board	$20M	$40M
National E-Health Regulatory Function	$10M	$20M
Total	***$30M***	***$60M***

The E-Health Strategy will leverage existing governance mechanisms to nationally coordinate the proposed E-Health Strategy work program. It has been estimated that the operations of the E-Health entity will cost $60 million terms over the next ten years, which provides for an additional 40 to 50 staff to be employed over and above those staff focused on E-Health foundations, solutions compliance and change and adoption activities.

7.1.5 Funding Considerations

The total indicative estimated cost of the implementation of the national E-Health Strategy is A$1.5 billion over five years or A$2.6 billion over ten years. This represents a relatively modest investment program when scaled against total annual recurrent spending on health (approximately A$90 billion) and the total annual recurrent spending on health by all levels of government (approximately A$60 billion).

The major variable component of this figure is the discretionary amount to be allocated to funding high priority E-Health solution developments and providing financial incentives to private sector providers. In both cases the magnitude of these investments should be proportional to the size of projected benefits and should be sufficient to drive meaningful progress towards the achievement of national E-Health outcomes.

In addition to investment on specific national E-Health Strategy initiatives, Australian, State and Territory Governments, individual care providers and care provider organisations will need to fund the implementation and maintenance of underlying computing infrastructure and E-Health standards compliant solutions. It is estimated that around an additional one percent of health sector funding a year will be needed over time to establish and maintain an acceptable national baseline of E-Health computing infrastructure and systems.

---

[55] Australian Broadcasting Corporation, 'Transcript of interview with Senator Ellison on Radio National', 15 June 2000, <http://www.abc.net.au/rn/talks/8.30/mediarpt/stories/s139702.htm> September 2008.

7.2 Benefits

7.2.1 Overview

The tangible benefits associated with E-Health are difficult to accurately quantify due to the poor quality of baseline Australian health care system information and the very close, and often blurred, relationship between E-Health and broader health sector reform initiatives. However, there is a growing amount local and international research available to highlight the potentially important role E-Health may play in delivering Australian citizens a higher quality, safer, more equitable and more efficient health system.

From a macro, top down perspective, E-Health should be considered a means to potentially address the ever increasing costs of Australian health care. With the percentage of health care spending as a proportion of GDP expected to grow from 9% today to an estimated 16 to 20% of GDP by 2045, any ability to constrain growing health care costs will directly impact the future sustainability of the Australian health care system.

A nationally coordinated approach to E-Health will contribute to this situation by improving the capacity of the Australian health care system to do more with existing resources and by enabling these resources to be deployed against real need. This will result from improving system quality and safety (and therefore reducing avoidable demand for health care services), improving system accessibility and improving system processing and cost efficiency.

7.2.2 Benefit Areas

A higher quality and safer healthcare system

The E-Health Strategy will enhance the quality and safety of care through improved decision support for care providers and consumers, and improved patient information leading to a reduction in adverse events and improved treatment effectiveness.

E-Health will empower consumers to better manage their own health by providing a significant improvement in the volume, quality and granularity of health information available to consumers supporting them in better managing their personal health. E-Health will also support consumers in self monitoring and maintaining their personal health information. Active consumer management and engagement in their health conditions has been shown to have a significant positive impact on health outcomes. Studies have shown reduced use of hospital bed days, reduced numbers of emergency room visits and improved clinical condition for consumers that actively manage their own healthcare. The flow on effects included a reduction in costs of over US$500 per patient per year, as well as secondary benefits such as improved social activity and reduction in depression.[56]

E-Health will provide care providers with access to decision support tools and up to date consumer information and knowledge sources at the point of care. Studies have shown that clinical decision support systems can enhance clinical performance for drug dosing, preventive care, and administration of recommended care[57]. For example, two clinical studies found that surveillance of prescribing behaviour and consumer information enabled by a decision support tool increased decreased adverse drug event rates by 60%.[58],[59] A primary practice study

---

56 Lorig K, Sobel D, Stewart A, Brown B, Bandura A, Ritter P, Gonzalez V, Laurent D, Holman H, 'Evidence Suggesting that a Chronic Disease Self-Management Program Can Improve Health Status While Reducing Hospitalization - A Randomized Trial', *Medical Care*, 1999.

57 Hunt DL, Haynes RB, Hanna SE, Smith K, "Effects of Computer-Based Clinical Decision Support Systems on Physician Performance and Patient Outcomes," *JAMA* 280, 1339-45, 1998.

58 Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, Morton SC, Shekelle PG, 'Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care', *Annals of Internal Medicine*, Volume 144 Issue 10, 16 May 2006.

conducted in Canada found that decision support for prescribing can change up to one-quarter of clinical decisions in some prescribing categories, based on consumer profiles.[60]

E-Health will support care providers to automatically monitor individual care plans and health status. People with chronic disease should be provided with a care plan, detailing medications, treatments, tests, and referrals tailored to their specific circumstances. Currently less than 25% of people with a major chronic disease are provided with care plans, and fewer than 2% are tracked for adherence to their care plans. E-Health can be used to facilitate and enable effective management of these conditions by providing tools to support practitioners in management of chronic disease, such as the electronic creation and management care plans, disease registries, home monitoring and associated decision support. Studies of care plan management systems in the US with in-built alerting or reminders have demonstrated a 15% to 20% increase in the number of consumers receiving recommended care over the control group and 40% to 60% improved compliance in disease control and plan.[61, 62]

E-Health will reduce the number of medically avoidable adverse events requiring additional care delivery. It is estimated that up to 40% of consumers are non compliant with prescribed medication regimes, and non-adherence to medications has been linked to increased utilisation of health care resources, including emergency department and hospital admissions, general practice visits and nursing home admissions. E-Health solutions can offer improved medication compliance[63] by providing health care professionals with access to electronic prescription and appropriate decision support tools. Improved management of chronic care conditions through E-Health will also lead to significantly reduced hospital admissions. Studies of automated monitoring systems for patients with chronic illness or who are otherwise at risk in the US and the UK indicated that inpatient bed days per patient can be reduced by between 30 and 60%[64,65,66] while reducing the number of primary, emergency and ambulatory care visits by a similar amount.

E-Health will enable care providers and health care managers to improve the services provided through access to better quality datasets of population health and treatment effectiveness. By using the collection of information on health care delivery and management across the full care continuum, E-Health decision support tools and systems provide critical information to support care providers in determining the most appropriate treatment plans. This information can also support healthcare managers in expanding knowledge about diseases and the effectiveness of treatment regimes.

---

59 E-Health for Safety, *Impact of ICT on Patient Safety and Risk Management*, 2006.

60 Taylor LK, Kawasumi Y, Bartlett G, Tamblyn R, 'Inappropriate Prescribing Practices: The Challenge and Opportunity for Patient Safety', *Healthcare Quarterly* 8(Sp) 81-85, 2005.

61 Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, Morton SC, Shekelle PG, 'Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care', 2006.

62 Ofman, J. J., et. al., 'Does Disease Management Improve Clinical and Economic Outcomes in Patients with Chronic Diseases? A Systematic Review', *American Journal of Medicine*, vol. 117, pp. 182-192, 2004.

63 Stroetmann KA, Jones T, Dobrev A, Stroetmann VN, 'An Evaluation of the Economic Impact of Ten European E-health Applications', 2007..

64 Meyer M, Kobb R, Ryan P. 'Virtually Healthy: Chronic Disease Management in the Home', *Disease Management*, , 5(2): 87-94, 2002.

65 Vaccaro J, Cherry J, Harper A, O'Connell M, 'Utilization Reduction Cost Savings, and Return on Investment for the PacifiCare Chronic Heart Failure Program: Taking Charge of Your Heart Health', *Disease Management*, 4 (3): 1-10, 2001.

66 Cherry JC, Moffatt TP, Rodriguez C, Dryden K, 'Diabetes Disease Management Program for an Indigent Population Empowered by Telemedicine Technology', *Diabetes Technology & Therapeutics*, 14 (6), 2002.

E-Health will provide health care managers with access to timely and comprehensive data to support the more effective surveillance and management of public health. Healthcare is an information intensive industry with care providers generating terabytes of data from prescribing systems, test ordering systems, referral systems. E-Health tools will support the collection of clinical data to support health surveillance and monitoring, improving the quality and safety of care through research.[67] A US study found that the early detection of public health concerns was improved by an automated electronic lab reporting tool for notifiable diseases. The study found that there was an increase of 29% in the number of identified cases during a reported disease outbreaks.[68]

A more accessible and equitable healthcare system

The E-Health Strategy will enhance the provision of more accessible and equitable delivery of healthcare services, irrespective of a consumers' demographic, socioeconomic or geographic profile.

E-Health will support a more accessible and equitable health system by providing consumers with better visibility of the location of care providers, the services offered and their availability in order to promote choice and access. It will also allow care providers to readily know who and where other providers are located to facilitate referrals and timely access to care. Provider directories are a critical component of the E-Health infrastructure supporting a broad range of electronic messaging services and E-Health solutions. The national NHS *'Choose and Book'* service combines electronic booking and a choice of place, date and time for first patient appointments. Consumers experience greater convenience and certainty through the ability to choose any hospital in England funded by the NHS and choose the date and time for their appointment, check the status of their referral and to change or cancel their appointments easily over the phone or on the internet. The solution helps improve the communication between primary and secondary care and ensures that the patient's journey through the system is transparent and effectively managed. It also offers GPs the opportunity to discuss cases electronically with consultants in hospitals, helping to ensure that patients do actually need a referral and, if so, that they are booked into the correct clinic.[69]

E-Health will provide rural, remote and disadvantaged communities with better access to a range of health care services through the use of technologies such as telehealth to support remote electronic consultations. The development of online tools and remote care support will enable Australia's rural and remote communities to gain access to more frequent care and support than would otherwise be available. Remote diagnostics and pathology solutions can be used to provide consumers in rural and remote areas with access to higher quality services that are delivered from metropolitan areas. Due to a shortage of specialist skills in a remote area of Sweden, a diagnostic imagery solution was used to provide online consultations. This resulted in a 50% reduction in waiting times and a 34% per cent increase in the number of tests conducted whilst minimising travel for patients.[70]

---

67 American Medical Informatics Association, *Toward a National Framework for the Secondary Use of Health Data,* < http://www.amia.org/inside/initiatives/healthdata/2006>, September 2008.

68 Overhage, JM, Grannis S, McDonald CJ, 'Comparison of the Completeness and Timeliness of Automated Electronic Laboratory Reporting and Spontaneous Reporting of Notifiable Conditions', *American Journal of Public Health,* February 2008.

69 NHS Connecting for Health, *Choose and Book,* <http://www.chooseandbook.nhs.uk/staff/overview>, September 2008.

70 Stroetmann KA, Jones T, Dobrev A, Stroetmann VN, 'An Evaluation of the Economic Impact of Ten European E-health Applications', 2007.

E-Health will support health care managers with access to quality data sources to inform service and workforce planning and development. E-Health will also enable health care managers to more effectively identify and address system throughput inefficiencies, such as inappropriate variation in practice and sub-optimal use of available workforce skills. The health system is comprised of many distinct physical and human resources, all of which need to be effectively procured, allocated and scheduled. Improved management of these resources, a key element of a sustainable health system, is dependent on successful coordination, integration and sharing of information. E-Health can provide the tools and information needed to make the deployment and performance of resources more visible, supporting better planning and demand management.

A more efficient healthcare system

The E-Health Strategy will improve the efficiency and cost effectiveness of the health care system. Estimating the size of efficiency benefits in dollar terms is very challenging and the subject of considerable international debate due to a range of factors including the lack of reliable data across the health system, the difficulties in isolating the benefits associated with specific E-Health solutions and the divergent approaches to determining the economic value of the quality of life.[71]

Whilst understanding the limitations in determining the value of benefits from E-Health, analysis shows that the tangible benefits associated with implementation of the Australian E-Health strategy are estimated to be in the order of A$5.7 billion in net present value over ten years[72]. This order of magnitude has been estimated on the basis of the literature review of AIHW and other publicly available data which indicate the savings that could be realised from reduced transaction costs, reduced duplication of work and avoided medical errors. These savings can be summarised as follows.

E-Health will improve system efficiency by reducing the time consumers and care providers spend manually booking appointments, ordering treatments, and repeating and sharing information across the health sector. It is estimated that 25% of a clinician's time is spent seeking information about patients[73], while 35% of referrals are inappropriate due to insufficient direct access to specialists and insufficient information being passed from primary care to specialists[74]. E-Health implementations overseas demonstrate significant direct productivity improvements for specialists, GP and pharmacists by helping to automate routine interactions between care providers such as referrals, prescriptions, and image processing. For example:

- E-prescription implementations in Sweden, Boston and Denmark reduce provider costs and save time to improve productivity per prescription by over 50%[75]
- E-referrals in Denmark reduced the average time spent on referrals by 97%[76] by providing more effective access to patient information for both clinicians[77]
- Test ordering and results management systems reduce time spent by physicians chasing up test results by over 70% in implementations in America and France. [78]

---

71 Increasingly, the most credible estimates of the economic value of quality of life improvements are developed through the use of a computable general equilibrium model, as computable general equilibrium modelling provides an indication of the improvement to the wider Australian community of increased labour supply.

72 The discount rate used to determine net present value is 7% per annum.

73 Australian Audit Commission, *For Your Information* Canberra, 1995.

74 Elwyn GJ, Stott NCH, 'Avoidable Referrals? Analysis of 170 consecutive referrals to secondary care', *British Medical Journal* 309, 3 September 1994.

75 Stroetmann KA, Jones T, Dobrev A, Stroetmann VN, 'An Evaluation of the Economic Impact of Ten European E-health Applications', 2007..

76 ibid.

77 Australian Audit Commission, *For Your Information* Canberra, 1995.

The E-Health Strategy solutions of e-prescription, e-referral and test ordering minimise the time spent by care providers in discovering information known by other providers and rework in areas such as referrals and prescriptions. The estimated benefit for care provider time, reflecting a conservative 10% reduction of total time spent on messaging costs for clinical and ancillary staff and improvements from improved messaging quality, is in the order of $2.8 billion in net present value over ten years.

E-Health will improve system efficiency by reducing the time and cost spent undertaking unnecessary or duplicated treatment activities such as diagnostic tests. Studies in hospital environments have indicated that between 9%[79] and 17%[80] of tests are unnecessary duplicates[81]. When alerted at the point of care of duplicate testing, 69%[82] of physicians cancelled their test orders. Such alerts have been shown to cut the absolute number of tests by up to 25%[83], reduce transcription errors from 12% to zero, and reduce waiting time for radiology results by 24% to 48%.[84,85] Based on an estimate of A$36 as the mean cost of tests prevented[86] and a conservative estimate of a 15% reduction in tests, the E-Health Strategy could realise benefits in the order of $800 million in net present value over ten years.

E-Health will reduce the time and cost spent addressing avoidable medical errors or avoidable degradation of chronic conditions. The costs of adverse events and medical errors are significant. It has been estimated that 10% of hospital admissions are due to adverse drug events and that up to 18% of medical errors are due to the inadequate availability of patient information.[87] Adverse events broadly account for as much as 3.8% of total costs of care each year which represents approximately $3 billion[88] in avoidable annual expenditure.

E-Health will directly reduce the risk of adverse drug events through supporting care providers with access to clinical decision support tools and up to date consumer information at the point of care leading to a reduction in the number of prescribing errors. For example, implementation of computerised physician ordering systems (included alerting) in both the hospital and primary care settings reduced adverse drug events by up to 75% in the US,[89] Canada, [90] Sweden[91] and the

---

78 Elwyn GJ, Stott NCH, 'Avoidable Referrals? Analysis of 170 consecutive referrals to secondary care', 1994.

79 Congressional Budget Organisation (CBO), *Evidence on the Costs and Benefits of Health Information Technology*, May 2008.

80 Kwok J, Jones B, 'Unnecessary Repeat Requesting of Tests: An Audit in a Government Hospital Immunology Laboratory', *Journal of Clinical Pathology,* 58(5): 457-462, May 2005.

81 ibid.

82 Congressional Budget Organisation (CBO), *Evidence on the Costs and Benefits of Health Information Technology*, May 2008.

83 Bareford D, Hayling A, 'Inappropriate use of laboratory services: long term combined approach to modify request patterns', *British Medical Journal*, 8;301(6764):1305-7, Dec 1990.

84 Connecting for Health Press Release, May 2007.

85 Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, Morton SC, Shekelle PG, 'Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care', May 2006.

86 Stuart PJ, Crooks S, Porton M, 'An interventional program for diagnostic testing in the emergency department', *Medical Journal of Australia,* 2002.

87 Australian Institute of Health and Welfare, *Australia's Health 2002.*

88 Ehsani JP, Jackson T, Duckett SJ, 'The Incidence and Cost of Adverse Events in Victorian Hospitals 2003-04', *Medical Journal of Australia*, 2006.

89 Evans RS, Pestotnik SL, Classen DC, Clemmer TP, Weaver LK, Orme JF, Jr, Lloyd JF, Burke JP, 'A computer-assisted management program for antibiotics and other anti-infective agents', *New England Journal of Medicine.* 338(4), 7, 1998.

90 Taylor LK, Kawasumi Y, Bartlett G, Tamblyn R, 'Inappropriate Prescribing Practices: The Challenge and Opportunity for Patient Safety', 2005.

91 Stroetmann KA, Jones T, Dobrev A, Stroetmann VN, 'An evaluation of the economic impact of ten European E-Health applications', *Journal of Telemedicine and Telecare,* 13:62-64, 2007.

UK.[92] [93] The prevention of adverse drug events through the implementation of the E-Health Strategy is estimated to be in the order of $1.3 billion in net present value over ten years. This estimate is based on international evidence demonstrating that a minimum of 25% of adverse drug events can be avoided due to the availability of patient information at the point of care.

Care providers will also be supported to more effectively treat chronically ill consumers via automated monitoring and tracking of care delivery processes. Benefits in the order of $600 million in net present value over ten years are estimated on the basis of the number of patients in metropolitan and rural and remote areas suffering from a chronic illness, and the potential savings per patient generated by improved access, monitoring and compliance.

E-Health will reduce travel required to/from rural and remote communities. US studies also indicate significant cost savings from telehealth investments. One implementation of in-home monitoring generated a return on investment of more than 200% and total savings of US$5,271 per patient per year. Assuming that an estimated 20% of trips to and from care providers can be avoided as a result of telehealth solutions in Australia, it is estimated that the E-Health Strategy will deliver travel time savings in the order of $60 million in net present value over ten years.

7.2.3 Benefit Summary

There are significant challenges associated with attempting to quantify benefits associated with E-Health, not least of which is the paucity of quality data on Australian health care system costs, activities and outcomes. Despite these limitations, it is possible to develop indicative estimates based on analysis of local and international literature. This analysis shows that the tangible benefits associated with implementation of the Australian E-Health Strategy are estimated to be in the order of A$5.7 billion in net present value terms over ten years. The annual savings associated with a fully implemented E-Health Strategy are estimated to be approximately A$2.6 billion in 2008-09 dollar terms.

Importantly, the estimate of E-Health efficiency gains does not include the benefits from improved quality of life and more accessible care for Australian patients, nor the multiplier impacts in the economy from increased labour force productivity, reduced pressure on health sector wages and the more effective allocation of resources.

In a recent report, the Allen Consulting Group (ACG)[94] summarises research into potential benefits from implementation of an IEHR over a ten year period and takes into account these additional benefit areas. The potential benefits described in the report are converted into impacts on key indicators to arrive at the range of estimated broad macroeconomic benefits.

The modelling described in the report indicates that the productivity of the Australian health sector would improve by between 4.8 and 6.0% within ten years based on E-Health enabled efficiency and effectiveness improvements. This equates to approximately A$4.3 – 5.4 billion per annum in 2008-09 dollars. ACG estimate that a national approach to E-Health will increase real Australian GDP by between A$7.5 and A$8.7 billion (in 2008-09 dollars) per annum within ten years. These figures are indicative and based on a broad set of assumptions; however they do reinforce the potential magnitude of the national E-Health prize.

The ultimate benefit achieved from implementation of a national E-Health Strategy will be a safer and more sustainable health system that is suitably equipped to respond to emerging health sector cost and demand pressures. Improvements in the Australian health care system will also drive stronger workforce productivity and will therefore be integral to Australia's long run economic

---

92 Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, Morton SC, Shekelle PG, 'Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care', May 2006.

93 E-Health for Safety, *Impact of ICT on Patient Safety and Risk Management,* 2004.

94 Allen Consulting Group, *Economic Impacts of a National IEHR System*, July 2008.

prosperity. The biggest challenge facing the nation is therefore to decide where to spend on E-Health rather than how much.

The stakeholders engaged in the development of the E-Health Strategy have created a workable plan that defines the major initial steps that Australia should take on the E-Health journey. The E-Health Strategy is pragmatic, balances different priorities and will lead Australia towards the delivery of a safer, better connected and more sustainable health care system.

Appendix A: List of Consultations

Consultation List

The following tables contain the names, roles and organisations of those individuals who have been invited to be a part of our consultation process.

FIGURE A-1: STEERING COMMITTEE

Name	Institution	Region
Ms Fran Thorn	Secretary, Department of Human Services, Victoria	Vic/Chair
Mr Peter Allen	Under Secretary, Portfolio Services & Strategic Projects, Department of Human Services, Victoria	Vic
Mr Phillip Davies	Deputy Secretary, Australian Department of Health & Ageing	Commonwealth
Assoc Prof Adrian Nowitzke	Chief Executive Officer, Gold Coast Health Service District, QLD Health	Qld
Mr Colin Xanthis	Chief Information Officer, Health Information Division, WA Department of Health	WA
Mr Peter Beirne	Chief Operations Officer, Department of Health and Community Services, Northern Territory Government	NT

Round 1 Consultation

In round 1 of the stakeholder consultations the following stakeholders were interviewed.

FIGURE A-2: ROUND 1 CONSULTATIONS – STAKEHOLDERS INTERVIEWED

Name	Institution
General Practice	
Prof Michael Kidd	Head, Discipline of General Practice, University of Sydney AHIC member
Prof Mukesh Haikerwal	Former AMA President Melbourne GP
Dr Tony Lembke	Rural GP, NSW Clinical Lead, Australian Primary Care Collaborative Program
Medical Specialists	
Dr Leo Donnen	Paediatric surgeon Royal Children's Hospital, Melbourne
Dr Derek Chew	Cardiologist Flinders Medical Centre SA ICT Clinical Reference Group
Nursing	
Ms Sharon Donovan	Nursing & Ambulatory Care Bayside Health, Melbourne

Name	Institution
Diane Brown	Director of Nursing, Mt Isa, QLD
Pathologists	
Professor Leslie Burnett	Director of Pathology Royal North Shore Hospital NSW
Dr Michael Legg	Pathologist President, Health Informatics Forum Australia (HIFA)
Pharmacists	
Mark Dunn	Tasmanian Pharmacist Publisher of the AusPharm suite of websites
Radiologists	
Nick Ferris	Member of the QUDI (quality use of diagnostic imaging) digital imaging/e-health advisory group
CIOs/Health Specialists	
Prf Enrico Coiera	Director, Centre for Health Informatics, University of Sydney AHIC member
Stephen Moo	NT CIO Chair of the NHCIOF
Andrew Howard	Former VIC CIO CEO, NEHTA
Abbe Anderson	GP Partners – Brisbane North Division of General Practice
Consumers	
Helen Hopkins	Executive Director, National Consumer's Health Forum AHIC member
Health Service Managers	
Dr Brendan Murphy	CEO, Austin Health, Melbourne
Ms Clare Amies	CEO, Western Region Community Health Service
Other	
Dr Michael Armitage	CEO Australian Health Insurance Association Former SA Health Minister

Round 2 Consultation – Regional Workshops

A broader consultation round, facilitated through a series of regional workshops, was used to inform the development of the E-Health vision and obtain insight into the priorities and implementation considerations that would impact the E-Health strategy. The following lists detail workshop invitees across the regional workshops.

FIGURE A-3: ROUND 2 CONSULTATIONS – NSW STAKEHOLDERS INTERVIEWED

Name	Institution
Margaret Allen	Business Analyst Planning Unit, The Children's Hospital Westmead
Nick Van Domburg	Chief Information Officer, Sydney South West Area Health Service
Stewart Dowrick	Executive Director, Corporate Services, North Coast Area Health Service

Name	Institution
Dr Bruno Giuffre	Staff Specialist Radiology, Royal North Shore Hospital, Northern Sydney Central Coast Area Health Service
Alison Jones	Head, Occupational Therapy Chair, Clinical Support Program, Allied Health, The Children's Hospital Westmead
David Rhodes	Director Allied Health, Hunter New England Area Health Service
Amanda Turville	Director of Client Services, Sydney South West Area Health Service
Neville Board	Cancer Information Systems Manager, Cancer Institute NSW
Dr David Doolan	Director, Clinical IT Support & Development, Hunter & New England Area Health Service
Roger Hanssen	Director Information Systems and Support, Ambulance Service of NSW
John Hubby	Director Corporate Services & Finance, Justice Health
Ms Rosemary Learmonth	Nurse Manager, Clinical Informatics, Liverpool Hospital, Sydney South West Area Health Service
Louise Robertson	Director (EMR) Information Systems Division, Sydney South West Area Health Service
Ms Jenny Simpson	Practice Support Unit, Greater Newcastle Cluster, Hunter & New England Area Health Service
Dianne Ayres	eMR Project Director, South Eastern Sydney and Illawarra Area Health Service
Bernard Deady	Executive Director, Corporate & Financial Services, Sydney West Area Health Service
Jean Evans	Chief Information Officer, South Eastern Sydney and Illawarra Area Health Service
Anne-Marie Hadley	A/g Chief Information Officer, Northern Sydney & Central Coast Area Health Service
Dr Michael Nicholl	Clinical Director, Division Women's Children's & Family Health, RNSH, Northern Sydney & Central Coast Area Health Service
Kate Needham	Executive Director, GMCT
Dr Roger Traill	Department of Anaesthesia, Royal Prince Alfred Hospital, Sydney South West Area Health Service
Jan Whalan	Director Corporate Services, Sydney South West Area Health Service
Margaret Allen	Business Analyst Planning Unit, The Children's Hospital Westmead
Nick Van Domburg	Chief Information Officer, Sydney South West Area Health Service
Stewart Dowrick	Executive Director, Corporate Services, North Coast Area Health Service

FIGURE A-4: ROUND 2 CONSULTATIONS – ACT STAKEHOLDERS INTERVIEWED

Name	Institution
Ian Thompson	Deputy Chief Executive, ACT Health
Judy Redmond	Acting Chief Information Officer, ACT Health
Megan Cahill	Executive Director Government Relations and Planning, ACT Health
Ross O'Donoghue	Executive Director Policy Division, ACT Health
Frank Byrne	Deputy Director, Medical Records, ACT Health
Ian Bull	Manager - National E-Health Project, ACT Health
Fred Pitcher	ICT Projects, InTACT
William Mudge	Director, Health ICT, ACT Health
Adrian Scott	Director, Strategic Support, ACT Health

Name	Institution
Susan Chicchio	ICT Health Projects, InTACT
Peter McNiven	Health Business Systems, In TACT
Louise Edmonds	Senior Manager, ACT Health Information Management, ACT Health
Mick Chisnall	General Manager, InTACT
Robert Triggs	E-health Support Officer, ACT Division of GPs
Rosemary Kennedy	A/g Executive Director Bus & Infrastructure, ACT Health
Grant Carey	Executive Director Aged Care and Rehabilitation, ACT Health
Janette Farrelly	Business Improvement Manager, Calvary
Brendan Donovan	Manager ICT, Calvary

FIGURE A-5: ROUND 2 CONSULTATIONS – COMMONWEALTH / NATIONAL STAKEHOLDERS INTERVIEWED

Name	Institution
Julie Roediger	Chair, Health Data Standards Committee
Richard Bartlett	National Manager, Primary Care Policy, Department of Veterans Affairs
Delys Heinrich	Department of Veterans' Affairs
Susan Linacre	Deputy Australian Statistician
Cathy Doherty	Office of Aboriginal and Torres Strait Islander Health
Alison Roseveer	Ageing and Aged Care Division, Department of Health and Ageing
Carolyn Brown	Ageing and Aged Care Division, Department of Health and Ageing
Alain Leitch	Ageing and Aged Care Division, Department of Health and Ageing
Sally Goodspeed	Australian Bureau of Statistics
Jane Spittle	Primary and Ambulatory Care Division
Gareth Sebar	Primary and Ambulatory Care Division
Megan Morris	Primary and Ambulatory Care Division
Kathy Finn	Office of Aboriginal and Torres Strait Islander Health
Garry Fisk	Office of Aboriginal and Torres Strait Islander Health
Tuija Harms	Primary and Ambulatory Care Division
Michael Ryan	Medical Benefits Division
Andrianna Koukari	Population Health Division
Martin Mullane	Primary and Ambulatory Care Division
John Patroni	Primary and Ambulatory Care Division
Sally Goodenough	Australian Institute of Health and Welfare
Dr Peter Garcia Webb	Australian Medical Association
Hitendra Gilhotra	Primary and Ambulatory Care Division
Rona Mellor	Medicare Australia
Lenore Simpson	Medicare Australia

Name	Institution
Phil Lowen	Australian General Practice Network
Louise Clarke	Association for Children with a Disability
Helen Hopkins	Consumer Health Forum
Catherine Ellis	Consumer Health Forum
Elizabeth Hoole	Department of Health and Aging, Portfolio Strategies Division
Rosemary Calder	Department of Health and Aging, Mental Health and Workforce Division
Tony Greville	Health Consumer Representative
Lisa McGlynn	Assistant Secretary e-Health Branch, Primary & Ambulatory Care Division, Department of Health and Ageing

FIGURE A-6: ROUND 2 CONSULTATIONS – VICTORIAN STAKEHOLDERS INTERVIEWED

Name	Institution
Phyllis Rosendale	Director, DHS
Greg Stenton	Director, DHS
Ed Rhode	Executive Officer / Chief Information Officer , Hume Rural Health Alliance/ Chief Information Officer
Dr Ian Rodgers	CIO, Royal Children's Hospital
Claire Culley	Divisional Director Surgical Services, Western Health
Sue Kirsa	Director of Pharmacy, Peter MacCallum Cancer Centre
Tim Barta	Director, DHS
Bruce Winzar	Bendigo Health
Paul Cohen	Barwon Health
Dr Jeff Urqhart	Barwon Health
Kerry Bradley	CEO, Mary MacKillop Centre
Peter Williams	Director IM&T Health, DHS
Jane Dooley	Project Manager, DHS
Ormond Pearson	CEO, West Gippsland Healthcare Group
Sylvia Barry	Director, DHS
Mary O'Reilly	Head of Unit, Infectious Diseases and Infection Control, Eastern Health
Martin Lum	Senior Medical Advisor, DHS
Maria Bubnic	Project Manager, Portfolio and Strategic Projects, DHS
Katerina Andronis	Director, Information Management, Peter MacCallum Cancer Centre
Dr Grant McArthur	Clinical Info Mgt, Peter MacCallum Cancer Centre
Peter Williams	Director, DHS
Prof Michael Dooley	Director of Pharmacy, Bayside Health & CSSC
Clare Amies	CEO, Western Region Health Centre
Sue Clarke	CEO, Bendigo Community Health Services
Patrick Burnett	Project Manager, DHS & CSSC
Rod Trurun	Manager Medical Imaging Department, Royal Children's Hospital & CSSC

Name	Institution
Scott Jansson	Operations Manager, Pathology, Melbourne Health & CSSC
Tracey Batten	CEO, Eastern Health & CSSC
Alison McMillan	Director Statewide Quality Branch, DHS & CSSC
Peter Williams	Director, DHS

FIGURE A-7: ROUND 2 CONSULTATIONS – TASMANIAN STAKEHOLDERS INTERVIEWED

Name	Institution
Richard Wylie	Manager, Information Management and E-Health, GP Tasmania Pty Ltd
Louise Sullivan	Executive Officer, Pharmacy Guild
Penny Minehan	Project Manager , Pharmacy Guild
Justin O'Shannassy	Project Manager, Health Connect, DHHS
Mary Blackwood	Director Oral Health, DHHS
John King Smith	Team Leader, Identification Services, DHHS
Nick Goddard	Manager, Co-ordination & Innovation, DHHS
Peter Mansfield	Manager, Clinical Data Services, DHHS
Chris Showell	Director, Information Services, DHHS
Glenn Lewis	Manager, Application Solutions, DHHS
David Seaton	Senior Medical Scientist, DHHS
Siobhan Harpur	Director, Community Health Reform and Implementation, DHHS
Kathy Kirby	Program Manager, Virtual Care@Tas, DHHS
Mark Upton	Manager, Patient Information Management Services, DHHS
John Smith	Manager, Resource and Systems Performance, DHHS
David Boadle	Chief Health Officer, DHHS
Wendy Quinn	Director, Disability Services, DHHS

FIGURE A-8: ROUND 2 CONSULTATIONS – NT STAKEHOLDERS INTERVIEWED

Name	Institution
Peter Beirne	Chief Operating Officer
Peter Campos	Assistant Secretary, Acute Care
Jenny Cleary	Assistant Secretary, Health Services
John Fletcher	Director SEHR
Dr Leonie Katekar	CEO, Top End Division of General Practice
Peter Kerr	Community Care Information Systems
Stephen Moo	CIO, NT Health
Bhavini Patel	Director NT Pharmacy
Noelene Swanson	Director Remote Health
Graham Symons	Head of DCIS

Name	Institution
Robert Whitehead	Director, eHealth Policy
Matt Antcliff	TEDGP - Urban SEHR
Peter Gazey	Nurse remote - SEHR
Steve Guthridge	Population health
Claire Johansson	Clinicians with SEHR
Kristine Luke	Acute services
Nunzio Meta	Pharmacist
Jeanine Richardson	Practice manager GP practice
Steven Schatz	Systems - primary care business analysis
Dr Karen Stringer	GP Liasion
Diane Walsh	Chair of Consumer Ref Group for Top End Div of GP
Dr Jo Wright	Remote services doctor

FIGURE A-9: ROUND 2 CONSULTATIONS – SA STAKEHOLDERS INTERVIEWED

Name	Institution
Mr Roger Milton	Director Strategy & Standards, ICT Services Division, Department of Health
Kym Piper	Director, Health Intelligence, South Australia
Andrew McAlindon	Director, Health Connect, South Australia

FIGURE A-10: ROUND 2 CONSULTATIONS – WA STAKEHOLDERS INTERVIEWED

Name	Institution
Dr Peter Flett	SHEF Members
Dr Robyn Lawrence	SHEF Members
Dr Phillip Montgomery	SHEF Members
Kim Snowball	SHEF Members
Dr Simon Towler	SHEF Members
John Leaf	SHEF Members
Dr Steve Patchett	SHEF Members
Ken Wyatt	SHEF Members
Dr David Russell-Weisz	SHEF Members
Sue Brooks	SHEF Members
Jeff Mofett	SHEF ICT
Sam Carrello	SHEF ICT
Peter Collard	SHEF ICT
Dr Mark Salmon	SHEF ICT
Dr Peter Sprivulis	eHealthWA CIS Lead

Name	Institution
Carmel McCormack	eHealthWA CIS Lead
James Williamson	eHealthWA Prgram Delivery Committee
Frank Daly	eHealthWA Prgram Delivery Committee
Steph Barrett	eHealthWA Prgram Delivery Committee
Ian Dey	eHealthWA Prgram Delivery Committee
David Taylor	eHealthWA Prgram Delivery Committee
Benedict Carnley	eHealthWA Prgram Delivery Committee
Yusuf Nagree	eHealthWA Prgram Delivery Committee
Carmel McCormack	eHealthWA Prgram Delivery Committee
Colin Leman	eHealthWA Prgram Delivery Committee
Grant Waterer	eHealthWA Prgram Delivery Committee
Dr Jacquie Garton-Smith	GP Liaison Officer
Dr Debbie McKay	GP Liaison Officer
Dr Peta Carr	GP Liaison Officer
Dr David Oldham	GP Liaison Officer
Dr Maree Creighton	GP Liaison Officer
Dr Vicki Westoby	GP Liaison Officer
Mr Terry Keating	Goldfields Esperance General Practice
David Glance	Great Southern GP Network
Ms June Foulds	Greater Bunbury Division of General Practice
Mr Matt Burrows,	Kimberley Division of General Practice
Mr Martin Weatherston	Midwest GP Network
Mr Chris Pickett	Pilbara Division of General Practice
Mr Michael Keeble	Wheatbelt GP Network
Mr Matt Tweedie	Canning Division of General Practice
Mrs Christa Riegler	Fremantle GP Network
Mr Mike Seward	Perth Primary Care Network
Ms Terina Grace	Osborne GP Network Ltd
Mr Peter Cook	Rockingham Kwinana Division of General Practice
Roger Swift	InfoHealth Application Business User Groups
Pat Cambridge	Health Policy & Clinical Reform
Mark Slattery	Health Policy & Clinical Reform
Jon Harrison	Information Policy & Support
Gopal Warrier	Information Policy & Support
Diane Drew	Information Policy & Support
Kirsten Nekrews	Information Policy & Support

Name	Institution
Suzanne Hillier	Legal & Legislative Services
Robyn Daniels	Legal & Legislative Services
Pamela Rose	Privacy
Keith Butson	ICT Architects
Chris Kempster	ICT Architects
Bas Roemermann	ICT Architects
Eagon Bramanis	ICT Architects
Rod Harman	ICT Architects
Jon Bray	ICT Architects

FIGURE A-11: ROUND 2 CONSULTATIONS – QUEENSLAND STAKEHOLDERS INTERVIEWED

Name	Institution
Paul Summergreene	Chief Information Officer
Dr Keith McNeil	Clinical CEO RBWH
Dr Paul Varghese	Director Geriatric Medicine PAH / Chair SAHS Aged Care Clinical Network
Dr Chris Davis	President-elect AMA Queensland, Director Geriatric Medicine / Rehabilitation, TPCH
Dr Robert Webb	Director, Hyperbaric Medicine Unit, Townsville
Dr Nick Buckmaster	Director Medicine / A/District Director Chronic Diseases, Gold Coast
Dr Mark Mattiussi	District Manager, Southside Health Service District
Moira Goodwin	Executive Director, Northside Primary and Community Health Services, Northside HSD
Dr John Kastrissios	GP, Logan / Chair General Practice Queensland Board
Dr Jan Pratt	Nursing Director, Primary Care Program, Community Child Health, RCH
Christopher Norton	Nurse Unit Manager, Acute Stroke, Geriatric, and Rehabilitation, QEII
Darren Clark	Nurse Unit Manager Robina / Co-chair SAHS ED Clinical Network
Dr Linda Selvey	Senior Director, Population Health Branch
Paul Carroll	Senior Director, Radiology Support, Clinical and Statewide Service
Dr Christopher Buck	Resident Medical Officer, Toowoomba
Stella Rowlands	Acting Director, Health Information Management Services, Sunshine Coast HSD
Adrian Nowitzke	Chief Executive Officer, Gold Coast Health Service District, QLD Health
Dr Michael Harrison	Pathologist, Queensland

Additional Consultations

In addition to the two formal rounds of consultation a number of individual interviews were conducted with key stakeholder representatives to seek their input and guidance. These additional consultations are listed in the following table.

FIGURE A-12: ADDITIONAL STAKEHOLDERS INTERVIEWED

Name	Institution
Jane Halton	Secretary, Department of Health and Ageing
Belinda Highmore	Manager, Medical Practice and eHealth Section, AMA
Wendy Lorincz	Policy Advisor, Medical Practice and eHealth Section, AMA
Dr. David More	Health industry commentator and publisher of the Aus Health IT blog
Rona Mellor	Deputy Chief Executive Officer, Medicare
Graham Gathercole	Chief Information Officer, Medicare
Mark Young	Manager eHealth Branch, Medicare
Pam Spurr	Manager New Business Projects - Technical Requirements, Medicare
Debbie Lutter	Manager Online Customer Strategy, Medicare
John Clarkson	UHI Program Manager, UHI Project, Medicare
Mark Richardson	Senior Business Specialist, eHealth Branch, Medicare
Peter Brown	Cancer Voices Australian

Strategy Review Workshop 30 July 2008

On the 30 July 2008 a workshop was held with a cross section of stakeholder representatives to present and review key elements of the strategy and recommendations. The stakeholders who attended this workshop are listed in the following table.

FIGURE A-13: STRATEGY REVIEW WORKSHOP ATTENDEES

Name	Institution
Peter Allen	Under Secretary, Portfolio Services & Strategic Projects Division Victorian Department of Human Services
Maria Bubnic	Manager, NEHIPC Secretariat Victorian Department of Human Services
Philip Davies	Deputy Secretary Australian Department of Health & Ageing
Colin Xanthis	Chief Information Officer, Health Information Division WA Department of Health
Peter Beirne	Chief Operations Officer NT Department of Health and Community Services
Adrian Nowitzke	Chief Executive Officer, Gold Coast Health Service District QLD Health
Lisa McGlynn	Assistant Secretary e-Health Branch , Primary & Ambulatory Care Division Australian Department of Health and Ageing
Peter Williams	Director IM & T Health Victorian Department of Human Services
Roger Milton	Director Strategy & Standards, ICT Services Division SA Department of Health
Max Gentle	Director Information Systems TAS Department of Health and Human Services
Mino Schilling	Office of the CIO NSW Health
Judy Redmond	ACT Health
Stephen Moo	Chair NHCIOF CIO, NT Department of Health & Community Services
Robert Whitehead	Office of the CIO NT Department of Health & Community Services
Richard Ashby	Acting CIO QLD Health
Stephen Burmester	Architect & Strategic Advisor to CIO QLD Health
Grahame Coles	Acting CIO VIC Department of Human Services
Mukesh Haikerwal	Melbourne GP Former AMA President
Michael Legg	Pathologist President, Health Informatics Forum Australia

Name	Institution
Catherine Ellis	Policy Adviser Consumers Health Forum of Australia
Leonie Katekar	CEO Top End Division of General Practice
Graeme Hart	Deputy Director Intensive Care Austin Health
Yvonne Ellison	Executive Director, Society of Hospital Pharmacists of Australia Former AHIC member
Jeff Urqhart	Geelong GP
Andrew Howard	Acting CEO National E-Health Transition Authority (NEHTA)
John Jackson	Private hospital pharmacist
Phyllis Rosendale	Director Intergovernmental Relations Victorian Department of Human Services
David Filby	Chair NHISSC Executive Director, Policy & Intergovernmental Relations SA Department of Health

Appendix B: Priority Solution Descriptions

Introduction

National consultation and international research have identified a set of high priority E-Health solutions that will provide the greatest tangible benefits to Australian consumers, care providers and health care managers. These are solutions that can provide access to patient, diagnosis and treatment information that enable improved quality, safety and effectiveness of care and care decision making and those solutions that can improve the efficiency of care delivery processes.

The high priority E-Health solutions are focused in three categories – electronic information sharing, service delivery tools and health information sources and are summarised in the following table.

E-Health Solution Category	Priority Solutions	Description
Electronic Information Sharing	• Referrals • Event summaries including discharge summaries, specialist reports and notifications • Prescriptions • Test orders and test results • Care plans	Improving the capability of patient, clinical and practice management systems to support key electronic information flows between care providers. These key information flows provide a basis for improved care planning, coordination and decision making at the point of care.
	• Consumer demographics • Current health profile • Current medications list	The key datasets that provide the summary of a consumer's key health data and their current state of health, treatments and medications. These datasets will improve the quality of service delivery and will ensure that consumers do not have to remember or repeat this information as they navigate the health system.
Service Delivery Tools	• Decision support for medication management • Decision support for test ordering	Encouraging the development of specific tools that improve the quality of clinical decision making and can reduce adverse events and duplicated treatment activities.
	• Chronic disease management solutions. • Telehealth and electronic consultation support	Encouraging development of specific tools that improve the management of chronic disease and the accessibility of care delivery. Chronic disease management solutions enable the identification and monitoring of chronic disease sufferers and support management of their condition by providing automated reminders and follow-ups. Telehealth and electronic consultation tools will enable improved rural, remote and disadvantaged community access to health care services.

Information Sources	• Health care reporting and research datasets • Health information knowledge bases	Implementing improved datasets for health care management that provide access to longitudinal and aggregated information for analysis, reporting, research and decision making. Providing access to a set of nationally coordinated and validated health knowledge sources for consumers and care providers.
	• Individual electronic health records (IEHRs)	Implementing individual electronic health records (IEHRs) that provide consumers with access to their own consolidated health information and provide care providers with a means to improve the coordination of care between multi-disciplinary teams. The IEHR can also support the collection and reporting of aggregated health information.

These priority E-Health solutions are not intended to be exhaustive list of the E-Health solutions required over time, however they do represent the areas that should be given national funding and resource priority due to the tangible nature of the care delivery and coordination benefits they can provide.

This appendix provides a more detailed description of each of the priority solutions.

Electronic information sharing

One of the highest priority solutions areas for improving the sharing of health information is to establish basic electronic information flows between care providers to enable the sharing of key datasets. Establishing the sharing of key datasets ensures that care providers have access to a greater set of information about the patient they are seeing and the patient does not have to repeat their information to each care provider. Ensuring that these datasets provide structured atomic data also allows this richer information set to be used as a basis for automated decision support, analysis and reporting.

The key electronic information flows that should be established between care providers are:

- Referrals
- Event summaries including discharge summaries, specialist reports and notifications
- Prescriptions
- Test orders and test results
- Care plans

Together with these key information flows there are a number of additional datasets that provide a summary of a consumer's key health data and their current state of health, treatments and medications:

- Consumer demographics
- Current health profile
- Current medications list

These datasets do not necessarily represent separate information flows but rather are additional sets of information that should be incorporated into some or all of the above information flows where required to provide context for treatment decisions. Sharing these datasets will improve the quality of service delivery and will ensure that consumers do not have to remember or repeat this information as they navigate the health system.

To enable improved sharing of health information, solution vendors should build secure messaging functions that can send and receive these key datasets into core care provider solutions such as practice management, patient management and clinical systems rather than create

standalone tools. Building support for information sharing into core care provider systems provides an integrated environment in which the broad range of information about a patient can be brought together to support care provision and decision making. Additionally, in many care scenarios individual datasets may be bundled together and shared with another care provider to provide context for the care required, such as providing patient demographic data with a referral or test order.

Referrals

The ability to send referrals electronically between care providers to manage the coordination of care has been identified as one of the high priority information flows that E-Health can support. In its more basic form, an electronic referral involves an electronic message sent from one provider to another that contains details of a patient, the symptoms they are presenting with and a request for the provider receiving the referral to provide services to the patient.

Benefits of being able to send referrals electronically include a reduction in the number of lost referrals, the ability track whether patients have seen the referred care provider and the ability to improve care decision making by providing patient demographic and treatment information easily within the referral message.

In some care disciplines such as allied health and community care, more complex referrals models may be employed where the referral is offered to a group of providers through a brokering mechanism and one of the providers accepts the referral. Development of a solution to support referral brokering at a regional or national level will be required in those care networks or regions where referral brokering is used.

Event summaries and notifications

Event summaries and notifications are another key information flow required to assist the coordination of care between multi-disciplinary care teams. Event summaries include discharge summaries from inpatient hospital stays and reports from day-procedures, outpatient visits and specialists. Event summaries are sent from the organisation or practice providing treatment back to the primary or referring care provider and typically provide a summary of diagnoses, treatments, outcomes and ongoing care requirements.

Notifications are a more basic form of communication and are used to inform care providers that something has changed in the patient's situation or care needs. Situations in which notifications may be sent include admission to or discharge from hospital, change in condition and change in care needs/treatments.

Benefits of providing event summaries and notifications include an improved ability by the care team to coordinate care and an improved ability to understand changes that have occurred to the patient's health, diagnoses, tests and treatments as a result health care events.

Prescriptions

While the majority of prescriptions in the primary care sector are now generated electronically by practice management systems, the prescription itself is still printed onto a piece of paper and manually transported to the pharmacist. Being able to have the prescription generated as a secure electronic message that can be received by the pharmacist provides the ability to significantly improve the provision and management of medications for the patient.

Potential benefits include virtual eradication of lost prescriptions, significant reduction in prescribing errors by removing reliance on hand-written scripts and the ability to track whether prescriptions have been filled to determine whether patients have actually got the medication they need. Electronic prescribing, when coupled with access to a current medication list, diagnosis

information and test results provides an information base on which decision support tools can operate to improve the safety and effectiveness of the chosen medication regime.

Electronic prescribing requires the implementation of a mechanism for holding prescriptions securely so that they can be retrieved by the pharmacist that the patient visits for their medication. Development of a solution to support prescription holding at a regional or super-regional level will be required as part of an electronic prescribing solution.

Test orders and results

In primary care, the majority of care providers receive their diagnostic test results electronically and increasingly use their practice management systems to generate diagnostic test orders electronically. Yet these orders are typically printed onto a piece of paper that the patient then manually transports to the testing facility. Within both the primary and acute care sectors there is an increasing desire to be able to both order tests and receive test results electronically. Being able to have a test order generated as a secure electronic message that can be received by the testing facility provides the ability to significantly improve the management of testing for the patient.

Potential benefits include virtual eradication of lost test orders, significant reduction in testing errors by removing reliance on hand-written orders and the ability to track whether tests have been undertaken. Providing test results electronically in a consistent format allows test results to be made available to care providers more quickly and also allows tracking of whether providers have received and looked at urgent test results. Electronic test ordering, when coupled with access to diagnosis information and other test results provides an information base on which decision support tools can operate to improve the safety and effectiveness of test selection and reduce duplicate and extraneous testing.

Electronic test ordering requires the implementation of a mechanism for holding test orders securely so that they can be retrieved by the testing/diagnostic facility that the patient visits for their diagnostic tests. Development of a solution to support order holding at a regional or super-regional level will be required as part of an electronic test ordering and results solution.

Care plans

A key piece of information that needs to be shared between multi-disciplinary care teams is the care plan and any associated treatment plans for patients who suffer a chronic disease and/or require aged care. Having access to an current care plan allows each provider to understand the care regime that the patient requires, the team involved in caring for the patient and their individual role in delivery of that care. This ensures that care provision is not duplicated or overlooked and also allows consumers and their families/carers to understand the care that should be provided.

Benefits of having shared care plans include a better ability to coordinate care across multi-disciplinary care teams, reduction in duplicated tests, medications and care, and an improved ability for care providers to respond quickly with appropriate treatments in the event of a critical care incident.

Patient demographics and allergies

While not a key information flow in its own right, some of the most basic information that needs to be shared between providers is patient demographic and allergy information. Patient demographic information such as name, address, sex, age, marital status, lifestyle information and allergies are key pieces of information that need to be shared between providers dealing with the same patient to ensure basic record keeping and care management. Patient demographics and allergy information should form part of the data set that accompanies key information flows such

as referrals and test orders to provide context for the requested services and provide input into care decision making.

Benefits of sharing patient demographics and allergies include improved care decision making and the ability to avoid adverse events associated with tests and treatments through care providers having a better knowledge of patient's allergies and demographic information.

Current medication lists

A current medication list provides an accurate and up-to-date record of the medications that a consumer has been prescribed by their care team and includes information such as medication type, condition being treated, brand, dosage and repeats. As with patient demographics and allergies, a current medication list is not an information flow in its own right but rather should form part of the data set that accompanies key information flows such as referrals, test orders, event summaries and care plans.

Having access to an accurate and up-to-date current medications list is critical for care providers in multi-disciplinary care teams to safely manage the medication regime for patients and avoid drug-related adverse events. This information is also vital for consumers and their relatives to ensure they have an accurate understanding of what drugs they should be taking when.

Potential benefits of having access to a current medication list include a reduction in drug related adverse events due to medication clashes and uncoordinated medication changes by care team members together with a reduction in the incidence of medication errors by consumers.

Current health profile

A current health profile provides a summary of a consumer's current state of health including most recent diagnoses, treatments and care events. It is intended to provide existing and new members of care teams with a summary of the consumer's broader state of health to inform diagnosis, treatment and care decision making. As with patient demographics and allergies, a current health profile is not an information flow in its own right but rather should form part of the data set that accompanies key information flows such as referrals, test orders, event summaries and care plans.

Benefits of sharing current health profile information include improved care decision making and the ability to avoid adverse events associated with tests and treatments through care providers having a better knowledge of a patient's broader state of health and current treatments and diagnoses.

Service delivery tools

The second high priority solution area is the development of service delivery tools that can utilise electronic health information and information sharing capabilities to improve care decision making and improve access to health care services. High priority service delivery tools include those that can improve the quality of clinical decision making, reduce adverse events and duplicated treatment activities and can improve the management of chronic disease and the accessibility of care delivery.

High priority solutions in this area include:

- Decision support for medication management
- Decision support for test ordering
- Chronic disease management
- Telehealth and electronic consultation support

As with improved sharing of health information, solution vendors should be encouraged to integrate these service delivery tools into core care provider solutions such as practice management, patient management and clinical systems where possible rather than create standalone tools. These tools will require access to patient information in an integrated environment to support care provision and decision making.

Decision support for medication management

Electronic decision support systems are tools that access knowledge stored electronically to aid patients, carers and service providers in making decisions on health care. In the area of medication management, decision support tools draw on electronic knowledge sources such as clinical practice guidelines and knowledge bases and apply this knowledge to local patient and clinical data through expert rules to guide medications decision making.

The use of decision support for medication management has been identified internationally as one of the key areas in which E-Health can provide tangible benefits to the health sector. Decision support systems, when coupled with a comprehensive and accurate base of patient information are able to identify potential drug-drug interactions, dosing inaccuracies and prescribing errors that could lead to serious adverse events. Additionally, decision support systems can identify when generic medicines can potentially be used providing opportunities for reduced treatment costs.

Decision support for test ordering

Electronic decision support systems for test ordering work in a similar way to those used for supporting medications management. Test ordering decision support tools draw on electronic knowledge sources such as clinical practice guidelines and knowledge bases and apply this knowledge to local patient and clinical data through expert rules to guide selection of the appropriate tests to be conducted.

The use of decision support tools in test ordering has also been identified internationally as one of the key areas in which E-Health can provide tangible benefits to the health sector. Decision support systems, when coupled with a comprehensive and accurate base of patient information are able to identify potentially inappropriate testing or over testing that could lead to serious adverse events. These systems can also identify duplicate, overlapping and otherwise unnecessary testing providing opportunities for reduced treatment costs by avoiding this unnecessary testing.

Chronic disease management

Chronic disease management solutions enable the identification and monitoring of chronic disease sufferers and support management of their condition by providing automated reminders and follow-ups. Chronic disease management solutions can also be used as sources of longitudinal information about the condition, treatment and treatment outcomes of chronic disease sufferers. This longitudinal information can be aggregated into reporting and analysis solutions for the purposes of supporting planning, program design, resource allocation and research on disease behaviour, prevalence and treatment research.

The potential benefits of chronic disease management solutions include the improved coordination and management of care for individual chronic disease sufferers together with improved analysis, reporting and research as a result of access to better longitudinal information.

Telehealth and electronic consultation support

Telehealth and electronic consultation support the provision of care services remotely through the use of audio and video telecommunications together with the ability to share and access electronic patient and care information.

Telehealth systems and systems that support the delivery of electronic consultations are key solutions that are required to support delivery of equitable, safe and quality care to consumers living in rural and remote communities that are most keenly impacted by workforce shortages. These systems provide the capability to provide remote access to clinical experts through fully remote consultations and also co-consultations in which a local care provider such as a community nurse and a remote specialist jointly consult with the patient.

Potential benefits include improved rural, remote and disadvantaged community access to health care services resulting in improved care outcomes. There are also potential efficiency benefits that can be achieved by using electronic consultation solutions to support short consumer/care provider interactions that can be done without face-to-face contact such as answering queries or providing prescription repeats.

Information sources

The third high priority solution area is the establishment of improved health information sources to provide consumers, care providers and health care managers with access to more comprehensive and validated information on which to base health care decision making. High priority information sources include:

- Implementing improved datasets for health care management that provide access to longitudinal and aggregated information for analysis, reporting, research and decision making
- Providing access to a set of nationally coordinated and validated health knowledge sources for consumers and care providers
- Implementing individual electronic health records (IEHRs) that provide consumers with access to their own consolidated health information and provide care providers with a means to improve the coordination of care between multi-disciplinary teams.

Improved datasets for health care management and research

Through the improved collection, recording and sharing of electronic health information E-Health has the potential to make available a more comprehensive set of information that can be used to support health care operations management, decision making and research. Establishment of datasets requires the definition of the information required for health care management and research, and the design and implementation of analysis and reporting solutions that will aggregate and consolidate this information to create the reporting datasets. These reporting solutions should, wherever possible, draw information from electronic health information flows and stores such as the IEHR repositories rather than imposing additional data collection and reporting requirements on care providers.

Potential benefits of establishing improved datasets include the ability to undertake improved health care management and research leading to improved health care outcomes, more effective allocation of health funds and resources, and improved treatment and diagnosis design. Additionally, by embedding the collection of electronic information about patients and their conditions into the care delivery process, E-Health is able to reduce the many disparate data collections that are currently used to support healthcare management, thereby reducing the burden of data collection on care providers.

Health knowledge sources for consumers and care providers

A key means by which E-Health can assist both consumers and care providers in providing improved care and health management is providing them with a single point they can go to on the internet to access health knowledge sources. While there is a plethora of information available on the internet, consumers and care providers have no means of determining which information sources are accurate and trustworthy and which are less so.

Establishing separate internet based portals for consumers and care providers that provide access to a set of nationally coordinated, validated and appropriately focused health knowledge sources will provide health care participants with a single point from which they can access trusted health knowledge.

Potential benefits include improving health outcomes by providing both consumers and care providers with trusted health information on which they can rely to guide their health care choices and manage their health and health care. There is also the potential to reduce the costs of providing access to health knowledge sources by establishing national procurement contracts for access to commercial knowledge sources rather than existing contracts that are duplicated across states/territories and care provider groups.

Individual electronic health records (IEHRs)

IEHRs are a means of providing consumers with access to their own consolidated health information without the need for them to access the information directly within each care provider system. IEHRs consist of an integrated electronic record for a consumer into which their health information is consolidated from the systems of the various care providers that hold information about them. IEHRs also provide a means of sharing this consolidated health information between multi-disciplinary care teams to improve care coordination and making this consolidated information available to support health care management and research. Depending on the IEHR strategy adopted there may be one or more repositories or data stores that are used to store the IEHRs.

The potential benefits associated with IEHRs include providing consumers and care providers with access to a broader range of information about their state of health, current diagnoses, treatments and care plans to allow better care decision making leading to better care outcomes. Access to this broader range of information making also can lead to a reduction in adverse events and a reduction in duplicated, unnecessary or dangerous testing.

Appendix C: References

Allen Consulting Group, *Economic Impacts of a National IEHR System*, July 2008.

American Medical Informatics Association, *Toward a National Framework for the Secondary Use of Health Data,* <http://www.amia.org/inside/initiatives/healthdata/2006>, September 2008.

Anderson GF, Frogner BK, Johns RA, Reinhardt UE, *'Healthcare Spending and use of Information Technology in OECD Countries'*, Health Affairs, May/June, Vol. 25 Issue 3, p819-831, 2006.

Australian Audit Commission, *For Your Information,* 1995.

Australian Broadcasting Corporation, 'Transcript of interview with Senator Ellison on Radio National', 15 June 2000, <http://www.abc.net.au/rn/talks/8.30/mediarpt/stories/s139702.htm> September 2008.

Australian Centre for Health Research Limited, *E-Health and the Transformation of Healthcare,* 2007.

Australian General Practice Statistics and Classification Centre (AGPSCC), *The BEACH Project: Bettering the Evaluation and Care of Health,* < http://www.fmrc.org.au/beach.htm>, August 2008.

Australian Institute of Health and Welfare, *Australia's Health 2002, Number 8*, Canberra, 2002.

Australian Institute of Health and Welfare. *Health Expenditure Australia 2005-06*, Canberra, 2007.

Australian Institute of Health and Welfare, *Australia's Health 2008: The Eleventh Biennial Health Report of the Australian Institute of Health and Welfare*, AIHW cat no. AUS 99, Canberra, 2008.

Australian Institute of Health and Welfare. *Health system expenditure on disease and injury in Australia, 2000-01*. AIHW cat. no. HWE 26 Canberra, 2007.

Australian Institute of Health and Welfare, *Interactive expenditure data: Health Expenditure Data Cubes*, <http://www.aihw.gov.au/expenditure/datacubes/index.cfm>, September 2008.

Australian Institute of Health and Welfare, *The Burden of Disease and Injury in Australia 2003,* AIHW cat. no. PHE 82 Canberra, 2007.

Bareford D, Hayling A, 'Inappropriate use of laboratory services: long term combined approach to modify request patterns', *British Medical Journal*, 8;301(6764):1305-7 December 1990.

Bhasale AL, Miller GC, Reid S, *'Analysing potential harm in Australian general practice: an incident-monitoring study'*, Medical Journal of Australia, 169: 73-76,1998.

Boston Consulting Group, *NEHTA Review,* 2007.

Canada Health Infoway, *2015 advancing Canada's next generation of healthcare*, 2007.

Canada Health Infoway, *Business Plan 2008-09*, 2008.

Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, Morton SC, Shekelle PG, 'Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care', *Annals of Internal Medicine*, Volume 144 Issue 10, 16 May 2006.

Cherry JC, Moffatt TP, Rodriguez C, Dryden K, 'Diabetes Disease Management Program for an Indigent Population Empowered by Telemedicine Technology', *Diabetes Technology & Therapeutics*, 14 (6), 2002..

Commonwealth of Australia, Intergenerational Report 2007, Canberra, Part 2.

Congressional Budget Organisation (CBO), Evidence on the Costs and Benefits of Health Information Technology, May 2008.

Connecting for Health Press Release, May 2007.

Consumer Health Forum, *CHF e-health industry and consumer workshop: 'What's next in e-health' Workshop Report,*<http://www.chf.org.au> September 2008.

Council of Australian Governments (COAG), *Communiqué,19 August 1994,* <http://www.coag.gov.au/coag_meeting_outcomes> September 2008.

Council of Australian Governments (COAG) 2008, Council of Australian Governments' Meeting, < http://www.coag.gov.au/coag_meeting_outcomes/2008-07-03>, August 2008.

Department of Health, National Audit Office, *The National Programme for IT in the NHS,* United Kingdom, June 2006.

Donchin Y, Gopher D, Olin M, et al, 'A Look into theNature and Causes of Human Errors in the Intensive Care Unit', *Crit Care Med,* 23: 294-300, 1995.

The Economist 2007, *'The Vault is Open: Microsoft Makes its Big Move into Health Care'*, October 2007.

Elwyn G, Stott N C H, '*Avoidable Referrals? Analysis of 170 consecutive referrals to secondary care,*' British Medical Journal 309, 3 September 1994.

eHealth NT, *Shared Electronic Health Record,* <http://www.ehealthnt.nt.gov.au/>, August 2008.

E-Health for Safety, Impact of ICT on Patient Safety and Risk Management, 2006.

Ehsani JP, Jackson T, Duckett SJ, 'The Incidence and Cost of Adverse Events in Victorian Hospitals 2003-04', *Medical Journal of Australia*, 2006.

European Commission Information Society and Media, *eHealth Priorities and Strategies in European Countries: eHealth ERA report,* March 2007.

Evans RS, Pestotnik SL, Classen DC, Clemmer TP, Weaver LK, Orme JF, Jr, Lloyd JF, Burke JP, 'A computer-assisted management program for antibiotics and other anti-infective agents', *New England Journal of Medicine.* 338(4), 7, 1998.

Gartner, Inc, Global Industries *Worldwide Fall Forecast: 2002-2008*, December 2004.

Gladwell, M, *The Tipping Point*, Little Brown, 2000.

GP Partners, *Advancing General Practice: Programs and Initiatives,* <http://www.gppartners.com.au>, August 2008.

HealthConnect, *'Health Information When You Need It'*, <http://www.health.gov.au/internet/hconnect>, August 2008.

Health Group Strategies, '*Funding Real Health Security: Higher Transparency of Price and Quality of Care while transforming Medicare subsidies to government and households*', Third Menzies Foundation Winter Lecture Series, p 8.

Hunt DL, Haynes RB, Hanna SE, Smith K, "Effects of Computer-Based Clinical Decision Support Systems on Physician Performance and Patient Outcomes," *JAMA* 280, 1339-45, 1998.

.Kwok J, Jones B, 'Unnecessary repeat requesting of tests: an audit in a government hospital immunology laboratory', *Journal of Clinical Pathology,* 58(5): 457-462, May 2005.

Lorig K, Sobel D, Stewart A, Brown B, Bandura A, Ritter P, Gonzalez V, Laurent D, Holman H, 'Evidence Suggesting that a Chronic Disease Self-Management Program Can Improve Health Status While Reducing Hospitalization - A Randomized Trial', *Medical Care*, 1999.

McBride M, '*Google Health: Birth of a Giant'* in Health Management Technology*, May 2008,* 29, 5; ProQuest Health and Medical Complete, 2008.

Meyer M, Kobb R, Ryan P. 'Virtually Healthy: Chronic Disease Management in the Home'*, Disease Management*, , 5(2): 87-94, 2002.

National Audit Office, *The National Programme for IT in the NHS: Progress since 2006*, United Kingdom, 2008.

NHS Connecting for Health, *Choose and Book,* <http://www.chooseandbook.nhs.uk/staff/overview>, September 2008.

NSW Health, Patient Safety and Clinical Quality Program: First report on incident. management in the NSW public health system 2005-2006, NSW Department of Health, 2006.

Ofman, J. J., et. al., 'Does Disease Management Improve Clinical and Economic Outcomes in Patients with Chronic Diseases? A Systematic Review', *American Journal of Medicine*, vol. 117, pp. 182-192, 2004.

Overhage, JM, Grannis S, McDonald CJ, 'Comparison of the Completeness and Timeliness of Automated Electronic Laboratory Reporting and Spontaneous Reporting of Notifiable Conditions', *American Journal of Public Health,* February 2008.

Primary Health Care Research and Information Service, *Division Plans and Reports: HUGDP,* <http://www.phcris.org.au/divisions/>, August 2008.

Productivity Commission, AHWAC 2004 data in *Australia's Health Workforce*, Research Report, 2005.

Productivity Commission, *Economic Implications of an Ageing Australia*, Research Report, Canberra, 2005.

Productivity Commission, *Impacts of Advances in Medical Technology in Australia*, Research Report, Melbourne, 2005.

Productivity Commission, 'Technical Paper 4: Total Health Expenditure'*, Economic Implications of an Ageing Australia:*, Research Report, Canberra, 2005.

Productivity Commission, Steering Committee for the Review of Government Service Provision 2008, *Report on Government Services 2008*, , Canberra 2008.

Stroetmann KA, Jones T, Dobrev A, Stroetmann VN, 'An Evaluation of the Economic Impact of Ten European E-health Applications', *Journal of Telemedicine and Telecare*;13:62-64, 2007.

Stuart PJ, Crooks S, Porton M, 'An interventional program for diagnostic testing in the emergency department'*, Medical Journal of Australia,* 2002.

Taylor LK, Kawasumi Y, Bartlett G, Tamblyn R, 'Inappropriate Prescribing Practices: The Challenge and Opportunity for Patient Safety', *Healthcare Quarterly* 8(Sp) 81-85, 2005.

Vaccaro J, Cherry J, Harper A, O'Connell M, 'Utilization Reduction Cost Savings, and Return on Investment for the PacifiCare Chronic Heart Failure Program: Taking Charge of Your Heart Health', *Disease Management*, 4 (3): 1-10, 2001.

Victorian Government Department of Human Services, 'Sentinel Event Program – Annual Report 2006-07', Melbourne, Victoria, Australia, 2007.

William B R, Elizabeth E R, Susan J S and Robert J A, *'Adverse drug events and medication errors in Australia'* International Journal for Quality in Health Care 15:i49-i59, 2003.