



**Evolution of eHealth in Australia  
Achievements, lessons, and opportunities**

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Approved for external information

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# Table of contents

<b>1</b>	<b>Executive Summary .....</b>	<b>6</b>
<b>2</b>	<b>Introduction .....</b>	<b>10</b>
2.1	Purpose .....	10
2.2	Intended audience .....	10
2.3	Scope.....	10
2.4	Methodology .....	10
2.5	Overview of this report .....	10
<b>3</b>	<b>Background and context .....</b>	<b>12</b>
3.1	International comparisons.....	13
3.1.1	Denmark .....	14
3.1.2	United Kingdom .....	15
3.1.3	Singapore .....	16
3.1.4	United States .....	17
3.1.5	New Zealand .....	19
3.1.6	Canada .....	19
<b>4</b>	<b>eHealth Achievements .....</b>	<b>21</b>
4.1	Establishment of national eHealth foundations.....	21
4.1.1	Foundation infrastructure services and standards .....	21
4.1.2	My Health Record system infrastructure.....	27
4.2	Achievements and contribution of notable Australian eHealth initiatives.....	32
4.2.1	Advances in sector ICT maturity driven by incentives .....	33
4.2.2	Foundation infrastructure and policy informed by project evaluation.....	34
4.2.3	eHealth infrastructure piloted by Wave sites .....	35
4.2.4	Utilisation of telehealth and home monitoring .....	35
4.3	Strengths of NEHTA’s role in eHealth.....	35
4.3.1	Establishment of strong relationships and partnerships .....	35
4.3.2	Cohesive solution built out of disparate elements .....	36
4.3.3	eHealth services provided by NEHTA .....	36
<b>5</b>	<b>What have we learned? .....</b>	<b>37</b>
5.1	Theme 1: Multi-level tensions.....	37
5.1.1	Technology-led vs clinical community-led.....	38
5.1.2	Centralised command and control vs. diffused power.....	40
5.1.3	Directed development vs open, community-led development.....	42
5.1.4	Market intervention vs free market .....	43
5.1.5	Participant in the health system vs. being a bystander.....	44
5.2	Theme 2: Organisational and system competencies .....	46
5.2.1	Having a strategy, and then working to it .....	46

5.2.2	Relationship building and collaboration .....	47
5.2.3	Capacity to rapidly iterate .....	49
5.2.4	Taking into account clinician and end-user experience .....	51
5.2.5	Using structural adjustment and market alignment mechanisms .....	52
5.2.6	Change management .....	55
5.2.7	Measurement, evaluation, and benefits management .....	56
5.2.8	Implementation capability .....	57
5.3	Theme 3: Necessary cultural shifts .....	58
5.3.1	Information communication technology is necessary to best practice care and public health .....	59
5.3.2	eHealth is enabler of action on clinical and public health problems, not an end in itself .....	60
5.3.3	eHealth solutions will underpin evolution of the 'workup' model to an 'integrated care' model .....	60
5.3.4	High-quality data comes at a cost .....	62
5.3.5	'Document' paradigm must give way to information assimilation .....	63
5.3.6	eHealth infrastructure, services, and specifications comprise a platform for innovation .....	64
5.3.7	Workflows must be positively disrupted in order to realise potential benefit .....	65
<b>6</b>	<b>Conclusion .....</b>	<b>66</b>
	<b>References .....</b>	<b>67</b>

# 1 Executive Summary

The national eHealth program in Australia is now at an important turning point as it moves into a new stage under the Digital Health banner. It is timely to take this opportunity to review the significant achievements made to date in the eHealth agenda, to analyse lessons learned, and most importantly, to use this information to inform the future of digital health in Australia.

This report seeks to summarise what has been learned about implementing eHealth in Australia. It is a synthesis of information that has been accumulated over the ten-year course of NEHTA's work, and is enriched with reference to publically available literature, international examples, and interviews with a number of NEHTA senior and executive managers. The report provides a consolidated summary of key achievements and lessons learned from eHealth implementations and programs within Australia and internationally. It distils underlying structural, cultural, and organisational determinants of eHealth success, and also identifies the important implications and opportunities.

## International comparisons

Analysing international experiences is critical in order to learn from both achievements and mistakes. In reviewing the experiences of Denmark, UK, Singapore, USA, NZ and Canada it is clear that digital health policy implementation has been strongly shaped by the type of governance structures and policy frameworks of each country, as well as local health, social welfare, telecommunications needs, and variety of stakeholders. Difficulties in digital health implementations have been experienced all around the world. Even the most advanced countries face challenges relating to interoperability, uniform coding of patient information, and dealing with privacy and security concerns.

Compared to other global electronic health record implementations, Australia's national electronic health record is in its early stages. Australia is well positioned to move into an era of continued implementation – focusing on enhancing usability, patient and provider registration and better sharing of clinical information.

## Achievements

Significant achievements have been made to date in the Australian eHealth agenda, under NEHTA's leadership. These achievements have created a solid foundation from which adoption, usage, and innovation in digital health can flourish. With widespread usage, digital health can be expected to deliver significant health system and population health benefits.

Key achievements include:

- Delivery of national eHealth foundations by NEHTA, such as the Healthcare Identifiers Service and standardised terminology. Importantly, the objectives for which NEHTA was established have been met. All the policy and foundations required to enable national interoperability between providers are in place. Unique identification of patients and providers, security infrastructure, terminology, and solution specifications are now all in use.
- Delivery of the My Health Record System. On current trend, the rate of adoption of the system amongst providers and consumers is tracking

ahead of all comparable forecast scenarios. A significant proportion of all public hospitals and a growing number of private hospitals are connected to the system.

- The contribution of a number of other notable eHealth initiatives such as HealthConnect and the Northern Territory My eHealth Record service.
- The establishment of strong relationships and collaborative partnerships between policy makers, governments, vendors, healthcare providers, and peak professional bodies.

These achievements could not have been realised without commitment from governments, industry leaders, and critically, the leadership within NEHTA. This report describes the complex and trying environment within which this has prevailed.

## What have we learned?

It is readily apparent from the eHealth experience in Australia and internationally that success emerges from highly complex policy, social, technical, commercial and political circumstances. Many factors impact the success or failure of eHealth initiatives, including the fixed characteristics of the setting where an initiative occurs, healthcare provider attitudes and behaviours, functional capabilities of the eHealth system being implemented, as well as policy frameworks.

Three themes were identified in the underlying structural, cultural, and organisational determinants of eHealth success. These themes are:

- 1 Multi-level **tensions** that complicate decision making;
- 2 **Competencies** that enable organisations and systems *to do eHealth well*; and
- 3 **Cultural shifts** that are necessary to realise the full potential of eHealth.

### Theme 1: Multi-level tensions

There are underlying tensions that affect eHealth initiatives at the system, organisation, and program levels. These tensions can be thought of in terms of a continuum, where each end of the spectrum represents opposite approaches or mindsets. Systems, organisations, and programs can be positioned anywhere along the continuum between the two ends of the spectrum, at a position that reflects their values and interests. Tension arises because there is no absolute correct position – there are advantages and disadvantages at either end.

In developing eHealth policy, as with all health policy, there are choices to be made in the allocation of resources, time, and effort. Any choice involves sacrifice and opportunity cost. The trick is to find the optimal position for a specific initiative, at a specific time. This positioning will inherently require compromise. Identifying these tensions is intended to prompt strategic planning with the goal of reaching balanced and mutually beneficial positions.

The key multi-level tensions identified are:

- 1 Technology-led vs clinical community-led;
- 2 Centralised command and control vs. diffused power;
- 3 Directed development vs open, community-led development;
- 4 Market intervention vs free market; and
- 5 Participant in the health system vs. being a bystander.

**Theme 2: Organisational and system competencies**

A number of critical success factors that are common to many eHealth initiatives have been identified. These are the structural capabilities, and organisational functions and skills that enable organisations to successfully implement digital health solutions. By identifying these competencies, the intent is to encourage policy makers and organisations to invest in developing them.

The key competencies are:

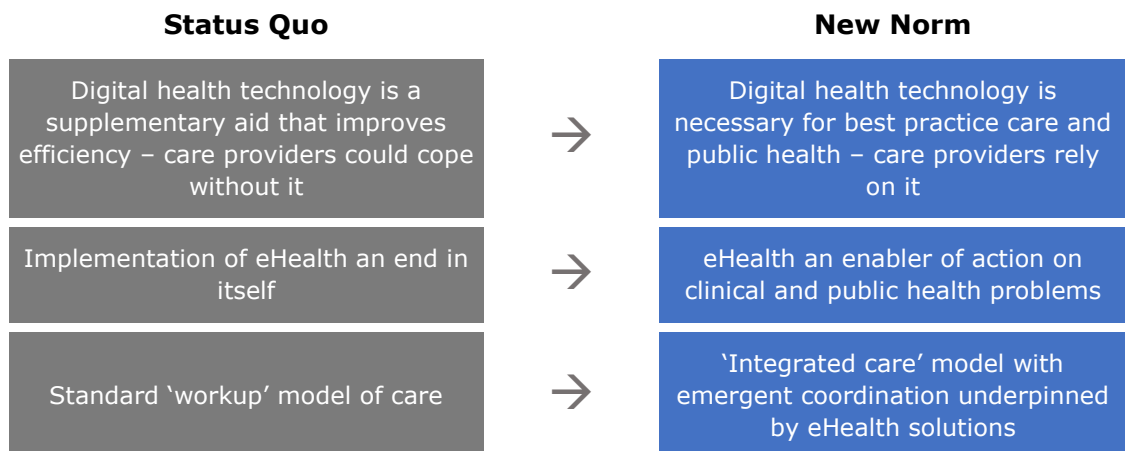
- 1 Having a strategy, and then working to it;
- 2 Relationship building and collaboration;
- 3 Capacity to rapidly iterate;
- 4 Taking into account clinician and end-user experience;
- 5 Using structural adjustment and market alignment mechanisms;
- 6 Change management;
- 7 Measurement, evaluation, and benefits management; and
- 8 Implementation capability.

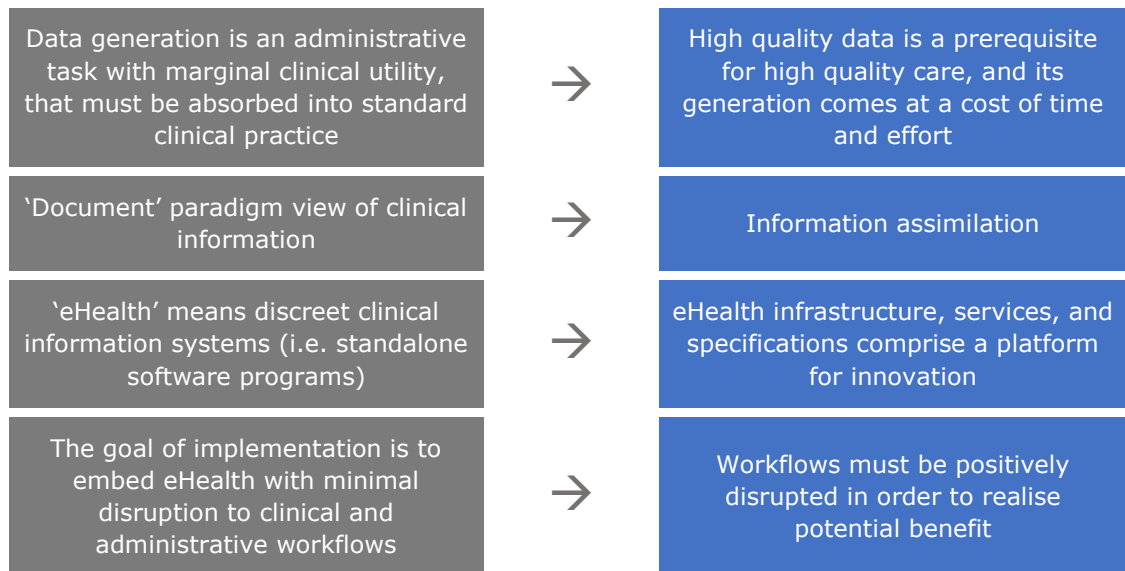
**Theme 3: Necessary cultural shifts**

Policy makers need to recognise that eHealth involves a significant change in clinical practice. Ongoing effort is needed to instigate and maintain meaningful usage of eHealth solutions until the point where using eHealth solutions and services becomes a part of normal 'business as usual' clinical practice. Experience shows that it is extremely difficult to introduce positive disruption by changing the way health care providers work in ways that take full advantage of eHealth capabilities – there are structural, attitudinal, and aptitudinal barriers.

What this review indicates is that in addition to the common barriers, there are a number of important cultural shifts across the health system that will have to occur in order for the full potential of eHealth to be realised. These are shifts that need to occur not only among governments, policy makers, vendors and healthcare providers, but also amongst the general public.

The necessary cultural shifts are:





## Conclusion

Important implications and opportunities arise from these findings which are relevant to future digital health implementations and policy. NEHTA has endeavoured to incorporate these lessons into its work, which will assist with ongoing and future digital health planning in Australia.

## 2 Introduction

### 2.1 Purpose

This document is intended to inform ongoing development of policy, strategy and change management approaches to eHealth in Australia and beyond.

It provides a summary of key achievements and lessons from eHealth implementations and programs in Australia. It also identifies opportunities for future development and execution of strategy, policy, delivery, and change and adoption activity.

### 2.2 Intended audience

This document is intended for a wide range of stakeholders across the health sector. It is most directly intended for current and future executive leadership of eHealth governance organisations. It is also intended for healthcare providers, industry professionals, consumers, and other participants.

### 2.3 Scope

This review covers the experience of Australian implementations and programs relevant to the national eHealth agenda. Generally speaking, it includes government-led eHealth programs in all jurisdictions, including national infrastructure, localised solutions, and approaches to change management. It also draws on international experience where relevant. It does not cover all eHealth initiatives in Australia, nor detailed policy and governance matters.

This document is a synthesis of what has been learned about 'how to do eHealth in Australia', specifically focussing on implementation and technical development.

This information has been accumulated over the course of NEHTA's work, and is enriched with reference to evaluation reports and best practice guides.

This document does not address issues related to safety of eHealth systems.

It does not comment extensively on the effectiveness or ultimate outcomes of eHealth implementations.

Please note the report uses the terms 'eHealth' and 'digital health' interchangeably.

### 2.4 Methodology

In addition to comprehensive review of both publically available literature and NEHTA documentation, the authors interviewed a number of NEHTA senior and executive management to elicit qualitative commentary. The semi-structured in depth interviews of NEHTA personnel (referred to herein as 'interviewees') were analysed for key themes which are reflected throughout this document.

### 2.5 Overview of this report

This report is divided into a number of sections.

Section 3 is a brief overview of the [background](#) and context of the Australian digital health program, as well as [comparisons](#) to other notable international digital health programs.

Section 4 outlines the evolution of eHealth [achievements](#).

Section 5 are the results of a meta-analysis of [what have we learned](#) to date. This is divided into three themes: [multi-level tensions](#), [organisational and system competencies](#), and [necessary cultural shifts](#).

### 3 Background and context

Australia enjoys a health system that up until now has ensured we have access to quality healthcare when we need it. However, like many other developed nations, we face challenges from an ageing population, prevalence of chronic disease, and a demand for more complex and scientifically advanced medical procedures.

Investment in eHealth has been a response to the pressing need to reconsider the ways we manage chronic disease, prevent medication errors, and reduce waste and harm through unnecessary duplication of tests.

The national eHealth program in Australia is now at an important turning point, as it moves into a new stage under the Digital Health banner.

This follows and builds on a decade of policy and funding commitment from all Australian governments. Over the past ten years, the National E-Health Transition Authority (NEHTA) has delivered eHealth foundations in accordance with its charter, following its establishment by the Council of Australian Governments (COAG) in 2005. This has made it possible to deliver a national eHealth record system to achieve the vision of the Australian health ministers 15 years ago. [1, p. 4]

Substantial jurisdictional projects such *HealthConnect*, which led to the My eHealth Record service in the Northern Territory, have led the way, and significant projects have been delivered in other jurisdictions and in partnership with the private sector, including through the Lead eHealth Implementation Sites (Wave 1 and 2) program.

The NEHTA work program has been guided by the 2008 National eHealth Strategy, the 2009 National eHealth Partnership Agreement, and the 2012 Memorandum of Understanding signed by all Australian governments. These documents directed the establishment of a national health information highway, robust policy frameworks, and the stimulation of investment and use of high priority systems.

The objectives for which NEHTA was established have been met. All policy and ICT foundations are in place to enable interoperability between providers, and use of the My Health Record system. Unique identification of patients and providers, security infrastructure, terminology, and solution specifications are now all in use.

The Commonwealth Department of Health has operated the Personally Controlled Electronic Health Record System, now known as the My Health Record System, for almost four years. Adoption of this system is increasing every day.

The experience NEHTA, its partner agencies, and funders have gained over the past ten years is rich with lessons. It is timely therefore to take account of our experience to date to feed further development, identify new strategic priorities and change efforts, so that improved health outcomes can be realised to the benefit of the public, and for healthcare providers and funders.

National eHealth policy development has always sought to take account of lessons from local and international experience. Since the outset the national eHealth program has been inspired by the work of other Australian jurisdictions and implementation in other countries, and mindful of their pitfalls. It has also been enhanced by continued evaluation. For example, the Healthcare Identifiers Act and Service Review and the PCEHR Review were both conducted approximately two years after the commencement of operations of each of those services. The themes identified in this report are consistent with the issues identified in those reviews.

From 1 July 2016, the new Australian Digital Health Agency will lead the national agenda under a new National Digital Health Strategy, supported by a new Intergovernmental Agreement of Digital Health to commit funding for delivery of that strategy. The Agency will incorporate functions of NEHTA and the My Health Record System Operator currently fulfilled by the Commonwealth Department of Health. With the establishment of the Agency to drive the next stages of a national digital health program, we have a rare opportunity to acknowledge and address the higher order determinants that have a fundamental influence over our ability to realise value from investment in digital health technologies.

This report takes advantage of that opportunity.

### **3.1 International comparisons**

Analysing international experiences enables us learn from others' achievements and mistakes. International comparisons are also useful in helping us take stock of how Australia is progressing. However, comparing Australia's progress to digital health adoption and implementation to other countries is difficult. There are as many different models of digital health around the world as there are healthcare systems, and there have been a wide variety of approaches.

Digital health policy implementation has been strongly shaped by the type of government institutions and policy frameworks of each country, as well as local health, social welfare, telecommunications needs, and variety of stakeholders. [2] These factors can also determine the pace of change and maturity within health systems. For instance, Australia's federal system faces different challenges in making major nation-wide policy changes compared to countries which have unitary political systems such as New Zealand, Denmark and Singapore.

Nevertheless, we know that difficulties in digital health implementation have been experienced all around the world, and common problems can be identified. Despite the promise of new science and technology innovations, challenges exist to widespread adoption. Even among the most well advanced countries, the challenges include:

- overcoming interoperability problems to ensure computer systems from different health sectors can communicate structured clinical information with each other;
- coding patient clinical information at the time of entry; and
- dealing with legal and practical concerns regarding privacy and confidentiality of patient information. [3] [4]

Australia's focus has been on accelerating digital health through national leadership and infrastructure, and to prioritise a solution to the interoperability challenge. This approach seeks to establish a common policy framework, core systems and services to create an environment in which to rally the wider program.

In the last decade, NEHTA has successfully developed standards for patient and provider identifiers, interoperable systems between providers, secure messaging and clinical and medicines terminology sets. The Commonwealth Government has offered the national digital health record to consumers on an opt-in basis, allowing consumers to securely access their own health information online. A key feature of the national electronic health record is that patients control what is stored on their

health records and decide which health care providers can view or add to their files – a feature which sets Australia apart from most countries.

The 2013 independent Review of the Personally Controlled Electronic Health Record (PCEHR) [5] found that stakeholders have positively endorsed the national infrastructure NEHTA has built. It found that the foundational work in eHealth undertaken to date has provided Australia with a strong policy framework and national infrastructure base that is now in place and starting to be used by both public and private health providers. Further, the Healthcare Identifiers Act and Service Review found that the development and implementation of a national HI service was “a very significant achievement” and that vendors and implementers have provided positive feedback about the role of both the Department of Human Services (DHS) and NEHTA in respect to the operations of the HI Service. [6, p. 8]

The approach in Australia has not yet dedicated substantive effort to achieve ‘meaningful use’ of the system among healthcare consumers and providers. Despite over 90 percent of GP services maintaining computerised patient records, adoption and utilisation of the My Health Record system has been slow. [6] This has resulted in stakeholders and the media to question the benefits of the investment to date. [7] [8] The Minister for Health Susan Ley said in May 2015 that “with less than one in ten Australians signed up to the PCEHR, this is not a large enough sample to make it an effective national system or worth the time and effort for patients and doctors using it”. [9]

Notwithstanding these challenges, Australia’s focus on building the foundations for a national system which delivers interoperability across jurisdictions and healthcare organisations places it in a strong position for the next phase of the program.

One of the key indicators of a successful implementation of digital health has been a country’s ability to address interoperability. A case in point is the United States which has invested significant funding on incentive payments for providers who demonstrated “meaningful use” of Electronic Health Records. While use of electronic health records by healthcare providers has undoubtedly increased following the introduction of the program, the U.S. faces major impediments when it comes to sharing health data across organisations. [10]

Compared to other global electronic health record implementations, **Australia’s national electronic health record is in its early stages.** [5] In contrast, Singapore and Denmark were able to get the basics in place in the 1990s, allowing their digital health programs to grow step-by-step in collaboration with the needs of clinicians in a ‘bottom-up’ approach. [11]

Australia is well positioned to move into a period of increased adoption and use—focusing on usability, patient and provider registration and better sharing of clinical information.

### **3.1.1 Denmark**

#### ***Time and commitment to deliver the basics and build critical mass***

Denmark is often cited as the shining example of digital health implementation. Nearly all primary care physicians in Denmark have electronic health records with full clinical functionality. These systems are connected to a national network that is operated by a private nonprofit organisation called MedCom, which enables general practitioners (GPs) to exchange clinical data with specialists, hospitals, pharmacies, laboratories, and other health providers. Every Danish citizen has their own

personal web page through the national e-Health portal Sundhed.dk, a single access point where they can access their information. [3]

Denmark's Health IT investments are delivering benefits. For instance, working with Medcom, Odense University Hospital has developed healthcare IT solutions to facilitate high quality care at home. Their investments have resulted in reducing the time patients with chronic diseases spend in hospital to an average of 2.9 days per patient (compared to the European average of approximately seven days). Readmission rates for chronic disease patients are also down by more than 50 per cent. [12]

All citizens in Denmark have had a unique personal ID, called the Central Person Register since 1968, which is used for identification in all public registries, including health databases. [13] Having the identifier established gave Denmark a strong advantage when it began getting its digital health basics in place in the 1990s. It started by getting some common components that were the foundations of its eHealth system, such as referral letters, discharge letters, prescriptions and lab results. By focusing on these commonalities, the system was able to standardise large volumes of daily transactions to create a critical mass in favour of the electronic management of key transactions and processes. [11] With a small number of accepted components, organisations were able to focus their resources on achieving set goals, learning key lessons that could be adapted into the next phase, and building adoption through a step-by-step program.

This strategy was bottom up. A large number of small projects in the 1990s merged into a network of integrated projects. From there, and with government support, a national body was formed in 1999 as a co-operative venture between government, local authorities, public and private organisations. Supportive government policies included national standards to facilitate interoperability of data systems, quicker payment for physicians who use EHRs, and financial incentives to primary care practices for phone and e-mail consultations. [11]

Peer pressure and lesson-sharing by early adopters played a role, as did the public perception that physicians who did not use EHRs were second-rate. All these factors facilitated the widespread adoption of EHRs before a mandate for GPs to use HIT was passed in 2004. [3] Doctors are not paid separately for entering patient data into the system, but recompense is part of the collective bargain agreement between GPs and the regional municipalities. [14, p. 8]

Much of the success is due to time and commitment which is supported by a clear and strategic vision delivered by Danish health authorities, and strong engagement across sectors and specialist fields. However, there are still challenges ahead. The structured content and terms within the regional systems are developed locally in cooperation with clinicians and vendors. Work continues on employing Systematized Nomenclature of Medicine--Clinical Terms (SNOMED-CT) terminology across the regional municipalities to ensure that there is a common and effective exchange of information about a patient. [15]

### **3.1.2 United Kingdom**

#### ***Learning from the mistakes of a top-down approach***

The National Programme for IT in the National Health Service (NPFIT) was the largest public sector IT program ever attempted in the UK, estimated to cost more than £12.4 billion over ten years. NPFIT experienced significant delays, insufficient

clinical engagement, gaps in stakeholders' expectations, problems with technology and other implementation issues, until the program was dismantled in 2011 [11], and replaced with a scaled down approach.

The NPfIT experience provides a number of key lessons for other countries implementing digital health initiatives. First, in its haste to realise the expected benefits of the program (which were to deliver efficiency by improving clinical decision making, reducing medication errors, speeding up the consultation process and reducing test duplication), the implementation failed to adequately collaborate with key stakeholders across the different sectors – political, clinical, academic, technical, commercial and personal. [11] The perceived urgency of implementation meant the government pursued a highly centralised top-down approach.

Unlike we have seen in Australia, the UK system did not first establish the required foundations (such as information governance, clinical coding and standards and information system architecture) to procure large commercial contracts for IT systems and services. [11] There was a narrow focus on the delivery of the IT system, rather than proper consideration of how best to use IT to improve NHS services. [16]

Further, the program did not adequately take into consideration the fundamental changes to clinical protocols, ways of working and organisational cultures which were required of such an ambitious program.

The UK experience is a lesson to all countries on how large scale digital health projects can accrue delays, cost overruns and lost trust when consideration is not given to developing the common infrastructure supported by collaboration between government and key stakeholders. [17]

If digital health is seen simply as a technology implementation program, rather than a major clinical transformation, IT decisions will not be aligned to specific clinical objectives.

The NPfIT was abandoned in 2011, with the Minister for Health, Simon Burns, stating that "a centralised, national approach is no longer required, and that a more locally-led plural system of procurement should operate, whilst continuing with national applications already procured". [18]

The current government has focused on the Summary Care Record (SCR), which will store a limited range of data (current medication, adverse reactions, and allergies) for all patients except those who opt out. GP practices are required to provide an automated upload of their summary information to the SCR, or have published plans in place to achieve this. As of June 2015, SCRs have been created for more than 96% of people in England – more than 54.6 million people, with an opt-out rate of just 1.4%. [19]

### **3.1.3 Singapore**

#### ***Strong government support and careful, unhurried implementation***

With one of the fastest-aging populations in the world, more than a fifth of Singapore's population is projected to be over the age of 65 by 2030. Coupled with an increase in chronic disease and rising demand for healthcare services, for Singapore, eHealth is widely seen as a means of meeting future healthcare challenges. [11]

Singapore is building a sophisticated national electronic health record system. The system collects, reports, and analyses information to aid in formulating policy, monitoring implementation, and sharing patient records.

The National Electronic Health Record (NEHR) system consolidates clinically-relevant information from each encounter a patient has with the healthcare system. Data captured in the NEHR system includes diagnoses, allergies, immunization, current medication, investigations, procedures administered, referrals and care plan.

System capabilities include a master index that matches patient records from a variety of sources and includes a unique identifier as well as other patient identity information; a summary care record for each patient that offers an overview of recent medical activity; access to overviews of specific events, such as hospital admissions; and access to health data in Singapore's registries for immunization, medical alerts, and allergies. [13]

As of September 2014, NEHR has been rolled out to all public hospitals, specialist centres, polyclinics, several community hospitals, nursing homes and 230 GPs. In total, 280 healthcare institutions and 14,000 clinicians have access to the NEHR. In terms of its time, cost, and scope goals, currently the NEHR implementation can be considered as an initial success. [20]

When fully developed, the system will allow data to be accessed and viewed in appropriate formats by medical professionals, patients, and researchers. There are also plans to enable patients to view and possibly contribute to their personal health records. [21]

Driving implementation of the system is patient demand, a clear government push, the desire for more transparency between healthcare organizations and payers and the desire for increased access. The push from government is also aligned to the urgency of healthcare organisations who are focused on alleviating the increasing healthcare burden. [11]

A key advantage for Singapore is its small size and the fact that many of Singapore's public hospitals have been sharing patient data since 2004. Rather than a hindrance for healthcare organisations, the introduction of the NEHR represented the logical next step towards the goal of improving health outcomes and the efficiency of Singapore's health sector, by being able to share structured data within public institutions and across to private organisations. [22]

In addition, the government's support of the project includes its reluctance to rush the implementation. The NEHR project is expected to take five to ten years to complete. Each phase of the project will incorporate lessons learned, IT training for healthcare providers and clinician feedback – an incremental, multi-stakeholder approach that was also a key feature of the success of the Danish model. [22]

### **3.1.4 United States**

#### ***Building critical mass to drive change, but interoperability still the challenge***

In 2009 as part of the *Health Information Technology for Economic and Clinical Health (HITECH) Act*, the U.S. Federal Government set aside \$27 billion for an incentive program that encouraged hospitals and providers to adopt electronic health records (EHR) systems. Billions more were allocated to help train health

information technology (HIT) workers and assist hospitals and providers in setting up EHRs that would enable the health data historically sequestered in paper files to be shared among providers and used to improve health care quality). [23] The measures have also incentivised patient engagement through the development of patient portals. [24]

The 'meaningful use' incentive program has accelerated adoption of health information technology with around 80 percent of office-based physicians and 90 percent of hospitals having adopted EHR systems under the program. [10]

The meaningful use program also helped to incentivise the creation of a variety of electronic health information sharing arrangements which serve market and clinical functions by meeting the needs of many different communities. In 2011, five of the US's largest health systems announced a plan to securely share patient data through a collaboration called the Care Connectivity Consortium. The companies – Kaiser Permanente, the Mayo Clinic, Geisinger, Intermountain Healthcare and Group Health – share a mission to deliver patient-centred, high-value health care to US citizens, and believe that achieving electronic health information interoperability and connectivity will be critical to achieving that mission. [11]

While the *HITECH Act* has undoubtedly increased EHR adoption, several barriers continue to inhibit nationwide interoperability. [25] These barriers include:

1. There is no universal patient identifier in the United States;
2. Electronic health information is not sufficiently structured or standardized and as a result is not fully computable when it is accessed or received;
3. Even when technology allows electronic health information to be shared across geographic, organizational and health IT developer boundaries, issues continue to inhibit electronic health information sharing, including:
  - a lack of financial motives;
  - differences in relevant statutes, regulations and organisational policies; and
  - there is often no reliable and systematic method to establish and scale trust across disparate networks nationwide according to individual preferences. [26]
4. Patient portals don't connect with multiple providers which can provide less value for patients, especially those with complex or chronic conditions who receive care from multiple providers. [24]

A criticism of the *HITECH Act* is that it incentivised providers to do something they should have been doing anyway - using computers to manage their patients' records and drive quality improvement - instead of addressing the interoperability of electronic health records. [10] Arguably, the US chose to focus on meaningful use at the expense of interoperability, and now it will be difficult to "unscramble the egg" as one interviewee commented. This is a different path compared to Australia, who focused on the gradual path of developing interoperability standards, based on an expectation that meaningful use would greatly accelerate once adoption of standards reached critical mass.

Without a fully interoperable and transparent system, there will remain significant barriers to realising the promised benefits in the US, including avoiding medication and diagnostic errors, track and intervene with at-risk patients, share information with other providers, or reduce administrative burdens.

### **3.1.5 New Zealand**

#### ***A work in progress - From a regional to a national approach***

New Zealand's use of information technology in health care has been considered among the highest in the world. [12] All of the country's general practices use an electronic medical record system to manage patient's problem lists, enter clinical progress notes, perform electronic prescribing, and order laboratory tests and x-rays, among other tasks. [27]

New Zealand has a long-established and universally used unique patient identifier, which is governed by a robust legal health information privacy code. With high computer use, GPs in New Zealand were also quick to embrace new technology when they saw an immediate benefit in personal and practice productivity. [27]

In 2010, the National Health IT Board introduced a four-year plan that set out a number of priority programs. New Zealand's was a detailed strategy aimed at setting implementation goals and deadlines for a regional approach, rather than focusing on ambitious national targets. The aim was to build on already proven successes and give careful consideration of what was achievable, by looking at what had already been achieved in parts of New Zealand, and trying to lift everyone up to the strengths. [28]

However, recently the strategy has changed. An independent review found that the overall system landscape remains highly diverse – particularly with regard to clinical information systems inside and outside hospitals. The four regions have adopted different approaches and the maturity of clinical information systems varies widely across District Health Boards. Most hospitals still run dozens if not 100s of different systems and repositories with clinical information. [12]

In October 2015, the New Zealand government announced plans to build a single, national electronic health record (EHR) able to be accessed via portals and apps running on a variety of devices. [29] The EHR is expected to enable clinicians to view comprehensive patient information in one place. It will include a person's allergies and alerts, medications and diagnostics, and will have clinical decision support tools.

New Zealand is now working towards a single EHR solution that would physically store the information in a consolidated repository, all joined-up and ready. [12] The aim is to drive tangible increases in productivity and quality that are difficult to achieve under their current approach and that have been achieved in other healthcare systems such as Singapore and Denmark.

New Zealand's approach was pragmatic and careful, which has resulted in a more consistent level of capability. With a reluctance to rush eHealth initiatives, the New Zealand Government focused on lifting all regions up to a standard of good practice which had already improved the quality of care in different parts of the country. However, the trade-off of this approach is that despite high use of information technology in health care, New Zealand is now essentially playing 'catch up' compared to other advanced health systems [12], and could have been realising quality and productivity benefits sooner had a more aggressive approach been taken.

### **3.1.6 Canada**

#### ***Central funding to accelerate adoption, but no national strategy***

Comparable to Australia's system of administering health care, in Canada the provinces and territories have primary responsibility for delivering health services, supervising health care providers [13], and are responsible for developing their health information systems. As a result of this decentralised system, Canada developed a patchwork of electronic medical record (EMR) systems, lacking interoperability. [30]

In 2001 the federal government established Canada Health Infoway (CHI), an independent non-profit corporation, to accelerate the e-health agenda and provide funding to provinces for the development of interoperable e-health systems. [31] Establishing CHI allowed the federal government to redistribute funding and use spending power to ensure that its objectives were met whilst still ensuring autonomy remained with the provinces and territories, which also invested in the cost of eHealth projects. [32] Between 2001 and 2013, CHI invested \$2.1 billion in 380 individual projects. [31]

Infoway has developed an EHR systems architecture, which forms the basis for significant advancement in technology use across the country. [33] Following the establishment of CHI, Canadian EMR adoption rates increased annually. Overall, rates increased from about 20% of practitioners in 2001 to an estimated 62% of practitioners in 2013. [30] However, the use of EMRs varies across the provinces and territories, with a range of 26 percent to 74 percent, [13] and poor levels of clinical uptake have slowed progress. [31]

Recent research evaluating CHI's investments in eHealth shows Canada lags behind comparable health systems in respect to eHealth adoption for the following reasons:

- There was no national strategy for implementing electronic health records;
- There is no national patient identifier;
- The lack of interoperability of EMR offerings for hospitals, pharmacies, and clinics;
- The need for information in both French and English, which reduces the number of suitable systems.
- Patient access to personal medical records has not been standardized and varies across jurisdictions;
- Inadequate involvement of clinicians and inflexibility in approach; and
- A focus on national rather than regional interoperability.

The Canadian experience demonstrates that the offer of central funding does not necessarily equate to action. [31] CHI was seen as a funding agency, not a policy-setting body, and the lack of a national strategy to guide investment and adoption was seen as a problem by participants. [34]

Similar to Australia, Canada's major challenge is adoption and utilisation among healthcare providers of interoperable electronic health records to realise the full benefits of eHealth investments to date. As part of addressing this challenge, CHI has launched Better Health Together, a public education campaign developed to raise awareness of the value and benefits of digital health among Canadians. It focuses on communicating the stories of people who have been helped by eHealth and is supported by the provinces and territories as well as clinical, consumer and patient organisations.

## 4 eHealth Achievements

Australia's eHealth achievements have created a solid foundation from which adoption, usage, and innovations in digital health can flourish. With widespread usage digital health solutions can be expected to deliver health system efficiency and population health benefits.

The following sections identify key achievements relating to: the establishment of national eHealth foundations (section 4.1); the contribution of notable Australian eHealth initiatives (section 4.2); and strengths of NEHTA's role in eHealth.

Importantly, communication directly between clinicians, hospitals and other healthcare providers can now be done securely and electronically in a clinically safe way using national standards, specifications and infrastructure that would not have been in place if governments had not pursued a national eHealth strategy back in 2006. [1]

### 4.1 Establishment of national eHealth foundations

Under the direction of the Council of Australian Governments (COAG), NEHTA has successfully delivered Australia's eHealth infrastructure foundations and solutions.

The core elements of a national eHealth infrastructure are now operational, with continued implementations, adoption, and early usage of the foundations continuing to increase. Industry and providers are continuing to incorporate eHealth products and solutions into practice. In terms of the adoption curve, solution adoption and early usage of the national infrastructure is exceeding expectations. We are witnessing a change in conversation from, 'do we need it' to 'how to best use the infrastructure?'

#### 4.1.1 Foundation infrastructure services and standards

**Healthcare identifiers and the HI Service** - The development, implementation, and operationalisation of the national Healthcare Identifiers Service is a major milestone for the Australian eHealth program. [6] Bipartisan support, and passage of the *Healthcare Identifiers Act 2010* (and also the *Personally Controlled Records Act 2012*, now *My Health Records Act 2012*) have been central to progressing eHealth in Australia.

The HI Service provides unique lifelong identifiers for every participant in the healthcare ecosystem, and are necessary to ensure accurate identification:

- Individuals: Individual Healthcare Identifier (IHI)
- Healthcare provider: Individual (HPI-I)
- Healthcare provider: Organisation (HPI-O)

As of 29 February 2016 there were 9,117 organisations registered in the HI Service with the majority of registered organisations being general practices, pharmacies and allied health organisations (Figure 1).

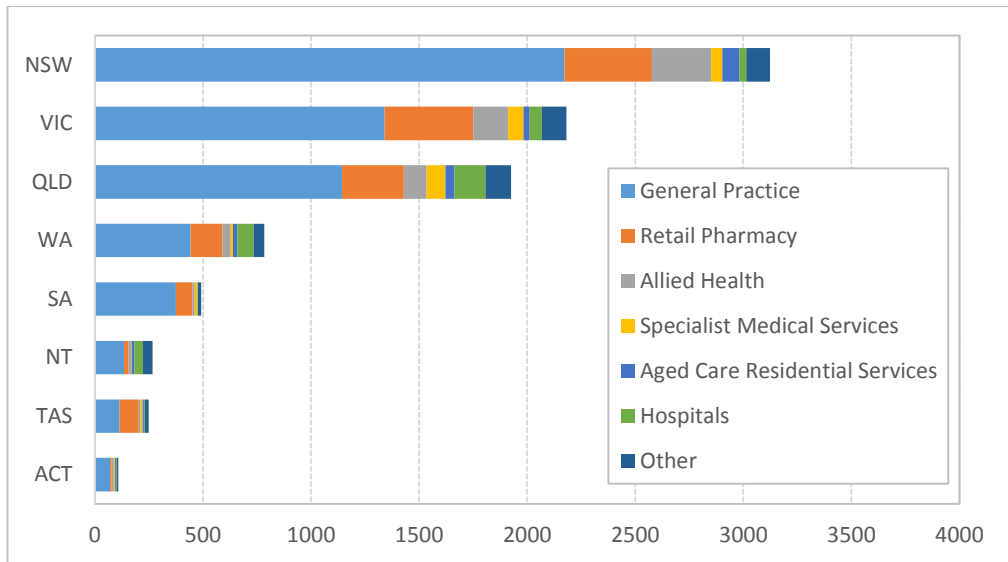


Figure 1 - Organisations registered in the HI Service by state / territory and type – 29 Feb 2016

Figure 2 illustrates substantial and increasing use of the HI Service, with 25.6 million transactions in total for the months of October and November 2015.

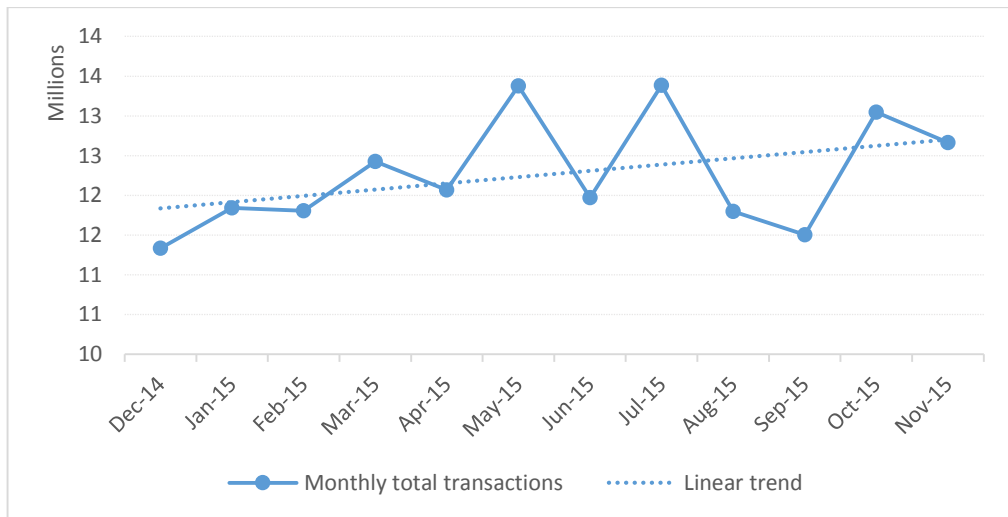


Figure 2 - HI Service Transaction Volumes

**Authentication** - The National Authentication Scheme for Health (NASH) allows consistent, reliable authentication of all registered healthcare participants connecting to the national infrastructure. NASH and healthcare identifiers make sure that only the right people have access to patient information, and ensure that newly acquired patient information is matched correctly with existing patient records. The total individual provider and organisational NASH Public Key Infrastructure certificates issues by the Department of Human Services are displayed in Figure 3 below.

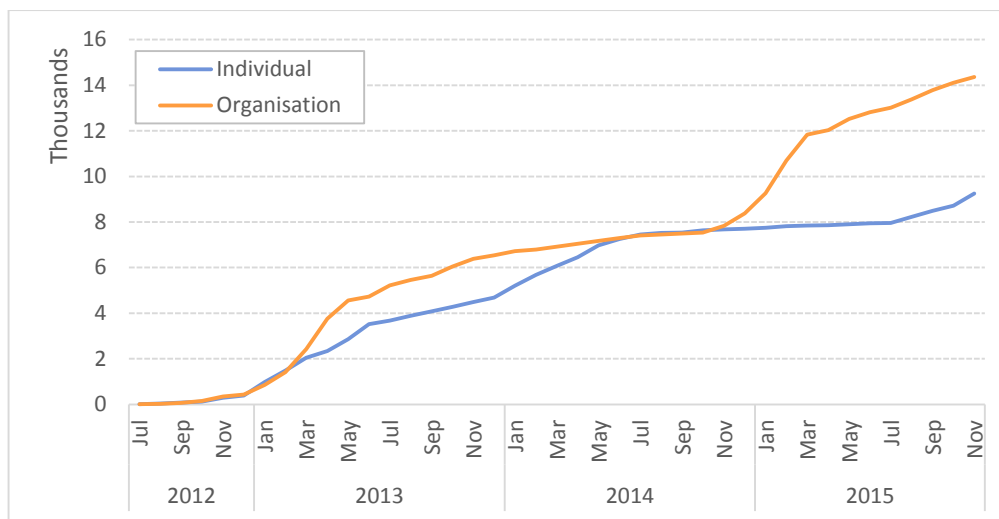


Figure 3 - Total NASH PKI certificates issued by certificate type<sup>1</sup>

**Clinical Terminology** - Standard terminology is a prerequisite to the safe exchange of clinical information between healthcare providers. This exchange allows interoperability in the way people record, read and interpret clinical information across care settings: for example, medicine names, diagnoses and pathology test results.

The Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT) is the internationally pre-eminent clinical terminology, released by the International Health Terminology Standards Development Organisation (IHTSDO). NEHTA is responsible for developing, managing, and releasing the Australian extension (SNOMED CT-AU). NEHTA is also responsible for the development, management, and release of the Australian Medicines Terminology (AMT), which is a derivative of SNOMED CT.

Since NEHTA began publishing terminology releases as specifications, there have been 7,674 terminology release file and release note downloads from NEHTA's website. This signifies ongoing and sustained adoption of clinical terminology (Figure 4). In a number of Victorian hospitals, AMT implementations have eliminated transcription errors and facilitated efficiency gains for hospital pharmacists. [35]

<sup>1</sup> Includes inactive certificates.

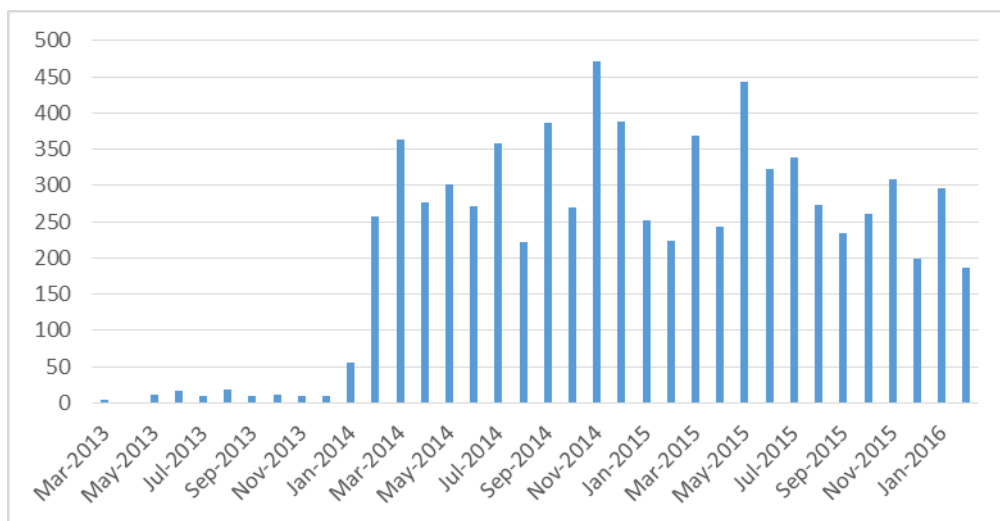


Figure 4 - Monthly clinical terminology release file downloads

### **Specifications for structured clinical documents and interoperability -**

Specifications define how commonly used documents in clinical settings should be structured so that data items can be broken down into their discrete component parts, accessed and shared in other systems. Specifications were developed through extensive consultation with healthcare providers, consumer groups, software vendors and governments, and have either become Australian Standards or are progressing through the standards process. Specified documents include but are not limited to: hospital discharge summaries, electronic prescriptions, electronic referrals and specialist letters. The base Secure Message Delivery (SMD) profile specifications are a particularly noteworthy achievement for their implementability and reusability.

**Secure messaging** - NEHTA's secure messaging specifications support interoperability between commercial messaging vendors. This is intended to allow a provider using one type of software to receive a message from another provider using a different software. Documents using standard terminology, structured according to NEHTA's specifications and sent via secure messaging can now be read by a clinician using any other system that conforms to the same standards.

Standards Australia released the SMD specification to the market on 11 March 2010. This specification was developed through a collaboration between NEHTA and the messaging software industry. Adoption of this specification has progressed, but more slowly than anticipated. Nonetheless, there are patches of good implementation: Tasmania has rolled out SMD to 80% of their GPs, and 88% of electronic discharge summaries are now being sent via SMD. Queensland Health are trialing an SMD solution that connects to the National Health Service Directory, also delivered as part of NEHTA's work program.

**NESAF** - The National eHealth Security and Access Framework (NESAF) provides standards, tools, and guides for the Australian healthcare sector to build and implement secure systems that protect patient data and eHealth-related assets, while providing the provenance required for ensuring patient safety and privacy. NESAF has been used to inform subsequent work, e.g. the Australian Commission on Safety and Quality in Health Care's Framework for Australian Clinical Quality Registries. [36]

**Supply Chain** - NEHTA has developed four supply chain products allowing jurisdictions and suppliers to follow global standards and a national approach to

electronic trading (Table 1 below). Through adoption and use of these solutions, jurisdictions and organisations can expect substantial operational efficiencies and safety benefits.

*Table 1 - NEHTA Supply Chain solutions*

<b>Product Name</b>	<b>Description</b>
National Product Catalogue (NPC)	The NPC is a centralised product catalogue that contains product information for medicines, medical devices and other healthcare items.
LocateNet	LocateNet is a centralised repository containing location information. It acts as a directory for suppliers and jurisdictions to look up accurate location information used for deliveries.
eProcurement	eProcurement is the electronic transfer of purchasing information between buyers and suppliers through supply chains.
RecallNet	RecallNet allows organisations to electronically view, share and report recall notifications.

Global Trade Item Numbers (GTIN) continue to be added to the National Product Catalogue (NPC) bringing the total number to 377,097 (Figure 5). The NPC is world class with no other country having an equivalent product and price synchronisation mechanism. Over a third of stock keep units (SKUs) globally are in the NPC, making the NPC, arguably, the most comprehensive master data exchange. This is reflected in that NEHTA receives a number of NPC queries from overseas.

The National Pharmaceutical Services Association (NPSA) has mandated the use of the NPC which has strengthened supplier uptake. The National Blood Authority has also now mandated the use of the NPC and is progressively implementing in line with their barcoding standards initiative. Leveraging the investment in the continued NPC growth, work is underway with jurisdictions, private hospitals, suppliers and industry to ensure strategies are in place for extended use of NPC data.

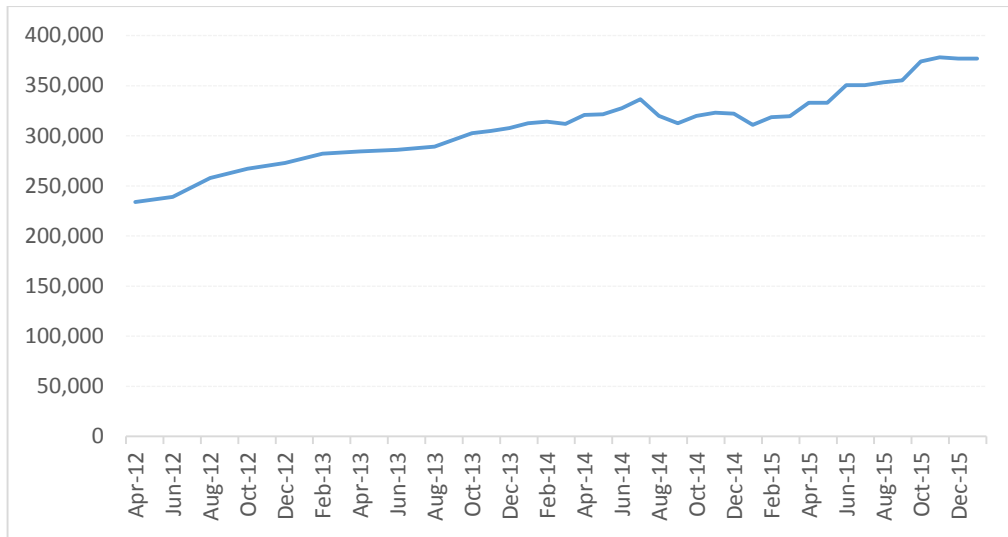


Figure 5 - Total Items (GTINs) in the NPC

Locatenet enhancements with Global Location Number (GLN) visibility and outward bound Application Program Interface (API) have been implemented enabling more secure location management across industry with over 7,000 GLNs (Figure 6).

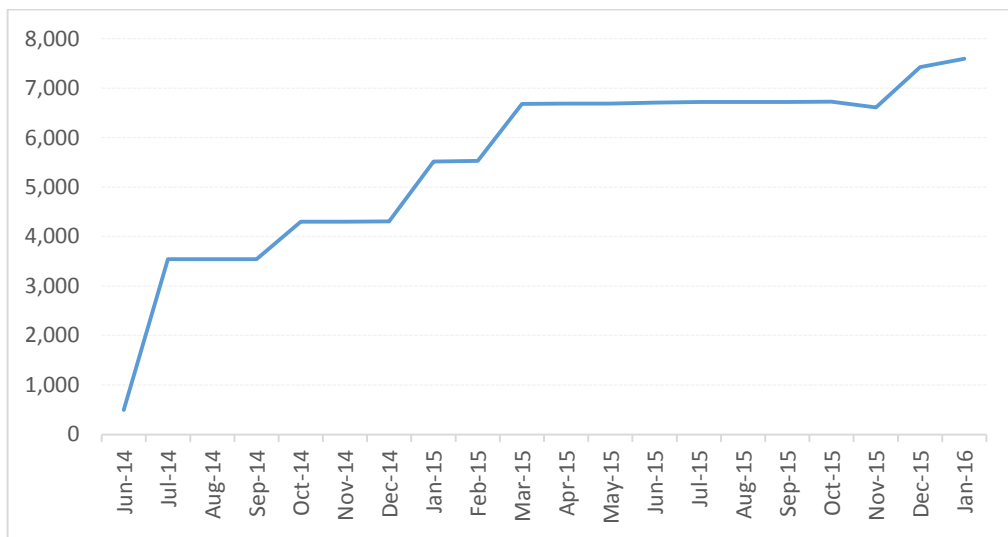


Figure 6 - Total GLNs

Recallnet implementations are progressing across jurisdictions, private hospital groups and suppliers. Recallnet enables suppliers to share real-time product recall and withdrawal notifications with their trading partners and regulators in a secure and efficient manner. Recall notifications which used to take several days now occur in under two hours. Victoria, Queensland and St Vincent’s are the current primary drivers in the use of Recallnet with other organisations progressively implementing (Figure 7). Work commenced supporting theatre management system implementations and use of GTIN's. This has helped support continued growth and participation.

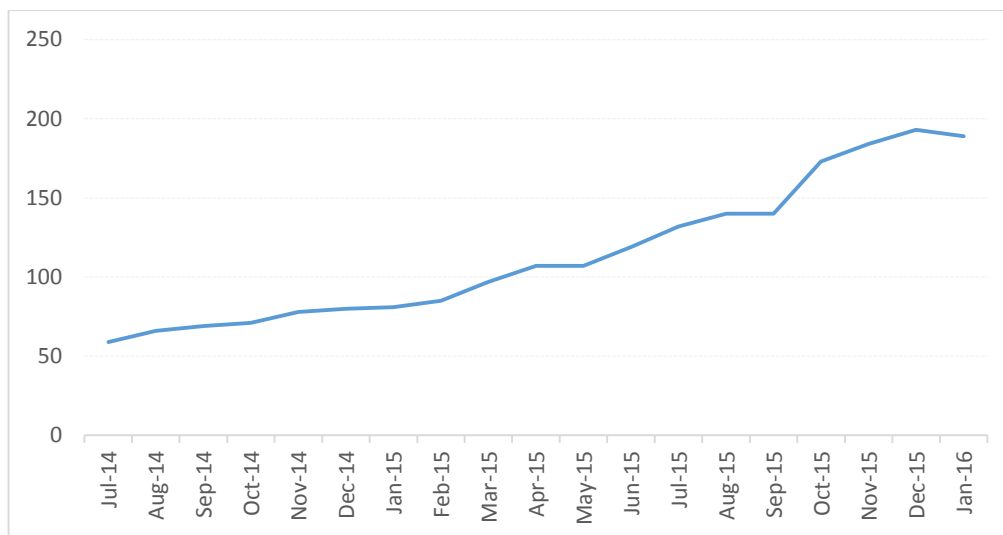


Figure 7 - Number of Participating Suppliers (Recallnet)

#### 4.1.2 My Health Record system infrastructure

In addition to the national infrastructure services and standards NEHTA was set up to deliver, NEHTA was responsible for managing the requirements and high-level architecture of the My Health Record system, as well as supporting the standards development process. NEHTA acted as a managing agent for the then PCEHR project on behalf of the Commonwealth Department of Health. [37]

Since system launch in 2012, NEHTA has played a supporting role in My Health Record system operation. This has been based on specifications maintenance and development, clinical safety, software integration work, and clinical usability.

The system's utility continues to progress as more people register for a digital record, more provider organisations connect, and clinical content flows into the system (three elements of critical mass).

##### Registered consumer rates continues to increase

As of 23 March 2016 there was a total of 2,642,278 active digital records - approximately 11% of the current Australian population.<sup>2</sup> On current trend this rate of adoption continues to track ahead of all forecast scenarios, except the scenario assuming continuation of *significant financial support* (Figure 8). In terms of age and gender, registration rates for boys and girls aged 0 - 4 years are almost double that of any other age category (Figure 9). This is largely attributable to the inclusion of My Health Record registration option on the Medicare Newborn Declaration Form. Having these processes combined for parents highlights the effectiveness of embedding registration for a digital record into an existing process.

<sup>2</sup> Source: ABS population clock  
<http://www.abs.gov.au/ausstats/abs@.nsf/0/1647509ef7e25faaca2568a900154b63?OpenDocument>

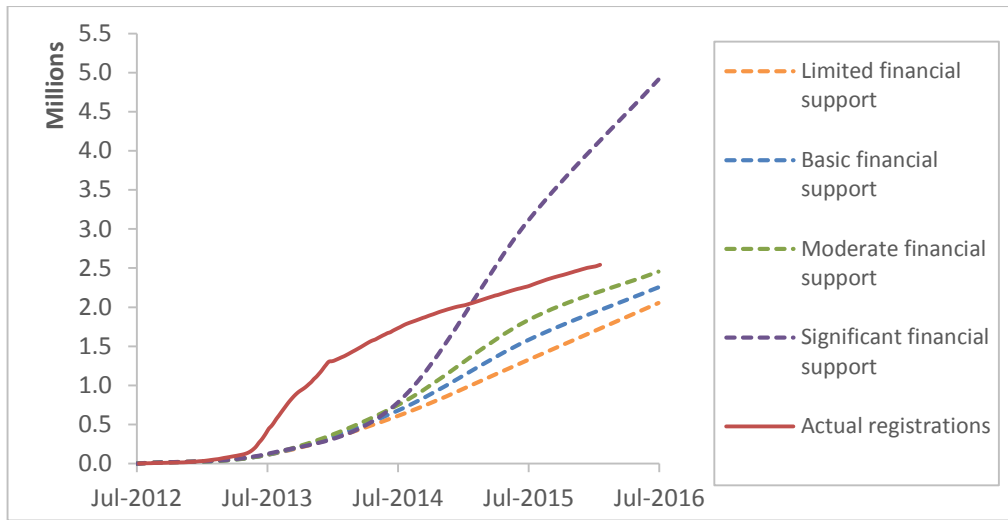


Figure 8 - Comparison of population registration to international adoption scenarios<sup>3</sup>

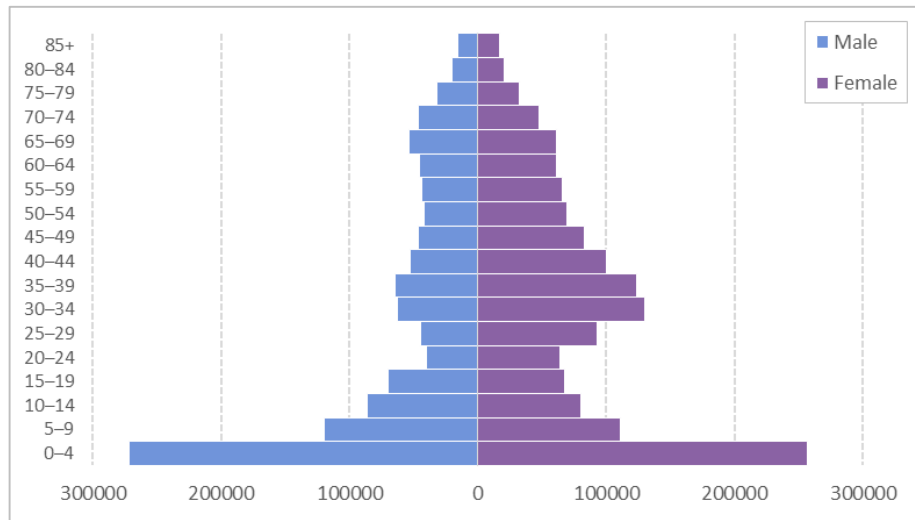


Figure 9 - Registrations by age and gender, as at 23-Mar-2016

**Provider organisations continue to connect to the My Health Record system**

As of 23 March 2016, a total of 8,139 organisations were registered in the My Health Record system. This number continues to increase steadily, (Figure 10) with the majority of registered organisations from general practice and retail pharmacy.

<sup>3</sup> Scenarios developed from comparable international eHealth implementations with varying incentive models. Source of scenarios: NCAP, based on 2010 national IEHR business case [84].

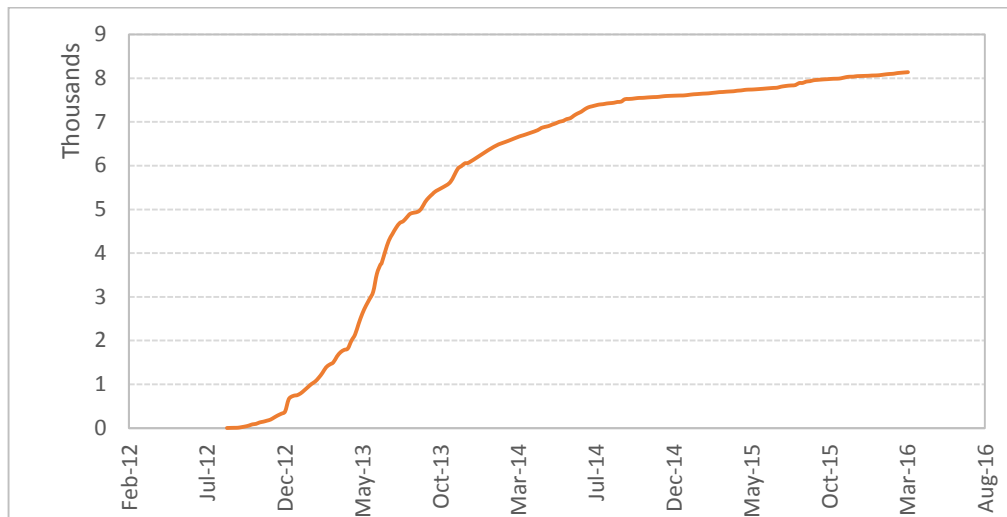


Figure 10 – Cumulative count of healthcare organisations registered for My Health Record system

### **HIPS and eHISC development and implementation is enabling streamlined connectivity**

As of 4 February 2016, there were close to 500 individual hospitals and government health centres connected to the My Health Record system. A significant number of these organisations have used the Healthcare Identifier and PCEHR System (HIPS) or eHealth Integration Sample Code (eHISC) solutions to connect to the national infrastructure. NEHTA’s collaborative development of the standalone middleware solutions, HIPS and eHISC, is enabling healthcare organisations and vendors more streamlined and efficient eHealth infrastructure connectivity. Implementation of HIPS and eHISC allows for:

- connection to the Healthcare Identifiers Service to search for and retrieve national healthcare identifiers,
- ability to register consumers for a digital record with assisted registration functionality,
- connection to the eHealth record system to:
  - determine if a patient has a digital record;
  - view a patient’s digital record; and
  - package and upload clinical documents into patient’s digital record, including discharge summaries.
- access to key jurisdictional ‘lessons learned’, thus lowering implementation barriers, all while providing implementers with the flexibility to adapt and support the code as required.

HIPS was used by some jurisdictions to meet the objectives of the Rapid Integration to PCEHR (RIP) projects to connect public hospitals to the My Health Record system. Each implementing jurisdiction was able to successfully connect to the national infrastructure and to deliver compliant discharge summaries. Five of the seven private hospital groups utilised eHISC in their Rapid Integration to PCEHR project. The number of acute facilities connected to the My Health Record system by jurisdiction are depicted below in Table 2 and Table 3.

Table 2 – Total public hospitals and health centres connected using HIPS or otherwise - as of 4 Feb 2016

STATE	PUBLIC HOSPITALS AND HEALTH CENTRES CONNECTED	NUMBER WITH VIEW CAPABILITY	NUMBER ABLE TO UPLOAD CLINICAL DOCUMENTS
NSW	164	164	159
SA	13	0	13
ACT	1	1	1
QLD	219	219	111
TAS	4	4	4
VIC	10	10	10
WA	4	4	4
NT	54	23	53
<b>TOTAL</b>	<b>469</b>	<b>425</b>	<b>355</b>

Table 3 – Total private hospitals connected using eHISC or otherwise - as of 4 Feb 2016

STATE	PRIVATE HOSPITALS CONNECTED TO THE MY HEALTH RECORD SYSTEM	NUMBER ABLE TO VIEW THE MY HEALTH RECORD SYSTEM	NUMBER ABLE TO UPLOAD CLINICAL DOCUMENTS
NSW	6	6	5
SA	1	1	1
ACT	1	1	1
QLD	6	6	5
TAS	1	1	1
VIC	11	11	6
WA	0	0	0
NT	1	1	1
<b>TOTAL</b>	<b>27</b>	<b>27</b>	<b>20</b>

### Clinical content contribution is increasing

As more people register for a digital record and more organisations continue to connect to the My Health Record system, more clinical content is therefore available for viewing. The rate at which documents are being uploaded to the My Health Record system continues to increase (Figure 11, Figure 12, and Figure 13).

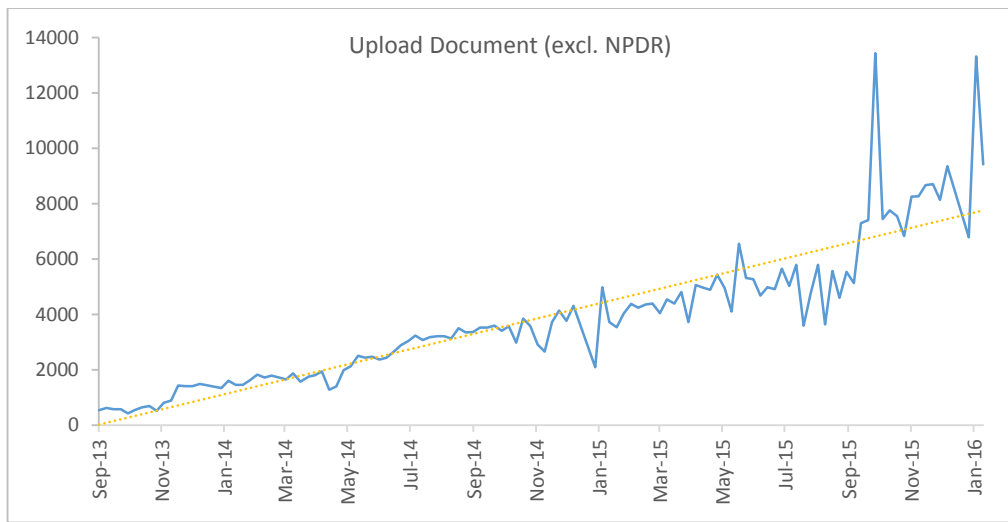


Figure 11 - My Health Record System document uploads per week

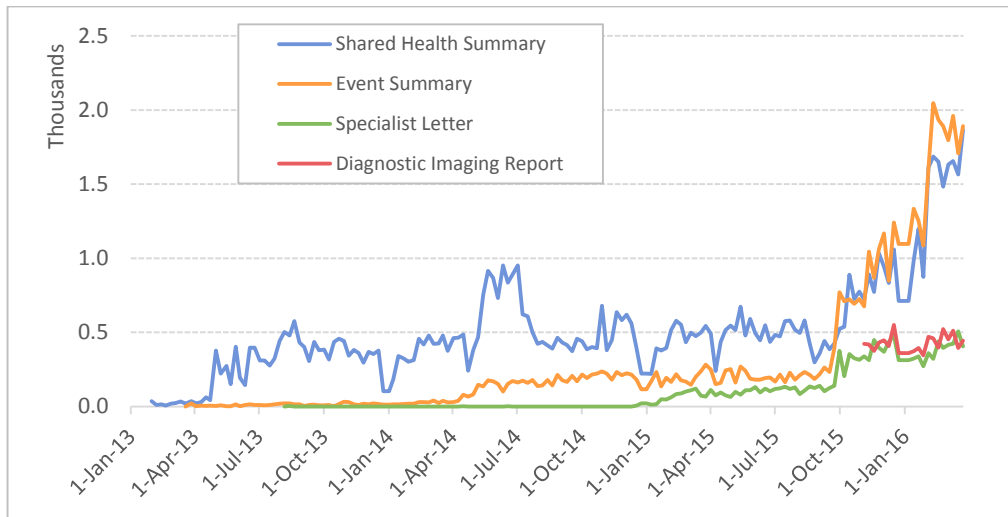


Figure 12 - Clinical document uploads per week, by document type

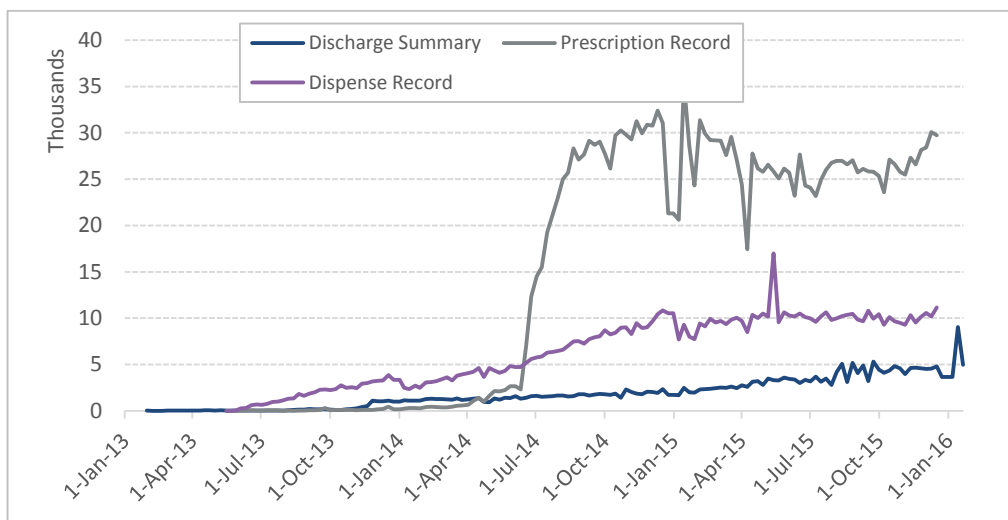


Figure 13 - Clinical documents uploaded per week, by document type<sup>4</sup>

The following additional supportive infrastructure components for the My Health Record system have been established and or delivered by NEHTA:

**Access and control settings** - Consumer and provider authentication, privacy settings, authorised representative access, audit trails, and notifications. The combined percentage of records with either a Record Access Code or Limited Document Access Code is less than 0.5% (Figure 14). The vast majority (99.5%) of people have not set access controls on their digital records.

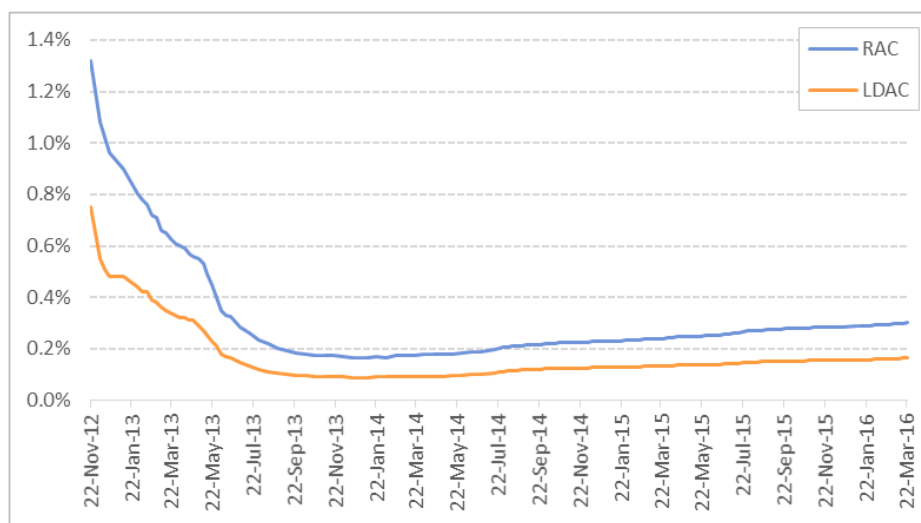


Figure 14 - Percentage of records with access controls, by control type<sup>5</sup>

**Feeds from existing data repositories** - Medicare Pharmaceutical and Medical Benefits Scheme items, Australian Childhood Immunisation Register, Australian Organ Donor Register.

**Structured clinical documents** - Additional clinical documents were identified for the My Health Record system including the shared health summary, event summary, and consumer-entered information such as allergies and adverse reactions, over-the-counter medications, and the location and custodian of an advance care directive.

**Establishment of vendor panels** - Through extensive stakeholder engagement, three health sector vendor panels, (general practice, community pharmacy, and aged care) representing majority market share, have been established. The purpose of the vendor panels is to ensure the building and implementing national specification, standards and foundations into the market. Once in market, providers gain the capability to use the foundation infrastructure and My Health Record system.

## 4.2 Achievements and contribution of notable Australian eHealth initiatives

There have been a number of pioneer eHealth initiatives and milestones which have contributed to the current maturity of information technology within the various sectors of the health system (Figure 15). This section describes some notable initiatives that provide evidence and lessons, which, when read in sequence, trace the evolution of Australia's approach to eHealth programs of work.

<sup>4</sup> Prescription records includes documents sent to the National Prescription and Dispense Repository (NPDR)

<sup>5</sup> Record Access Code (RAC) / Limited Document Access Code (LDAC)

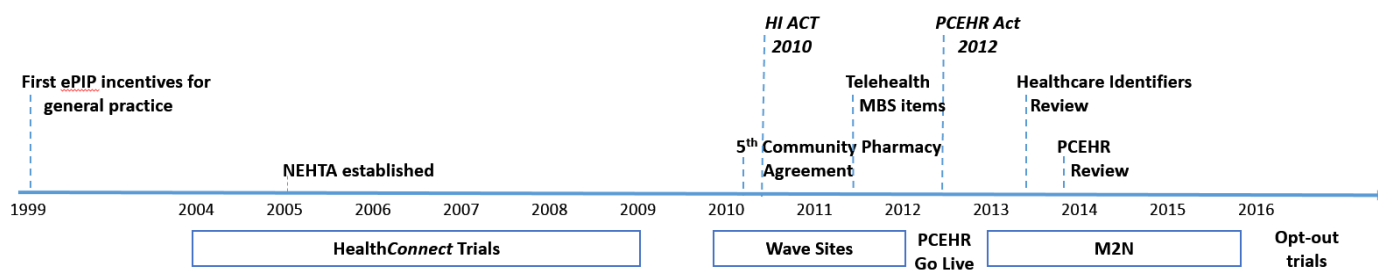


Figure 15 - Timeline of eHealth initiatives and milestones

#### 4.2.1 Advances in sector ICT maturity driven by incentives

To encourage primary healthcare providers to adopt ICT and to compensate organisations for the costs involved in increasing ICT maturity, the Commonwealth has provided incentives to general practices and community pharmacies.

##### **Practice Incentive Program - eHealth (ePIP)**

The *Practice Incentives Program* with an eHealth focus (ePIP, formerly PIP - IM/IT information management/information technology) was first introduced in 1999 for general practice, and concentrated on information management and information technology; where there was a reduction in fee for service in exchange for pooled funds to offset the costs of ICT infrastructure. [38] In the 2013-14 financial year, approximately 72% of all general practices and 85% of PIP registered practices (4,569) were receiving the PIP eHealth incentive. [38] Practices receiving ePIP demonstrates the effectiveness of financial incentive *as a lever* to instigate adoption and early usage of eHealth infrastructure.<sup>6</sup> For general practice, there has been 17 years of incremental increases in ICT maturity to enable electronic health information exchange. ePIP incentives have successfully facilitated computerisation of medical records and eHealth readiness for general practice.

##### **Community Pharmacy Agreements**

Similar to ePIP, the Community Pharmacy Agreements between the Commonwealth and the Pharmacy Guild of Australia have included financial incentives for community pharmacists to adopt, use, and embrace electronic solutions. [39] [40] [41] The Fifth Community Pharmacy Agreement, which came into effect in 2010, for the first time incentivised community pharmacists to adopt electronic medication dispensing. [40] The Sixth Community Pharmacy Agreement allocates \$61 million until 2020 for community pharmacy to support initiatives designed to improve outcomes through sharing of information as part of a personally-controlled electronic health record. [41] The impact of financial incentives for community pharmacy contributes to increasing ICT maturity in the sector.

<sup>6</sup> Current incentive eligibility criteria: integrating Healthcare Identifiers into electronic practice records; having a secure messaging capability and a written policy to encourage use; working towards recording the majority of diagnoses for active patients electronically and using a medical vocabulary that can be mapped against a nationally recognised disease classification system; ensuring that the majority of prescriptions are sent electronically to a Prescription Exchange Service; and using PCEHR compliant software and applying to participate in the eHealth record system.

## 4.2.2 Foundation infrastructure and policy informed by project evaluation

### ***HealthConnect***

*HealthConnect* was a 2004-2009 national change management strategy of state and territory based projects, endorsed by Australian Health Ministers, which sought to improve safety and quality in healthcare by enabling improved access to key health information at the point of care, through the use of electronic communication. [42] The projects funded through the *HealthConnect* program collectively helped to establish some of the technical foundations and policy directives for future eHealth activities.

This included incremental localised increases in ICT maturity; building of foundation infrastructure capabilities; testing or piloting broader visions; and validating value proposition assumptions. All of which contributed to improvements in national readiness for eHealth, including changing perceptions of eHealth around the country.

A number of *HealthConnect* projects identified a need for a national healthcare identifier, and so the agenda for national Healthcare Identifiers and the Healthcare Identifiers Service was progressed.

Some of the individual *HealthConnect* projects have led to significant evolutions in the way eHealth has been incorporated into policy and practice today.

### ***NSW Healthelink***

The *Healthelink* project was able to demonstrate through a proof of concept the potential value of not only a shared record system, but also of an opt-out approach to consumer participation. [43]

*Healthelink* was the NSW Health Electronic Health Record (EHR) *HealthConnect* initiative which brought together, through an 'opt-out' consent model, summaries of health information for individuals from different GPs, hospitals and community health centres and placed them into one secure computerised record.

*Healthelink* was able to demonstrate a repository could bridge an electronic information gap between the NSW Health tertiary and primary care systems. The 'opt-out' method for consumer participation proved to be an effective method of recruiting consumers; however it raised issues of inconsistency of privacy legislation across Australia as well as provider and consumer expectations with regards to record accessibility. The *Healthelink* pilot evaluation provided actionable lessons for an "opt-out" approach and consent process for sharing health information, both have which have contributed to the existing legislative and policy frameworks today.

### ***HealthConnect NT - eHealthNT – SEHR - MyEHR***

The Northern Territory's My eHealth Record service ('MyEHR' or 'MeHR') is an example of a successfully implemented shared electronic health record system which has become embedded as a tool in the delivery of healthcare.

Lessons from the Northern Territory have directly informed the existing My Health Record system requirements. The NT's experience has provided an understanding of the different types of controllable factors of a successful shared record system, and the extent to which these factors can be influenced directly by design, policy and concerted change management. [44]

Although the systems and some core policy settings differ, a NEHTA 2014-15 evaluation demonstrated health system efficiency benefits and health outcome benefits enabled by the MyEHR service, which validated the value proposition of the national My Health Record system. This validation supports ongoing investment in the My Health Record system while providing a yardstick against which the My Health Record system can be compared. [44] The Northern Territory is leading the country in cross sector information exchange and provider experience using eHealth solutions in the delivery of care.

#### **4.2.3 eHealth infrastructure piloted by Wave sites**

Following the HealthConnect projects, the newly developed eHealth infrastructure foundations and standards were deployed into a broad range of healthcare settings across the country, known as the Wave sites (or eHealth lead implementation sites). The sites provided valuable feedback on whether the infrastructure foundations were in fact fit-for-purpose. The Wave sites provided additional lessons to inform strategic decisions and priorities. It was a necessary and important step to capture lessons to ensure a future eHealth implementation approach would set the overall eHealth program and the PCEHR system up for success. [45, p. 42]

#### **4.2.4 Utilisation of telehealth and home monitoring**

Historically, healthcare has been delivered via direct, physical patient-clinician consultation. Advances in telehealth and home monitoring are enabling healthcare delivery regardless of provider and consumer location. Use of telehealth and home monitoring services have the capacity to improve real-time access to healthcare information and clinical advice. Clinicians are now able to be reimbursed through Medicare for video conference consultations. For the 2014-15 financial year, there were over 84,000 MBS claims for telehealth consultations.<sup>7</sup> A CSIRO telehealth and monitoring study found a 37% reduction in mortality with the use of the Telemedicare Clinical Monitoring Unit in the management of chronic disease in the home. [46]

A variety of different healthcare professionals across the country are now using and embracing technologies like telehealth and home monitoring services in the delivery of healthcare. This fundamental shift from the traditional face-to-face consultation to a consultation underpinned by an eHealth solution supports the notion that emerging technologies may positively disrupt how healthcare is delivered while proving healthcare delivery is not static, but adaptive and changeable.

### **4.3 Strengths of NEHTA's role in eHealth**

#### **4.3.1 Establishment of strong relationships and partnerships**

NEHTA has been able to establish strong ongoing relationships and partnerships across numerous sectors in the health system; especially jurisdictions, vendors, private hospital groups, and generally strong relationships with peak bodies. As collaboration is necessary to deliver outcomes from complex eHealth programs, the establishment of strong relationships is a significant achievement.

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<sup>7</sup> Source: Medicare Statistics, Medicare Item Reports July 2014 – July 2015. Available from [http://medicarestatistics.humanservices.gov.au/statistics/mbs\\_item.jsp](http://medicarestatistics.humanservices.gov.au/statistics/mbs_item.jsp)

Section 5.2.2 explains in more detail why relationships are so crucial, and how NEHTA developed its relationships over time.

### 4.3.2 Cohesive solution built out of disparate elements

NEHTA as an organisation initially comprised a collection of projects that were separately funded: Healthcare Identifiers Service, NASH, Clinical Terminology, SMD, etc. In order to progress the business case for the then ieHR, (now My Health Record), these disparate and siloed work programs had to come together collectively.

Through technical and business knowledge, and also through continually increasing the maturity of project, product and program management disciplines (e.g. creation of single program management committee), NEHTA has been able to engage *at a business level*, break down the silo structures, and has been able to build a cohesive, whole 'solution' out of disparate eHealth elements.

In addition, the organisation has evolved in its understanding of eHealth as it relates to clinical service delivery. NEHTA has been able to bring constituent parts together, in context. The interoperability framework and national reference architecture are key examples of this holistic achievement. For example, it is now possible to engage with a multi-national vendor to build a button into their software that performs a function relying on all the pieces of the eHealth infrastructure, specifications, and solutions.

### 4.3.3 eHealth services provided by NEHTA

NEHTA has, in recent years, begun building and providing services directly to the healthcare community to facilitate further adoption of eHealth solutions. Examples of these services are:

**eHealth Reference Platform** – The eHealth Reference Platform (eHRP) is a clinically validated technical simulation of eHealth system functionality. It provides participants and software vendors an ability to demonstrate and consider new capabilities, to test new software and clinical processes, and to conduct training supporting clinically safe work practices.

**On Demand Training** – Primary care healthcare professionals can simulate use of the eHealth functionality in participating GP desktop software with simulated patient information provided specifically to demonstrate eHealth functions. For the month of January 2016, On Demand Training sessions were conducted from 379 distinct locations across the country.

**eHealth Online Forms** – The eHealth Online Forms application tool allows healthcare organisations to efficiently submit an online application for any or all of the following My Health Record services:

- Healthcare Provider Identifier for Organisations (HPI-O),
- My Health Record system, and
- NASH PKI Certificate for Organisations.

## 5 What have we learned?

It is readily apparent from the experience of eHealth in Australia and internationally that the extent of integration and success of initiatives emerges from highly complex policy, social, technical, commercial, and political circumstances.

Some of the factors that affect the success of initiatives are fixed characteristics of the setting within which an initiative occurs – these cannot be directly influenced by an eHealth program, even one of national scale. External factors are imposed; programs are forced to accommodate them or exploit them, rather than being able to manipulate them. For example, large geographical distances between specialist services and patients in rural and remote regions are conducive to the use of telehealth. Another example was given in Section 3.1, which noted that digital health policy implementation and the pace of change within health systems have been strongly shaped by the types of government institutions and policy frameworks of each country.

Other factors, such as health care provider attitudes, behaviours, and market power, are able to be influenced and thus subject to policy changes and robust change management. Other factors, such as functional capabilities of a system, or policy and governance frameworks, are directly controllable and governable.

Understanding the different types of factors that affect eHealth initiatives – and the extent to which they can be influenced and controlled – provides the opportunity to identify the preconditions for success that can be manipulated, and the uncontrollable circumstances that can only be accommodated and or at best exploited. This knowledge can then be applied to future initiatives.

A colossal amount has been written about how to do eHealth. Focusing in general on process evaluation, thousands of critical success factors and recommendations have been identified. This weight of 'best practice' knowledge is imposing, and difficult to apply systematically.

The following sections attempt to distil into three key themes our analysis of NEHTA's experiences and lessons from other notable Australian and international eHealth initiatives. The three themes are:

- 1 Multi-level **tensions** that complicate decision making.
- 2 **Competencies** that enable organisations and systems *to do eHealth well*.
- 3 **Cultural shifts** that are necessary to realise the full potential of eHealth.

### 5.1 Theme 1: Multi-level tensions

The first key theme, multi-level tensions, relates to common issues that affect the success of many eHealth initiatives around the world. For example, the effectiveness of stakeholder engagement and governance arrangements, underestimated complexity, poor system usability, cost and time overruns, difficulty and cost to vendors to implement standards, opposition from the clinical community, and failure to realise anticipated benefits. In short, doing eHealth is not easy and it very complex.

These common issues are widely recognised, and scarcely an evaluation report is written without mentioning many of them. The question is: if they are widely known

about, understood, and planned for, why do they continue to negatively affect eHealth initiatives?

It is apparent that knowing about issues and solving them are two very different things – the critical success factors and recommendations that seek to address these common issues are often inconsistent and even contradictory. This uncertainty about the best way to proceed seems to arise because underlying tensions complicate decision-making. Policy making is, after all, about balancing competing interests.

This section identifies key tensions affecting eHealth initiatives at the system, organisation, and program levels. These tensions can be thought of as continuums, where the two ends of a spectrum represent opposite approaches or mindsets, with their own pros and cons. They are continuums because systems, organisations, and programs can be positioned anywhere along the continuum between the two ends of the spectrum. The other important characteristic, and the reason there is tension, is that there is no absolute correct position – there are advantages and disadvantages at either end. The issue for policy makers is to find an optimal position (the ‘sweet spot’) for a specific initiative, based on existing priorities and constraints, at a specific point in time.

People with eHealth domain experience implicitly recognise these tensions when they go through the process of weighing up the pros and cons of a course of action. For example, decision makers need to recognise that a policy for strong government intervention to ensure interoperability may be at the expense of allowing the market to freely innovate.

By acknowledging these tensions, our hope is that we can expose them, and prompt planning processes with the specific goal of reaching dialectical (i.e. balanced and mutually beneficial) positions.

Organisations and programs have some choice over where they position themselves on each continuum; external circumstances will sometimes force a particular position. At a system level, it is more apt to say that a position emerges over time, particularly in relatively new programs. If you identify a critical success factor or pitfall, this helps you zero in on the optimal position. In complex systems thinking, the positions that emerge over time could be likened to leverage points. [47]

### **5.1.1 Technology-led vs clinical community-led**

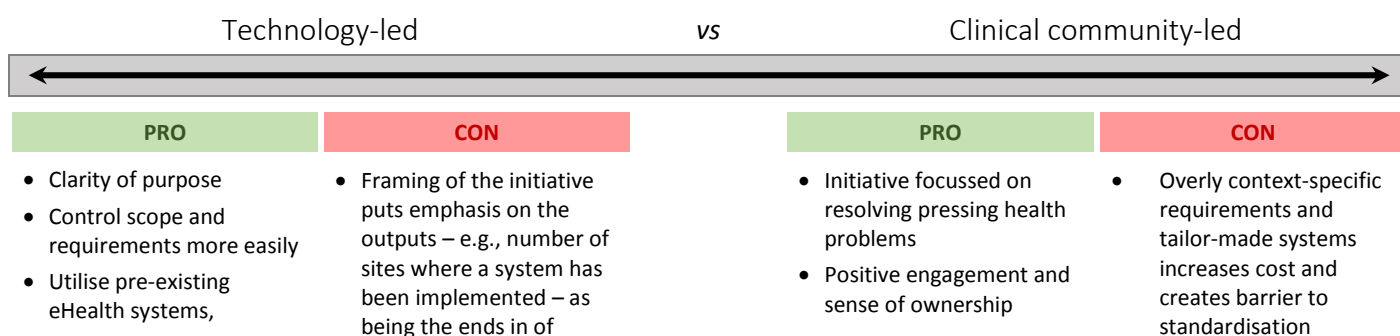
A common criticism of eHealth initiatives in Australia and overseas has been that they are excessively technology-centric. This critique speaks to a tension at the heart of eHealth initiatives – their leadership *ethos*.

At one end of the spectrum, in initiatives that have a ‘technology-led’ ethos, the mandate is to deliver an eHealth technology that is pre-chosen; be it an existing system, such as an off-the-shelf clinical information system, or a category of technology, like an electronic medical record. The initiative is therefore oriented explicitly around the tailoring and implementation of a technology. The premise is that the technology will deliver value in a given context – it is the solution to an implied problem. At the other end of the spectrum, eHealth initiatives with a clinical community-led ethos attempt to put foremost the interests and needs of the clinical community and their patients. In this ethos the initiative is oriented around a resolving a problem affecting health or health service delivery. An eHealth technology happens to be the most appropriate solution.

This tension can give rise to strongly adversarial behaviour. For example, one interview respondent who was a former clinical software developer recalled: “*Our customers [saw] us [the vendor] as vermin to be exterminated*”. In the case of NEHTA, the organisation tends to be viewed by the clinical community (those who are aware of it) as a technology company – one that is “working on its own... in the wilderness”, with a “cultural dominance of technical thinking”. The ethos was largely enshrined by its Constitution and work program, wherein pre-chosen technologies were identified. Accordingly, the strategy has been deliberately technology-orientated; focused on the delivery of eHealth foundation infrastructure and standards. This approach has had a number of advantages, including imparting clarity of focus, and allowing the primary relationships to be maintained with funders and software vendors. Arguably, there is no need for NEHTA to be known to clinicians; indeed it was not set up as a public-facing company. As detailed in Section 4, the organisation has fulfilled its technology-orientated mandate.

However, being technology-led has a number of disadvantages. For example, the choice of technology can often be made before the initiative even commences – the choice is the very inception of the initiative. This can lead to disengagement, and the risk of the technology not being fit for purpose. Furthermore, the clinical community might not even agree that the problem to which the chosen technology purported to solve even exists. Also, in defining what success looks like, the framing of a technology-led initiative inevitably puts emphasis on the outputs – e.g., a specification or standard, or the number of sites where a system has been implemented – as being ends in of themselves, rather than a means to an end. This can mean initiatives are considered ‘complete’ before any benefits are realised. Prime examples of this foundation infrastructure services such as the HI Service and Recallnet, which from NEHTA’s point of view have been delivered, but significant in systems and processes investment is still required on the part of implementers before benefits can be realised.

Conversely, clinical community-led eHealth initiatives have the advantage that the problems being addressed are perceived as a priority by the clinical community, leading to engagement and a sense of ownership. This ethos leads to eHealth being treated like any other clinical program, and not a separate silo. A disadvantage of clinical community-led eHealth initiatives is their tendency to result in tailor-made systems which are highly context specific, which is a barrier to standardisation and which may not meet the goals and needs of the funders of the program. They can also reinforce existing sub-optimal ways of working – an analogy is building an ‘electrified filing cabinet’ – because it is more difficult for people working within a system to conceive of ways to utilise emerging technology to reimagine workflows and instigate positive disruption. Notably, design visionaries such as Henry Ford and Steve Jobs would argue that you should not ask the customer what they want, otherwise you would get a mechanical horse.



- |   |  |   |   |
|---|--|---|---|
| <p>minimising development costs and complexity</p> <ul style="list-style-type: none"> <li>• Opportunity to apply outside thinking to health sector, and utilise emerging technology to reimagine workflows</li> </ul> | <p>themselves, rather than a means to an end</p> <ul style="list-style-type: none"> <li>• Alienation of clinical community</li> <li>• Technology not fit for purpose; does not solve priority problems</li> <li>• Risk of bias toward view of eHealth being a solution to problems for which it is not suited</li> </ul> | <p>amongst clinical community</p> <ul style="list-style-type: none"> <li>• eHealth viewed as an enabler, not an end in of itself</li> <li>• eHealth not a separate silo, but treated like any other clinical program</li> </ul> | <ul style="list-style-type: none"> <li>• Difficult to achieve consensus</li> <li>• Initiative conceived within the context of the dominant ways of working; reinforces existing sub-optimal workflows ('electrified filing cabinet')</li> <li>• Risk that initiative doesn't take advantage of emerging technologies</li> </ul> |
|---|--|---|---|

### 5.1.2 Centralised command and control vs. diffused power

eHealth initiatives are incredibly complex. For example, the Healthcare Identifiers Act and Service Review notes:

*The difficulty of integrating national Healthcare Identifiers into extremely diverse clinical processes and clinical systems, all with their own identifiers, across public and private health services is a major undertaking and the scale of this challenge should not be underestimated ... This environment will become even more complex as additional programs come on line. [6, pp. 11-12]*

Initiatives are made more complex by significant external factors that lie outside the control of an organisation or program. Often this complexity and degree of external dependency is underestimated; resulting in ineffective governance, lack of clarity around roles and responsibilities, unrealistic timelines, cost overruns, and unrealised benefits. For instance:

*The primary issues identified in relation to governance were a lack of clarity in responsibilities and accountability between organisations, parallel governance structures for programs of work with a high level of interdependency and a need to revise the terms of reference and members of key governance groups to enhance stakeholder engagement. [6, p. 12]*

The first tension arises in responding to the problems associated with complexity and external dependencies. At one end of the spectrum is centralised command and control. The other end of the spectrum is diffused power; characterised by decentralised decision making, empowerment, and multi-polarity. The natural tendency has been toward increasing the degree of central command and control. For example, here is a key lesson from the evaluation of the HealthConnect program:

*There have been a significant number of lessons from the HealthConnect program which will contribute to future work in the eHealth arena... The need to clearly define project scope, implement strong project management techniques and centrally administer programs and projects with clear accountability and reporting structures in the place. [42, p. 77]*

The tension is illustrated by statements in the PCEHR review, which advocated centralisation and decentralisation, respectively:

*The current PCEHR governance model lacks accountability and transparency. A single entity that carries the responsibility for both clinical and corporate governance will ensure that the eHealth product design has been through appropriate clinical assurance and gating processes before the product goes 'live'. [5, p. 80]*

*The creation of a successful eHealth ecosystem, refers to developing appropriate approaches to introduce solutions to the industry that acknowledge the*

*fragmentation of the industry, specialisation of private organisations, and the industry policy settings and strategies needed to be deployed by governments to encourage continuing investment and evolution of the industry. This may include the decentralisation of decision making and empowerment to enable smaller, workable health care communities to deliver solutions that can then be proven and scaled quickly to benefit larger communities. [5, p. 44]*

International experience (see section 3.1) also bears out this tension. Canada at first had a centralised national approach to eHealth, and are now moving to a decentralised regional model of implementation. In contrast, New Zealand initially had a regional model, and are now attempting to shift to a nationally coordinated approach. Evaluation of eHealth programs in the UK identified the failure of the “highly centralised top-down approach” pursued by the Government, which was exacerbated by the pressure to realise quick returns. Singapore and Denmark also had highly centralised programs, but deliberately chose to make gradual progress, have more conducive political environments, and have been more successful.

Both orientations have advantages and disadvantages. For example, centralised control is advantageous because governments are expected to keep tight control over the expenditure of significant amounts of public funds on eHealth and seek specific outcomes from their investment. However too much control can stifle local innovation and inhibit collaboration:

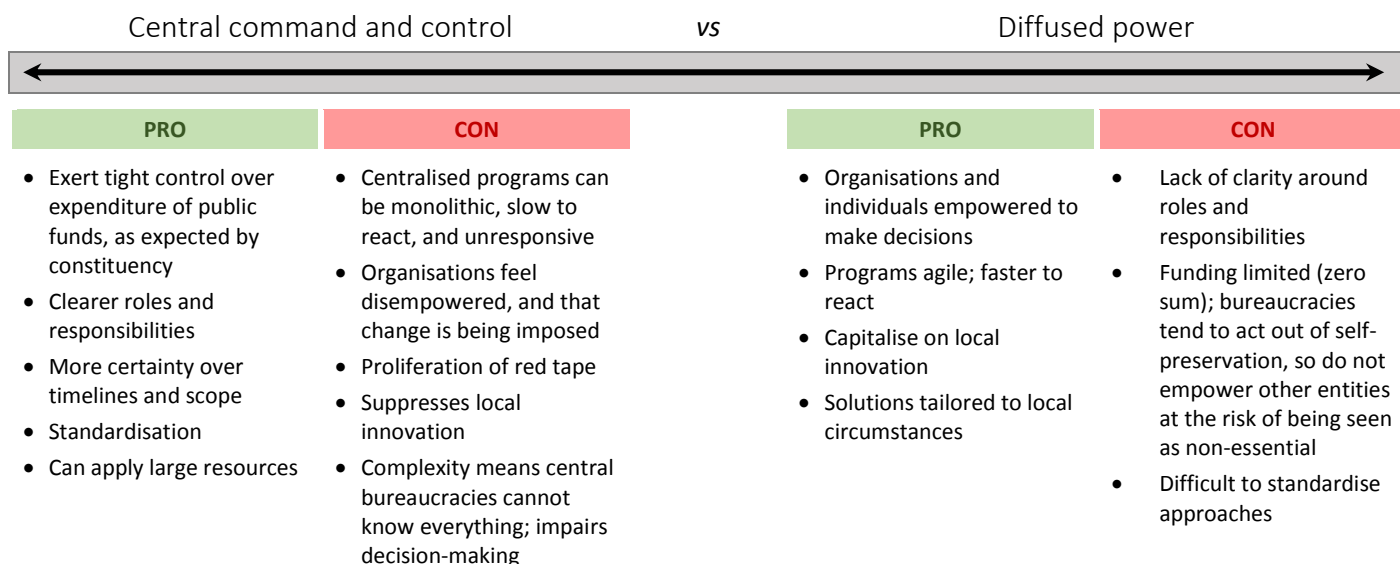
*They’ve not allowed us to do anything without going all the way through DoHA and back again. So we’ve not been allowed to innovate. – Clinical Lead [45, p. 71]*

*A perceived centralist approach, led by NEHTA and the Federal Department of Health has been identified as reducing confidence of the private sector to invest in product development and evolution, reducing the willingness to collaborate given multiple comments that information was often shared with NEHTA with little received in return. [5, p. 44]*

As another example, diffusing power can have the disadvantage of leading to a lack of clarity around roles and responsibilities:

*Across a range of stakeholders engaged in the Program, it was reported that there was a lack of clarity around roles and responsibilities, particularly in the early stages of the Program. This stemmed in part from the tension between nationally consistent direction and the need for local autonomy, innovation and ownership of project delivery.” [45, p. 45]*

More advantages and disadvantages are illustrated in the following figure:



### 5.1.3 Directed development vs open, community-led development

In the case of NEHTA, the tension between centralised control and decentralisation manifests as a choice between centrally directing development of specifications and standards so as to tightly control the outcome, and advocating and facilitating open, community-led development.

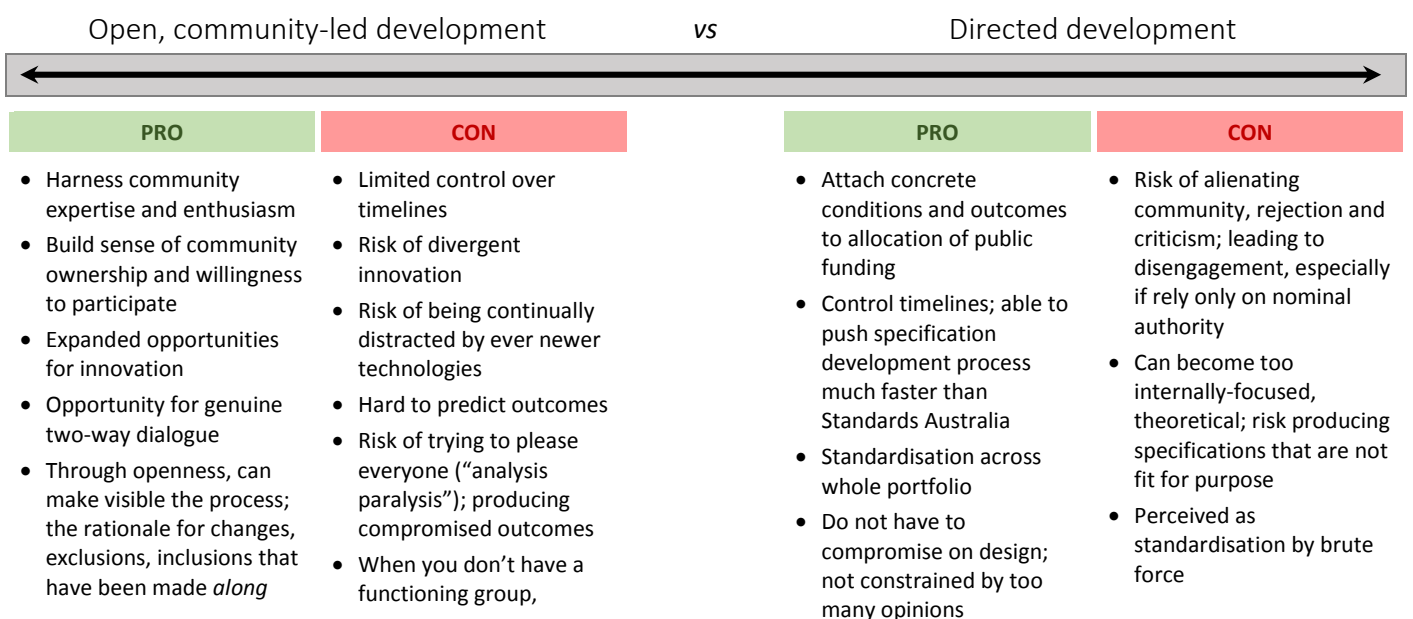
There has been disagreement about the process for developing and updating specifications, and the most appropriate level of community involvement. This was typified by one person we interviewed, who commented regarding consultation: "[You're] damned if you do, and damned if you don't". Another respondent said: "Strive for best of both worlds: a defined, open process, but with an end date."

Broadly, three different levels of community involvement are possible:

- 1 *Engagement* – managed engagement with a known, limited set of parties to get them 'on board', on the terms of the engaging organisation.
- 2 *Collaboration* – parties at the table considered equal, though ultimately the process is managed by one party through a defined consultation process.
- 3 *Meritocracy* – the most capable party as judged by the community assumes leadership of the process – this is *emergent leadership*. Importantly, leadership is not bestowed, but *proclaimed*. This approach requires a willingness to put a position of leadership on the line, and it is most often built around open source, with a creative commons licencing model.

NEHTA as an organisation is understandably risk averse – it has defaulted to a more closed model of development, with confidential documentation, products protected by IP, and selective engagement on NEHTA's terms. This has been in large part due to delivery and funding pressures- and seen as necessary to realise substantial achievements over a relatively short time frame.

In contrast to NEHTA's approach, investments by public funding in the US must be open-source, with open knowledge collections and open meetings by default. As detailed in the figure below, this constrained model of community involvement has a number of advantages, but it also misses the value of making transparent to the community the *process NEHTA goes through* to reach a decision.



- |   |  |   |  |
|---|--|---|--|
| <p><i>the way</i> to reach an endpoint</p> <ul style="list-style-type: none"><li>• Open disclosure ensures patient and clinician trust in systems<sup>8</sup></li><li>• Open source products available free to the community and permits community to inspect for safety risks and security vulnerabilities</li></ul> | <p>process doesn't work, e.g. <a href="#">IT-014</a></p> <ul style="list-style-type: none"><li>• Willingness to cede leadership to community not something government entities comfortable with</li><li>• Very difficult to design a process that allows visibility of development decision making process</li></ul> | <ul style="list-style-type: none"><li>• Manage risk more tightly</li><li>• Cost recovery or even generate revenue from IP</li></ul> | <ul style="list-style-type: none"><li>• Engagement can be artificial consultation and one-way dialogue</li></ul> |
|---|--|---|--|

### 5.1.4 Market intervention vs free market

At a system level, the tension between central control and diffused power is also reflected in the extent to which government actors choose to intervene to influence market dynamics and outcomes.

NEHTA's approach has been described as a "middle way", where the organisation has defined standards for interoperability and exchange of information, and used market adjustment mechanisms sparingly. The focus has been on developing 'implementable' specifications, and then encouraging implementation, but not seeking to intervene in markets through other mechanisms such as regulation. Maintaining the perceived independence of NEHTA is important; one interviewee said: "We shouldn't be a regulator; it is an orchestration role."

Tension arises when trying to work with implementers who have varying levels of capability and maturity. In a completely free market, innovators are able to move ahead. On one hand, NEHTA "can only move at the pace of the slowest" and should therefore develop standards that will enable *uniformly* increased capability across a sector. On the other hand, a free market perspective suggests that expecting to have "a single step up for all", is unrealistic – "we [NEHTA] can't inhibit the high flyers". NEHTA has sought out a middle ground, to "let the innovators go, but drag the laggards along". Another appropriate analogy given was: "floating all boats".

The general practice, community pharmacy, and aged care software vendor panels, whereby vendors are given seed funding to implement NEHTA specifications, are an example of a market adjustment mechanism characteristic of this middle way. This strategy aims to give vendors maximum opportunity to innovate using national infrastructure services as a platform, but also tries to cover as large a percentage of the market as possible. Disadvantages of this approach are the time it takes, the cost, and the dynamic of vendors becoming accustomed to receiving funding, and only implementing the required bare minimum functionality. An alternate strategy already in train is to use pull demand (e.g. via payments to general practice health care providers to use eHealth) to indirectly influence software vendors. Over time, as vendor maturity increases, NEHTA and governments have been moving towards legislative, accreditation, and compliance models that inexorably raise the bar.

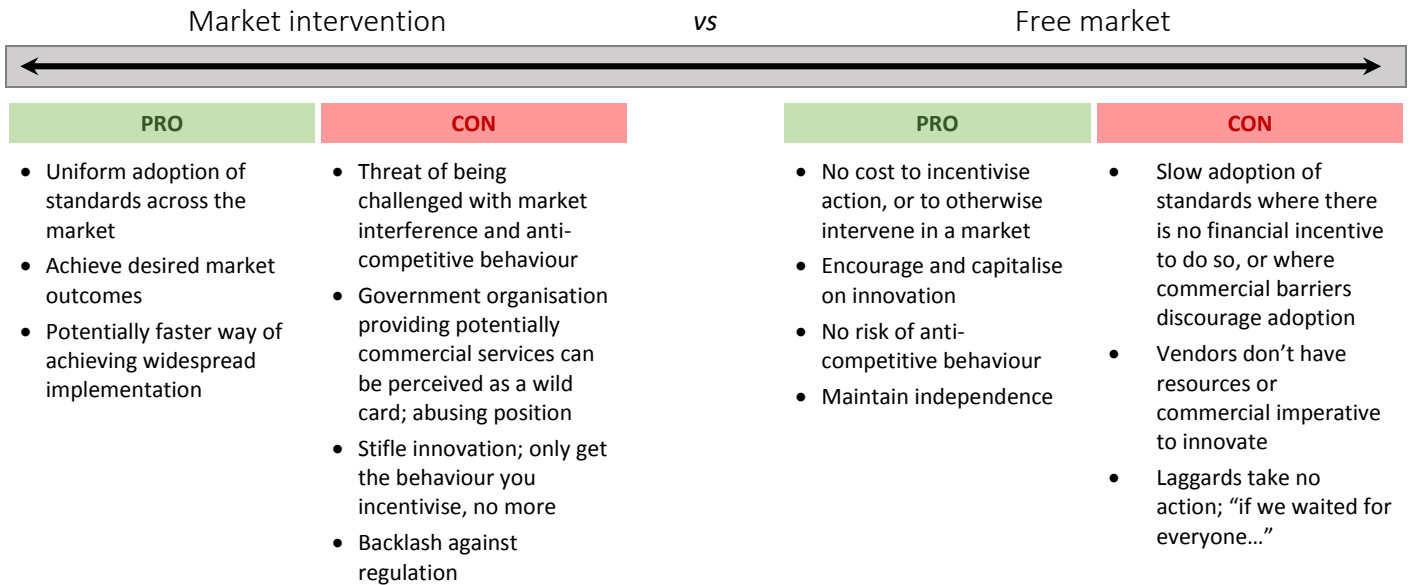
Tension also arises when market forces are preventing eHealth outcomes. Commercial considerations are often a practically insurmountable barrier to implementation of eHealth without resorting to intervention. This is particularly evident in the secure messaging market, the pathology and diagnostic imaging market, and also clinical terminology, where adopting standards can displace

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<sup>8</sup> See PCEHR review [5, p. 88]: "A major lesson from patient safety is that open disclosure is essential to ensure patient and clinician trust in a system, and to maximize dissemination of lessons learned."

proprietary approaches, and threaten incumbency and competitive advantage. In recent years, NEHTA has adopted a more assertive approach in the face of slower-than-expected adoption of standards: “Over time, we’ve realised we can be a market disruptor if we want to”. This is characterised by a willingness to provide services directly if required, and also negotiate directly with vendors in particular sectors.

While a full analysis of the advantages and disadvantages of market intervention and free market approaches is beyond the scope of this report, the following figure provides pros and cons identified through analysis of Australia eHealth experience. Section 0 provides a description of how the use of structural adjustment and market alignment mechanisms (‘levers’) has evolved over time.



### 5.1.5 Participant in the health system vs. being a bystander

For NEHTA, jurisdictional eHealth programs and other international eHealth agencies, a central tension is the extent to which they participate directly in the health system, or stand apart as a bystander. Acting with the view that the entity is a participant in the health system affords opportunities to directly affect outcomes, though also engenders accountability and risk; while acting with the mindset of being outside the health system reduces risk, and in many ways provides more freedom, but potentially reduces scope to have direct impact. Another aspect of this the tension between positioning as an active service provider or taking a more academic, policy making role in the system.

This tension is particularly evident in the choice between positioning an organisation as one that produces standards and products which other organisations choose to implement *at their own risk*, or positioning an organisation as a direct service provider, *and* accepting the shared accountability associated with enabling or operating mission-critical systems. As with the other tensions, an organisation is going to be somewhere along the continuum between these two endpoints. Where an organisation is positioned hinges largely on the willingness and capacity of an organisation to accept accountability; to have “skin in the game”. A perspective from the PCEHR review was:

*The government’s role in the eHealth system should be limited, focused on developing appropriate essential standards required for security and data interchange, with the requirements of vendors and end-users being the*

*primary consideration in this process. The government should also maintain the essential national infrastructure required for authentication, and ensuring an appropriate privacy framework. [5, p. 79]*

In the case of NEHTA, the organisation has historically been risk averse, as one respondent stated: "We've been scared of putting something out there that might involve clinical risk". This is completely understandable and justifiable. However, it is also understandable how obliging implementing organisations and the clinical community to accept total responsibility for implementing and using NEHTA's eHealth products could lead to a lack of respect and credibility, and thereby inhibit a sense of partnership and trust.

A disadvantage of not sharing responsibility is that when using new systems, care providers do not have a licence to fail. This point was clear in the PCEHR review. [5] For example, in the original PCEHR system participation agreement, the system operator had no obligation to the implementing organisation and users except for availability of the service. It is logical therefore that care providers would be conservative about using new systems, and reluctant to experiment. Risk is pushed down, responsibility for the outcomes (good and bad) is not shared, and as a result the changes in workflow that would be necessary to realise significant benefit from eHealth do not occur (more about this is in Section 5.3.7).

Notably, in the last two years NEHTA has displayed more of a willingness to provide services directly to end users, for example the on demand training service, the eHealth online registration forms service, and the National Clinical Terminology Information Service (NCTIS) providing services such as Ontoserver. In the case NCTIS, this has reduced the cost and difficulty of implementing complex terminology standards, leading to leaner delivery timeframes and smaller overheads for vendors. From a NEHTA enterprise architecture point of view, in formulating a national eHealth architecture, there has been a realisation that NEHTA "exists only within the ecosystem we are trying to promote – we are part of the whole; not along-side".

Bystander		vs	Participant in the health system	
PRO	CON		PRO	CON
<ul style="list-style-type: none"> <li>• More straightforward, easier, simpler</li> <li>• Reduced risk profile</li> <li>• Separate eHealth programs and agencies can safeguard funding streams</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of credibility, trust, and respect from clinical community</li> <li>• Risk of being perceived as "another bureaucratic organisation that doesn't listen"</li> <li>• Separate eHealth agencies risks siloing eHealth from other clinical programs</li> <li>• Organisations and clinicians assume all risk for implementing and using eHealth, which adds to reluctance to use, and limits experimentation</li> </ul>		<ul style="list-style-type: none"> <li>• Can provide services direct to clinical community and vendors</li> <li>• Provide plug-in modules and services to reduce cost and difficulty of implementing complex standards, leading to leaner delivery timeframes and smaller overheads for vendors</li> <li>• Perceived as having "skin in the game" – enhances credibility and respect</li> </ul>	<ul style="list-style-type: none"> <li>• Messier, harder, more complex</li> <li>• Accountabilities, costs and heightened risks associated with service provision</li> <li>• Entities may have charters which preclude accepting any responsibility</li> <li>• Need to be extremely disciplined to provide services, and have full end-to-end product management ("a product is not a project")</li> </ul>

## 5.2 Theme 2: Organisational and system competencies

The second key theme addresses critical success factors that are common to many eHealth initiatives. The following sections describe underlying competencies that enable organisations and systems to *do eHealth well*. These competencies are not a checklist or detailed best practice guide – they are structural capabilities, and organisation functions and skills, combined with specific values and principles.

By identifying these competencies and the principles underpinning them, our intent is to encourage policy makers and organisations to invest in developing these competencies.

### 5.2.1 Having a strategy, and then working to it

eHealth initiatives are premised on a desire to realise the promised benefits to safety, health outcomes, and to ease the budgetary burden of healthcare.

Australian and international experience suggests coherent strategy is a key ingredient in being able to successfully realise this promised value. In eHealth initiatives, evidence suggests strategy is critical because it:

- Promotes a focus on the target state (*this is where we want to get to*) and strategic outcomes (*this is what we will get*). This sets out a roadmap and execution plan to reach the target state and achieve strategic outcomes.
- Optimises the allocative efficiency of scarce resources, and importantly, *rules things out* if they do not help contribute to achieving strategic outcomes.
- Gives certainty about commitment to an initiative beyond short term political cycles – particularly standards, and thereby fosters investment. Conversely, absence of strategy undermines the willingness to commit to investment in eHealth by system vendors and implementing organisations. A roadmap can be a foundation for trust; as commercial organisations often need a five year horizon for investment planning.
- Promotes innovation and collaboration aligned to a common purpose, as opposed to divergent innovation.
- Instils patience, and avoids decision-making based on short-term political cycles. The European Union's Study on Economic Impact of e-Health identifies factors critical to the success of e-health projects, including long term perspective, endurance and patience. "Beneficial e-health investment is like a good wine; it takes a considerable amount of time (about 5 years) to mature and develop its potential fully." [48] This is supported by the gradual progress achieved through Denmark's 15-20 year experience; and Singapore's 5-10 year NEHR project. Furthermore, NEHTA's evaluation of the Northern Territory's shared electronic health record system suggests an order of doing things, and the need for patience to build prerequisites of critical mass. There is a continuum of maturity that starts with attitudes towards eHealth, technical readiness, and installation of eHealth systems, through to early use of those systems, before use of the information in those systems leads to improved clinical decision making, and thus to improved healthcare delivery and population health outcomes.

That strategy plays this important role seems self-evident. However, there are many examples where eHealth initiatives progress without coherent strategy at a national, organisation or program level. For example, Australia has not had a

defined national eHealth strategy since 2008; a situation that has deterred investment and engagement, and hindered decision making. For example, one respondent commented: "At the moment it is way too random... for example the NHD [National Health Services Directory] – there is no roadmap for how this works. This is not the way to build relationships."

However, the situation of not having an agreed, coherent strategy is often the reality. Short term funding cycles preclude long-term strategy, political circumstances may be unfavourable, and it is often very difficult to reach consensus about strategic priorities. Therefore, it is important to also have the capacity to align activity and make decisions even in the absence of coherent strategy.

### **5.2.2 Relationship building and collaboration**

As described in Section 5.1.1, eHealth initiatives are incredibly complex. Part of the reason for this complexity is that they often involve more than one government, consortiums of organisations, multiple sectors of the health system, and multiple departments within a single large organisation. Competency in relationship building and forming partnerships is therefore a prerequisite for the ability to collaborate.

The importance of relationship building as a foundation for effective collaboration applies to all aspects of implementation, as well as formulation of strategy and policy, development of specifications, and solution design. Effective collaboration allows quick resolution of issues, and more efficient implementation than would otherwise be possible without strong relationships. The evaluation of the Wave site program concluded:

*Successful eHealth implementation more often than not requires the sustained cooperation of multiple organisations and business units. A strategic priority for organisations involved in eHealth projects therefore must be to invest in establishing and working to sustain organisation-level relationships with other healthcare organisations. [45, p. 73]*

Within NEHTA, relationships and partnerships have, over time, come to be viewed as business assets in their own right. For example, the relationships built through the Jurisdiction collaborations process and vendor panel processes are very valuable.

When NEHTA started, there was no coordinated communication between state and territory health department Chief Information Officers (CIO). The establishment of NEHTA diverted commonwealth funding and the organisation became – without intent – a mirror, a common enemy; which in effect fostered collaboration. Out of this emerged the National Health CIO Forum (NHCIOF), which is today an effective facilitator of collaboration on eHealth, and has meant that jurisdictions have developed better working relationships with each other. Through working in partnerships, the focus for NEHTA has shifted away from a prescriptive 'do it this way' approach to a more collaborative 'how can we help you?' approach. From NEHTA's perspective the benefits are clear: collaboration is driving consistency across jurisdictions in implementation of NEHTA products and solutions, reducing implementation costs, and jurisdictions are starting to drive adoption and use of eHealth more and more.

The same 'common enemy' dynamic existed in NEHTA's relationship with software vendors. Early on, NEHTA tended to have an almost "dictatorial", "holier than thou" relationship with vendors. Vendors understandably took some time to recover from this mantra. Now, collaborative development of specifications with the standards

community and vendors is emerging as the norm, evidenced by 'connectathons' that now form a part of specification development and solution design.

Evidence suggests the following factors are important in relationship building and collaboration:

- It is necessary to invest in relationships. For example, in NEHTA's case it has taken immense effort to bring the Jurisdictions along: "It takes years to build up relationships". A clinical lead involved in a Wave site project commented: "It's not: organise relationships around a single initiative, one project – it's what you need to invest in as business as usual." [45, p. 69] NEHTA's Clinical Usability Program (CUP) is another example of investment in relationship building with peak clinical bodies.
- Relationships need to be founded on mutual benefit (common purpose) and reciprocity. Again from the lead eHealth site evaluation: "There is no formal governance structure that makes it so – they see benefit in the relationship." [45, p. 69] NEHTA's change in approach with vendors has been founded on the common purpose of building solutions to address the priorities of our shared stakeholders.
- Respect and trust are crucial in forming lasting partnerships. One respondent commented: "[The organisations with whom NEHTA has relationships] have personal trust that we understand them – their business drivers – well enough not to put them at risk ... Working together comes from mutual respect." There also has to be a willingness to have open and frank discussions.
- Commitment to transparency and openness – for example defaulting to creative commons licencing. This builds trust and confidence, as recommended in the PCEHR review: "Apply governance principles of transparency of metrics and reporting to build confidence in the clinical relevance of information that is provided." [5, p. 17]
- Boundary roles are critical in building relationships between organisations, and also internally to create bridges between programs of work ("organic connection") at all levels within organisations. In their review of the UK's National Health Service 'Summary Care Record' (SCR) and HealthSpace programs, Greenhalgh and colleagues stated:

*A prominent finding in this study was the large amount of work involved in the SCR and HealthSpace programs, the difficulty and complexity of this work, and its critical dependence on the qualities and capability of particular people. The numerous individuals involved in these programs occupied disparate worlds, brought different values and spoke different 'languages'. Those who proved most pivotal held boundary roles between different organisations and sectors and managed to align – to some extent at least – the complex and competing institutional logics which characterised the programs. They achieved this by engaging actively in what previous authors have called 'translation'. [49, p. 12]*

- Lack of continuity in pivotal boundary roles is a known pitfall, and has to be planned for. For example, the ability of an individual to engage in 'translation' requires sufficient business and technical knowledge, which takes time to develop. One respondent commented: "The individual is important. If you clearly defined the role, not everyone could do it". Another noted: "People almost create the [boundary] role". This said,

choosing the right people is important, but there is a definite skillset that can be trained: "It is not unscientific – you have to develop a business relationship, not make friends."

### 5.2.3 Capacity to rapidly iterate

eHealth technologies and the settings into which they are introduced are not static – they are constantly evolving and changing in unpredictable ways. It is evident that because of this, the capacity to rapidly iterate systems and policies has emerged as an essential organisational competency. This is similar to a capacity for innovation, and it is also an organisational mindset.

There are a number of reasons why capacity to rapidly iterate is an essential competency. Firstly, 'big bang' approaches to implementation seem to be much less effective than gradual change. Experience from Denmark, Singapore, and the Northern Territory's shared electronic record system demonstrate that achieving critical mass takes time, and that throughout, continual effort, reinforcement, and iterative policy and system enhancements are required. Involving clinicians in ongoing system enhancement also fosters a sense of ownership and willingness to use, as the following quotes demonstrate:

*Since the [HI Service] became operational, stakeholders do not feel they have adequate opportunities to provide input and ensure that their priorities are being recognised. [6, p. 21]*

*The valuable role of the MyEHR service Clinical Advisory Committee suggests that robust clinical governance mechanisms that continually capture end-user input – throughout the full lifecycle from requirements setting through to end-user feedback – will be important to foster a sense of participation and ownership. [44, p. 50]*

Secondly, past eHealth initiatives clearly show that having an expectation that stakeholders will reach consensus is unrealistic. This view of needing consensus in order to proceed is pervasive, as illustrated by this comment from Standards Australia in the PCEHR review:

*In the course of the development of PCEHR technical standards, we have observed the absence of agreement on e-Health policy matters amongst stakeholders. This has posed challenges to developing timely and widely accepted technical standards... Wider agreement on policy matters relating to the PCEHR will lead to a collegial health informatics stakeholder community, a more effective and efficient standards development environment and ultimately a more widely acceptable and employable PCEHR platform. [5, p. 82]*

In reality, there is a need to accept that it is normal for stakeholders to have disagreements, and for the clinical community to have internal disagreements and change their minds. Disagreements in healthcare policy reform and delivery are common – after all eHealth is a microeconomic reform where scarce resources are being allocated – so an organisation needs to be comfortable with contention. Rapid iteration is a way to deal with this. For example, one respondent commented that: "the first version [of a specification] needs to be thrown away just to find out what the problem really is."

Thirdly, the capacity for rapid iteration is important to avoid technical redundancy and stagnation. For example, Canada is facing the issue that their very significant investment in Clinical Document Architecture (CDA) specification risks becoming

redundant, as provinces in Canada want to use the newer standard, FHIR (Fast Healthcare Interoperability Resources). Arguably, the My Health Record system faces similar issues with encroaching redundancy of underlying technical architecture.

And fourthly, having the capacity to iteratively enhance systems and policy settings is necessary to enable new, unforeseen ways of working that capitalise on the opportunities of eHealth. For example, from evaluation of the Northern Territory's shared electronic record system:

*The MyEHR policy frameworks governing use and consent were deliberately designed to be flexible enough to support new (and difficult to foresee) uses. Importantly, the policy (and technical) settings evolved over the life of the system to respond to emerging use cases, barriers and trends. For example, when it was apparent that populating the record with clinical content was critical to drive use, the consent model was changed from the initial setting requiring consent to upload in each instance, to an ongoing consent and default to send setting. This was supported by technical changes to support automated generation of clinical documents. (p50)*

For an organisation, the willingness and capacity to rapidly iterate is founded on enabling "machinery of business" – principles, processes, techniques, and toolsets. For example, agile design and software development techniques are important. In the case of NEHTA, current investment in specification development tooling will enable more rapid iteration of specifications, and increase the number of specifications that can be developed in parallel. In addition, investment in the eHealth reference platform has created an environment to explore and test functionality, and for incubation of new ideas. Additionally, over time NEHTA has internally strengthened clinical governance, and been able to incorporate clinical input relating to safety and usability into development cycles in a more agile way. The goal is to be able to say to software vendors: "*this has been validated by the clinical community.*"

Coupled with practical techniques and toolsets, an organisation must have a culture of innovation. The practice of rapid iteration in eHealth is no different from the historical culture of innovation and trial and error in medicine. So, like in medicine, it needs to be governed by strong principles of ethics and a disciplined process.

Faced with reality that reaching a consensus is impractical, it emerges that the integrity and discipline of *the process* of reaching a compromise is vital. The development of standards is, at its heart, about how to work with the community; strong, simple principles exist on how to negotiate compromises, and these must be embodied by an organisation. Because the process of reaching consensus has integrity, participants in the process are willing to agree to abide by the outcomes of the process, even if they have had to compromise on the outcomes.

Furthermore, iteration needs to be driven by an ongoing cycle of action and evaluation resembling praxis (a form of critical thinking comprising the combination of reflection and action<sup>9</sup>). This is fostered by a culture of innovation that allows people to fail in the positive sense; a "try by doing" mindset.

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<sup>9</sup> See [https://en.wikipedia.org/wiki/Praxis\\_\(process\)](https://en.wikipedia.org/wiki/Praxis_(process)) for a description of the concept.

## 5.2.4 Taking into account clinician and end-user experience

One of the most often repeated observations of eHealth initiatives is how difficult it is to introduce disruption and change the way people work in order to take advantage of eHealth capabilities. Personal ways of working and providing services are very hard to change and is particularly difficult in such a specialised area. It is vital that organisations designing and implementing eHealth solutions understand *why* this is the case, so they can take into account the impacts on clinician and end-user experience when planning eHealth initiatives.

One orthodox view within IT circles is that care providers are resistant to change because of a threatened loss of prestige, power, and control associated with changes in work practice instigated by eHealth. The attitude ascribed to care providers is that they are consciously unwilling to 'go the extra mile' to satisfy institutional demands to use eHealth systems to their full potential, and that by not doing so they are being neglectful of their patients' best interests.

This is an example of *fundamental attribution error*, which is the tendency to attribute behaviour to people, rather than system structure. [50] Health systems are complex adaptive systems that resist disruption for a number of reasons.<sup>10</sup> Notably, in the traditional 'workup' model of care (see section 5.3.3 on page 60), a clinician has ultimate responsibility, and therefore autonomy. This autonomy is a barrier to passive (peer-to-peer) diffusion of innovation, and top-down (management directed) dissemination of innovation. In addition, there is an absence of traditional financial incentives that promote disruption, and also a misalignment of incentives and goals between administrators and care providers. Care providers also perceive there to be an asymmetry between the effort required to implement eHealth and the benefits expected to flow. There is a perception that government and healthcare funders will be the primary beneficiaries. Further, organisations can be damned by their own success. Cited by Greenhalgh et al. [51], Eveland (1986) writes:

*Organizations that carefully implement state-of-the-art computer systems tend to have a great deal of difficulty taking advantage of changing technology; they have too many 'sunk costs' in the old systems. It is well to remember that every old, outdated, ossified tool or practice in any organization was once an innovation that got 'routinized' all too well.*

In this context, a continual succession of initiatives (not just eHealth) have the effect of imposing more and more onerous requirements on care providers to instigate the changes desired by administrators. In recent times this has caused growing strain and a rise in 'burnout' [52] – care providers are burning out because extra requirements, such as improving data quality in clinical information systems, have been imposed by the system *without compensating advantages*. Cited by Greenhalgh et al. [51], Adler and colleagues write:

*Innovations that put additional cognitive or economic burdens on professionals will not diffuse effectively unless they afford sufficient compensating advantages.*

Fatigue and burnout comes from having immense personal responsibility and overbearing scrutiny, without a corresponding level of control (agency). Administration imposes requirements, without sharing accountability. This is

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<sup>10</sup> Greenhalgh, T., Robert, G., and Bate, P. (2004). How to Spread Good Ideas: A systematic review of the literature on diffusion, dissemination and sustainability of innovations in health service delivery and organisation. Report for the National Co-ordinating Centre for NHS Service Delivery and Organisation R & D (NCCSDO)

disempowering, corrosive of job satisfaction, and leads to distrust of administration and ultimately, burnout.<sup>11</sup> In the Australian context, this is exacerbated by episodic fee-for-service funding models, which made sense when they were designed in the form of Medicare during the 1960s and 1970s, but are not suited to provision of comprehensive community health, nor integrated care of patients with chronic disease. [53, pp. 177-179]

Past experience suggests the usability of eHealth systems is a critical determinant of clinician experience and the sustainability of usage. Increasingly, corporate systems are expected to conform to consumer-grade standards of usability. One respondent commented: "When it comes to a doctor, [eHealth] has to transgress its constituent parts – it needs to be seamless; under the hood." NEHTA's experience attests to fact that, as you would expect, lack of end user engagement in design and build phases leads to issues in user acceptance testing. Similarly, over time a cultural respect for safety has emerged, evident in proactively incorporating repeatable and generalisability safety and usability processes into the software development lifecycle.

### **5.2.5 Using structural adjustment and market alignment mechanisms**

Using a set of mechanisms in mutually reinforcing ways (i.e. to simultaneously push and pull) is a critical competency for organisations and governments involved in eHealth. Australian and international experience shows that the complex social, technical, and commercial circumstances surrounding eHealth initiatives often necessitate the use of structural adjustment and market alignment mechanisms. A suite of mechanisms (also referred to as policy instruments, or 'levers') is available, including: funding models; incentivisation; regulation; seed funding; software conformance and compliance processes; accreditation and standards; and academic research and benefits case studies. Organisations such as NEHTA and other government bodies also have the option to fund pilots, provide implementation support services, such as change management, technical consulting, and privacy advisory services, or operate services and provide them directly to a market.

In writing about structural reform in Australia over the last 30 years, Banks [54] identifies several lessons that are applicable to eHealth:

- Reforms that are intended to benefit the wider community often threaten the status quo of a minority. The members of the minority individually have more at stake than the often diffuse beneficiaries, and therefore are more likely to be motivated to oppose the reforms.
- Market alignment mechanisms such as seed funding and incentivisation are important in "oiling the wheels" by minimising adjustment costs associated with reforms.
- Commercial stakeholders seek sustainable business models. Project by project seed funding is not likely to sustainably incentivise those who need to invest to realise eHealth capabilities.

Further to these lessons, evidence from previous eHealth initiatives suggests that structural adjustment mechanisms and market alignment mechanisms are particularly necessary to:

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<sup>11</sup> For some examples of these issues see the following articles: [79] [81] [80] [78]

- 1 **Manage benefit asymmetry.** Benefit asymmetry occurs where the benefit from the effort of one party flows to another. Amongst stakeholders who receive little in the way of direct benefit in return for their effort, this can lead to an apathetic reaction to eHealth, i.e. 'It's a good idea, but...' [55]
- 2 **Realign markets so they are economically efficient.** In the Australian context, the general practice clinical information system market is arguably economically inefficient – one interviewee referred to it as a “cottage industry” – because of an oversupply of variety. Because of this, NEHTA has sought to use market readjustment mechanisms such as incentives, conformance regimes, and industry collaboration to restructure the industry. This inefficiency arises in markets like health where the benefits to society of an initiative can be greater than the benefits of private action, markets will tend to oversupply variety to the point of economic inefficiency.<sup>12</sup> Where social marginal benefits exceed private marginal benefits, the resulting network size will tend to be smaller than the socially optimal network size – and the free market-generated network size is not economically efficient. Compatibility standards (such as clinical terminologies) can increase public benefit because they increase the network of users adopting compatible products.
- 3 **Overcome first mover disadvantage.** The dynamics of standardisation and complexity of eHealth solutions are such that organisations initiating action suffer from first mover disadvantage. For later entrants to the market, once the system reaches a tipping point, the benefit to a new participant outweighs any negatives associated with participation. [56] As noted by Banks [54], losses are front-loaded relative to benefits, exacerbating first-mover disadvantage. The PCEHR review advocates incentives and financial support to: “offset initial and ongoing costs of implementation for organisations and clinicians.” [5, p. 14] This is particularly important for managing the relationship with small vendors and helping them to overcome resource-related barriers to innovation.
- 4 **Overcome commercial barriers.** Commercial interests are often a barrier to adoption of eHealth solutions that have societal benefits. Notable examples in the NEHTA portfolio are electronic transfer of prescriptions, secure messaging, and clinical terminology.
- 5 **Catalyse adoption.** Seed funding and other financial levers have the potential to catalyse adoption in situations where there is no immediate commercial or business incentive to act. For example, one respondent commented that for software vendors, there are “no real imperatives to implement foundations and solutions ... In [vendors'] minds we are the customer; customers pay”. Relating to jurisdictions, another respondent commented: “No one is going to move unless it is a policy priority and funding attached.” Seed funding encourages software vendors them to provide functionality that their paying customers are not yet demanding. For example, general practices are not demanding of their clinical information system vendors: ‘we have to have eHealth’. So financial incentives are required because vendors are being asked, with limited resources, to build things their customers do not know about and are not willing to pay extra for.
- 6 **Signal support and commitment.** One barrier faced by organisations like NEHTA is uncertainty. Small acts of legislation and regulation, and statements of support for standards from governments, are important in signalling commitment, providing certainty for organisations considering investment, and

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<sup>12</sup> This explanation paraphrases a section of NEHTA’s SNOMED CT-AU Draft Implementation Plan [83, p. 29], which refers to a World Trade Organisation report [82, p. 36].

advertising to the market that expectations will rise over time, thereby fostering innovation and competitiveness. As a domestic example, the fact that jurisdictions started requiring that product for which they entered into supply contracts be listed in the National Product Catalogue (NPC) was a significant boost to adoption. Internationally, Denmark was able to mandate use of computers and sharing of data after a significant amount of time building capacity.

In the case of eHealth in Australia, where resources have been allocated to structural adjustment and market alignment mechanisms to achieve these ends, they have usually worked well, with some caveats. For example:

- The Practice Incentive Program (PIP) eHealth incentive payment has been an effective mechanism to increase eHealth readiness and IT maturity amongst general practice. Similarly, Community Pharmacy Agreements have successfully encouraged community pharmacies to adopt the capability to use electronic solutions for managing prescriptions. However, the impact of supporting general practice and community pharmacy to adopt ICT and eHealth solutions has ensured capacity to implement the eHealth foundations, but has inadvertently resulted in a growing disparity of IT maturity across the different sectors of the health system (Figure 16). Consequently, eHealth solutions cannot deliver the intended full value of cross sector information exchange.

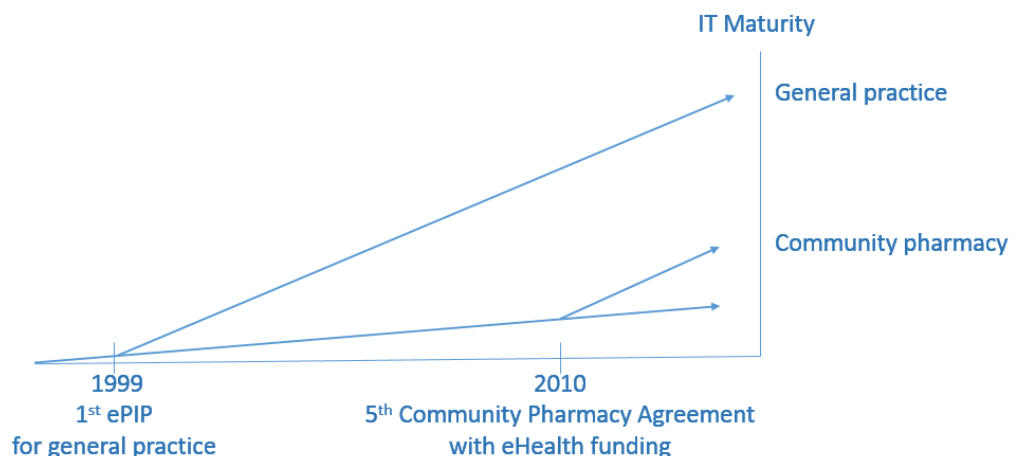


Figure 16 - IT maturity disparities between sectors

- 'Wave 1' lead eHealth site pilots projects were able to generate strong adoption of the Healthcare Identifiers Service. [45, p. 62]
- In provider sectors that were targeted for change and adoption activity coinciding with the launch of the My Health Record system (general practice, public hospitals and community pharmacy) the number of registered organisations exceeded even the most optimistic projection. [55, p. 6]
- Seed funding for software vendors and jurisdictions has delivered relatively big bang for buck, because the funding provided often does not cover the full cost of development and implementation. In addition, funding software vendors to implement eHealth solutions on behalf of one jurisdiction as part of the jurisdiction collaboration process has been deliberately done so as to benefit other jurisdictions using the same vendor systems.

Arguably though, given the lessons from Banks [54], the current mix of levers is incentive heavy. Incentives have several disadvantages. Firstly, “you only get what you pay for”, as one interview respondent commented. Because of this, stakeholders become accustomed to receiving incentives, dampening innovation, as noted in section 5.1.4 on page 43. Secondly, a desired behaviour often stops after the incentive stops. Thirdly, in the absence of an equivalent incentive for other sectors (e.g., specialists, aged care, and allied health), there exists the potential for a significant divergent disparity of eHealth readiness and IT maturity across all the sectors of the health system. In addition, it is necessary to apply levers in mutually reinforcing ways, given isolated levers are not sufficient. For example, the existing software conformance, compliance and accreditation (CCA) regime has not been sufficient in of itself to ensure usability of software. This is not to say that CCA is failing in its primary function, just that there is a gap between CCA and usability.

### **5.2.6 Change management**

The introduction of new technologies into clinical and administrative practice is inherently disruptive and requires change management to ease the change burden on end users. eHealth experience in Australia demonstrates that when done well, effective and coordinated change management allows for streamlined adoption and use of new processes and systems. The NT MyEHR service *HealthConnect* program was able to capitalise on specific enabling factors that were within its control. This is an example of where investment in change management activities has been able to exploit on the limitations of fixed characteristics in which the system was deployed and in turn deliver benefits and outcomes. [44, p. 36] [42, p. 32] When change management is absent or done poorly, end user resistance can completely derail any attempts at change. The Victorian *HealthConnect* project acknowledged that as the project progressed and the project objectives changed, there was less focus upon change management. As the initial project plans were not used, there was a lack of clear planning. As effort increasingly focussed on putting the project back on track, the focus on change management diminished. Assumptions that eHealth would be eagerly embraced and its advantages immediately obvious were proved incorrect by some stakeholder reactions. [42, p. 65]

At present, the broader eHealth program has room for improving its competency in change management. Critical success factors suggested by past experience include:

- Change management activities have to be resourced to commensurate with the scale of the transformative change that is being attempted. This means that organisations need to invest at least as much (and ideally more) into the programs of organisational change and transformation as they do in the technology itself. [57]
- It is important to note health care organisations and health services are not homogenous entities. When conducting a major change management program all parts of a healthcare organisation need to be considered, not just the clinical parts. eHealth operates in an ecosystem environment requiring complex socio-technical change, not change within sector or organisational silos. [58]
- Metcalf’s theory suggests that the more participants there are participating in an eHealth ecosystem, the more potential value the system will have, making it more attractive for others to join, and therefore minimise the negative impacts of change. [59, p. 184] This is an example of a network effect, and it can be harnessed when introducing eHealth. For a network

effect to flourish in the case of eHealth solutions such as secure messaging and shared record systems, an important lesson is the need for balance in network participation between suppliers of information and those who consume information.

- National solutions need to be supported by national change management and communication activities. For example, the rate of adoption and use of the My Health Record system has been slower than it otherwise might have been because of the absence of a nationally coordinated communications campaign.
- There has been ongoing interruption in change management at a primary healthcare sector-level caused by uncertainty in primary healthcare organisations, evidenced by the evolving and uncertain role of the Divisions of General Practice, Medical Locals, and now Primary Health Networks, in fostering eHealth amongst primary healthcare sector.

### **5.2.7 Measurement, evaluation, and benefits management**

eHealth investment is made on the assumption that it will delivery health system efficiency and improvements in population health outcomes. Measurement, evaluation, and benefits management are core organisational competencies that seek to ensure this investment delivers value for money.

Experience to date suggests sufficient resources need to be allocated to these disciplines because measuring the impact of eHealth is very difficult. This difficulty arises because an eHealth system or solution cannot be separated from the business changes necessary to make the system or solution useful. For example, the value of clinical terminology cannot be evaluated without factoring in how it was implemented and is utilised. Nevertheless, eHealth programs are increasingly expected to be grounded in evidence-based practice and policy, and to demonstrate return on investment. Organisations and programs that lack evaluation, measurement, and benefits management cannot learn from what has worked well and what has not worked well. In addition, lack of measurement and evaluation introduces a risk that necessary funds are not allocated to allow for ongoing work, because treasury submissions lack robust evidence. Lack of evidence also introduces a license to attack and undermine programs publically.

It has already been discussed that, when performed, evaluation has clearly influenced foundation infrastructure and emerging policy (see Section 4.3.3). There is an ongoing need to continue and expand evaluation, measurement and benefits management. The PCEHR review noted, "The current [measurement] approach does not appear to communicate how the overall benefits of this investment are being realised, recognition for achievements of individuals or communities that make positive contributions to benefit outcomes and when the expected efficiencies and patient benefits are being realised." [5]

In recent times, NEHTA has formed academic partnerships, developed a research framework, conducted comprehensive multi-organisation evaluations, and commissioned research with the intent of demonstrating the impact of eHealth. These activities has been in response for an ongoing need to quantify the impact of eHealth investment. In general however, there is a lack of evidence of eHealth benefit, or at best it is 'too early to tell'.

## 5.2.8 Implementation capability

An organisation's ability to effectively and efficiently implement new eHealth functionality, policy, and processes is an emergent competency, e.g. a competency that has emerged out of the need to implement a national infrastructure in a previously siloed system. Organisations that have mature implementation capabilities possess the knowledge and skills to implement eHealth efficiently with minimal adverse impacts. Organisations that struggle with implementations often have issues with cost blow outs, changes to scope, delays, failure to meet requirements, and human resources impacts.

Evidence suggests implementation capability is often lacking within healthcare settings. As an example, privacy policy implementation in general practice was assessed and described in a recent Office of the Australian Information Commissioner (OAIC) privacy assessment report. [60] Findings from the 2015 OAIC report identified all of the seven assessed GP clinics have extensive policy and procedure manuals which set out all the policies applicable to their practice, including the handling of personal information. However, these policy and procedure manuals often have incorrect or out of date privacy references. Furthermore, eHealth systems were not mentioned in any of the manuals supplied to the assessors. [60] This review demonstrates healthcare organisations are not implementing policies and procedures which meet their existing ethical, professional, and legal obligations.

For organisations that cannot implement policies to meet their security obligations under existing laws; it is quite naïve to think organisations have the understanding and in-depth knowledge to meet their obligations to connect their organisations and systems to a newly created and complex eHealth infrastructure. Providers can obtain the authority to interact with the My Health Record system, however clinicians often acknowledge possessing only rudimentary computer skills and understanding of privacy obligations. This is routinely demonstrated in a lack of the capacity to utilise the full features of a CIS and in the findings from the OAIC report.

For NEHTA, building implementation capability has been an ongoing exercise. NEHTA's implementation support capability to organisations has continued to mature, which has resulted in improvements in the *process of* implementation. A game changer for eHealth implementation was the funding of NEHTA's Implementation Services. Prior to this, the goodwill of implementing organisations was not sufficient to ensure actual implementation proceeded. Direct seed funding for implementations was an additional catalyst, which further instigated organisations to contribute their own resources to implement eHealth.

Lessons from previous implementations have improved the richness and efficiency of an implementation program activity and capability. For example, the short four-to-six month timeline of the 2015 Private Hospital Rapid Implementation Program is an example of how NEHTA has been able to shorten the process of implementation within complex ecosystems by applying lessons from previous experience. Additionally, the lessons from the Wave sites have been captured in implementation best practice guides, which set out recommendations for implementing organisations (see for example [61]). Implementation hands-on support also works to ensure NEHTA can play a coordinating role to ensure implementers do not diverge, and thereby risk system interoperability across the whole system.

Despite NEHTA's improvements in implementation capability, programs have not yet gone far enough to ensure benefits realisation. Seed funding has enabled outputs rather than outcomes. NEHTA's recent implementation work has acknowledged this shortcoming and has embraced the role of benefits and evaluation in producing outcomes.

Even with ongoing advancements, the handover from an implementation program to normal business operations is a critical step that has at times not been effective. There needs to be an ongoing monitoring capability embedded into implementations to ensure a smooth transition for program to business as usual.

There is a strong link between implementation capability and an organisation's capacity to build relationships and partnerships. For example, managing delivery on contracts has helped NEHTA to understand a lot about organisational processes, technical capabilities and limitations, as well as who within an organisation is critical to a successful implementation.

### 5.3 Theme 3: Necessary cultural shifts

The third and final theme is about the cultural shifts that are necessary to realise the full potential of eHealth.

eHealth has tremendous potential to instigate transformation of the Australian health system, and bring it closer to an ideal system that is sustainable, effective, and fair. However, research to date investigating the impact of eHealth on the quality, safety and efficiency of healthcare casts doubt over the extent to which these potentially transformative benefits are actually being realised. Empirical evidence from around the world has shown that while the impact of eHealth has generally been positive, results have been underwhelming, and related mainly to efficiency. [62] [63] [64] On the whole, evidence does not substantiate postulated benefits.

NEHTA has previously documented a stark disconnect between the relatively high level of readiness and adoption of eHealth technologies in Australia, and the small amount of meaningful use. [55] It is evident that technical readiness and adoption does not automatically translate into use. The implication NEHTA has drawn is that in addition to upfront development and implementation costs, *ongoing* effort is needed to instigate and maintain meaningful usage of eHealth solutions until the point where they reach self-sustaining critical mass.

The question remains, where should this ongoing effort be directed? As noted in section 5.2.4, it is extremely difficult to introduce disruption by changing the way health care providers work in ways that take advantage of eHealth capabilities. Past experience suggests health system participants invariably view eHealth as a good idea, and are generally willing to implement technical systems, but there are structural, attitudinal, and aptitudinal barriers preventing technical readiness from translating into widespread use.

What our analysis indicates is that there are a number of important **cultural shifts** across the health system that will have to occur in order for the full potential of eHealth to be realised. These shifts in thinking may seem like the tensions identified in section 5.1, however they differ in that they are not a choice one way or the other – we argue it is necessary normative change. These are shifts that need to occur not only among governments, policy makers, vendors and healthcare providers, but also amongst the general public.

### 5.3.1 Information communication technology is necessary to best practice care and public health

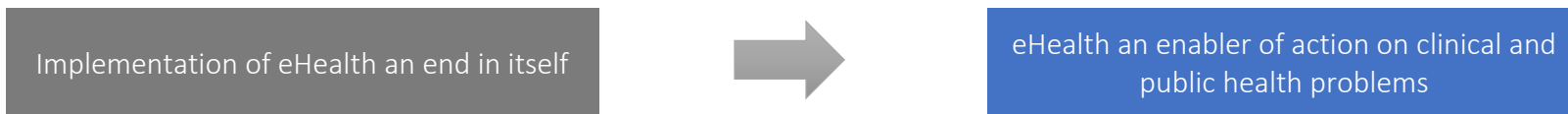
Digital health technology is a supplementary aid that improves efficiency – care providers could cope without it



Digital health technology is necessary for best practice care and public health – care providers rely on it

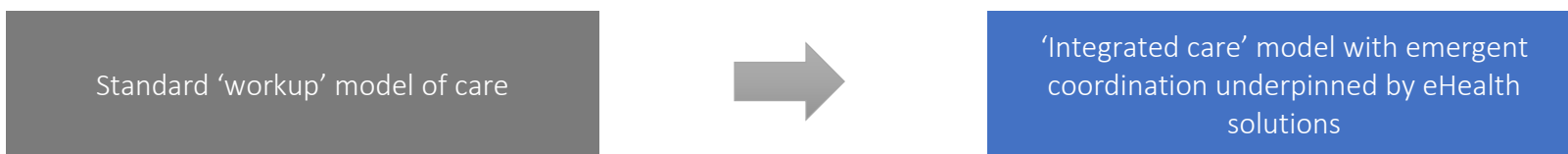
Why the shift is necessary	Implications	Challenges
<p>The significant investment in digital health demonstrates a belief in its potential benefit, however this has not yet translated into a general acceptance that we have moved past the time where it is possible to provide the same quality of health care without relying on digital health technologies. Evidence suggests the clinical community still adheres to the belief that it is possible to memorise huge amounts of information, continually assimilate new information and patient data, and then make effective, safe decisions. Surgeon Atul Gawande poignantly notes:</p> <p><i>At least 30% of stroke patients, 45% of asthma patients, and 60% of pneumonia patients receive incomplete or inappropriate care from their doctors. Mistakes are frequent in almost any endeavour requiring mastery of complexity and large amounts of knowledge. [65]</i></p> <p>Additionally, from Dr Larry Weed's 1971 Internal Medicine Grand Rounds:</p> <p><i>Of course we want specialisation... Yet if he's that good and focuses will he be able to encompass everything? No he will not. So you want people to be part of a system... A doctor has to be a guidance system. He is not an oracle that knows answers... The new knowledge we need now is how to use knowledge. [66]</i></p>	<ul style="list-style-type: none"> <li>• There is a need to normalise use of digital health technologies as part of routine clinical and administrative practice. 'eHealth' has to become 'health'.</li> <li>• Accordingly, the perception of digital health infrastructure, services, and systems must evolve from nice-to-have to mission critical. This criticality has implications for the extent of accountability accepted by organisations who provide infrastructure and services (see Section 5.1.5 on page 44).</li> </ul>	<ul style="list-style-type: none"> <li>• Optimal healthcare in a complex ecosystem cannot be done efficiently and safely on paper. However, paper medical records have been an incredibly successful and effective technology that is resistant to disruption.</li> </ul>

### 5.3.2 eHealth is enabler of action on clinical and public health problems, not an end in itself



Why the shift is necessary	Implications	Challenges
<p>eHealth is not yet <i>underpinning</i> clinical and public health programs. It often remains the case that eHealth agencies and programs are set up as separate silos, and that implementation comes to be viewed as an end in itself.</p> <p>There is a risk that in focusing on the implementation of a digital health technology as the goal, the need to realise improved health outcomes from this investment is discounted.</p> <p>The perception of digital health needs to evolve to ensure infrastructure and solutions are leveraged not only in health, but in other portfolios that affect health. For example, the Northern Territory’s shared electronic health record system over time came to enable clinicians to better provide proactive population-based primary health care. This suggests eHealth should be written into primary health care strategies <i>as an enabler</i>. There is encouraging evidence of this occurring more widely, for example in the RACGP vision statement [67] and planned trial of the Health Care Home model [68].</p>	<ul style="list-style-type: none"> <li>• The national digital health strategy should seek to align digital health activities with broader policy drivers and attempts at health system transformation, and should also contain activities designed to ensure digital health is included in <i>other</i> clinical and public health strategies (e.g. primary health care, chronic disease, preventive health).</li> <li>• Broader clinical and public health programs must necessitate utilisation of digital health infrastructure, services, and solutions in order to deliver against their target outcomes.</li> <li>• Digital health programs need to be defined not by the technologies being implemented, but by the desired outcomes. E.g. instead of a program being called ‘secure messaging’, it could be named ‘clinical correspondence’.</li> </ul>	<ul style="list-style-type: none"> <li>• eHealth is an isolated, small part of a bigger picture. E.g., eHealth is a small component of each Health Minister’s portfolios. In addition, the eHealth Division within the Commonwealth Department of Health has historically been a discreet program not integrated into the other Departmental programs.</li> <li>• Cultural dominance of technical thinking within eHealth programs and agencies (see Section 5.1.1 on page 38).</li> </ul>

### 5.3.3 eHealth solutions will underpin evolution of the ‘workup’ model to an ‘integrated care’ model



Why the shift is necessary	Implications	Challenges
<p>At the moment, healthcare delivery is predominantly based upon a ‘workup’ model, which is focused on a discreet</p>	<ul style="list-style-type: none"> <li>• Integrated care requires thinking to evolve from ‘local’ siloed records to a centralised, shareable record (e.g.</li> </ul>	<ul style="list-style-type: none"> <li>• Transparency of the provenance of data and of the mechanisms employed to help minimise data errors is</li> </ul>

interaction between the clinician and the patient. This model involves individual providers collating information from a number of sources (including the patient), and then analysing and synthesising that information in order to make informed clinical decisions. The workup, or ‘clerking’ model of systematic enquiry is a failsafe method for the care provider. However, this failsafe method can be highly inefficient, particularly for people with chronic disease whose care is fragmented across multiple providers—meaning that acute care and primary care work predominately in isolation and patient care is not well coordinated. [69]

There are increasing attempts within Australia to address this with the introduction of an ‘integrated care’ model. There are a number of definitions of integrated care, however all point to a transformation of healthcare delivery which will lead to better health outcomes and health system efficiency. The following definition is a synthesis:

*Integrated care brings together seamless, efficient coordination of the whole of a person’s health needs across the continuum of all medical phases from prevention and health promotion through to end stage care, regardless of who funds, owns or provides each service.*

*Integrated care is dependent upon better communication and connectivity between health care providers to ensure the needs of consumers are central to healthcare delivery, which will result in improved patient satisfaction and better health outcomes.<sup>13</sup>*

eHealth solutions will underpin evolution of the ‘workup’ model to an ‘integrated care’ model.

cloud-based) that gives a *snapshot of patient state at a point in time*.

- Continuity of care and reduction of duplication are key objectives of integrated care. In many integrated care models, a care provider (e.g. a general practitioner) plays an active coordinator role to ensure a patient’s needs are met without duplication. Importantly, eHealth solutions will enable coordination to *emerge* without a care provider playing an active coordination and planning role. This could be called **emergent coordination**. It will arise from adherence to best practice-based rulesets instantiated within clinical information systems, together with information exchange (allowing the patient state to be accurate and current irrespective of where the patient interacts the health system). An analogy for emergent coordination is complex, seemingly coordinated flight patterns emerging in migratory birds (‘flying V’), which actually result from simple instinct (innate rulesets) to minimise drag. This is illustrated in Figure 17 below.

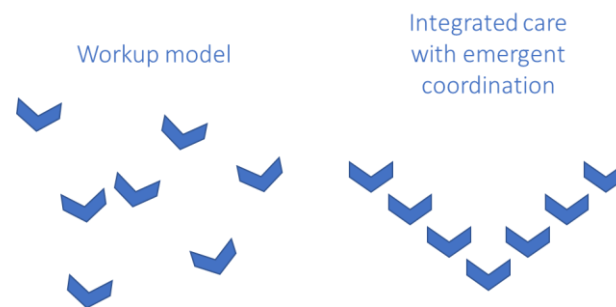


Figure 17 – Emergent coordination

- In an integrated care model, the concept of a ‘nominated provider’ is an anachronism. According to a NHPA report frequent GP attenders and their use of health services in 2012–13, even a person who goes only occasionally to the GP (4-5 times per year) sees on average 2.4 different GPs and 1.4 different medical specialists. [70]

required. From the Northern Territory’s experience of their shared electronic health record system, initially it wasn’t clear how clinicians were to utilise the capabilities offered by the MyEHR service to modify workflows and work practices in a beneficial way. For example, clinicians receiving information from another sector were initially hesitant about acting on recommendations. A clinical lead commented:

*The next clinicians were not comfortable following recommendations because they couldn’t see how you came to them... [they] need a picture of how you came to that. If responsibility has transferred, I don’t want to blindly follow instructions. For example, what is called the ‘work up’ was often not included. [You] need visibility of the thinking process... so that I can trust the recommendation, or have cause to challenge it.*

<sup>13</sup> [NSW State Health Plan: Towards 2021](#); [Victoria Department of Health](#); Queensland Health’s [Integrated care innovation fund](#); WA Health’s [Networks Strategic Direction 2015-2020](#); South Australia’s [Transforming Health Discussion Paper](#); Tasmania’s [Health Plan](#)

### 5.3.4 High-quality data comes at a cost

Data generation is an administrative task with marginal clinical utility, that must be absorbed into standard clinical practice



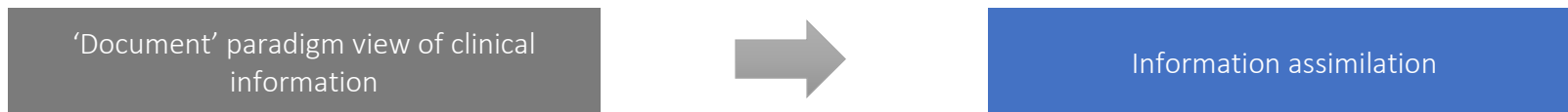
High quality data is a prerequisite for high quality care, and its generation comes at a cost of time and effort

Why the shift is necessary	Implications	Challenges
<p>Care providers rely on high quality data and information to make informed clinical decisions. The standard ‘workup’ model (see Section 5.3.3 above) enables a clinician to collect and assimilate the information necessary at a point in time to make a particular decision. But increasingly, care providers are being expected to generate high quality data for use by <i>other</i> care providers and for secondary purposes. For instance, high quality data in turn enables improved monitoring of trends, chronic disease control, surveillance, and decision support. This is illustrated by anecdotal feedback regarding the rollout of structured discharge summaries in Western Australia:</p> <p><i>Notification and Clinical Summaries software (NaCS) is currently being rolled out to public acute facilities as the system to generate electronic, shareable discharge summaries. NaCS discharge summaries conform to NEHTA standards, as well as incorporate SNOMED CT-AU terms. The impact means there is now atomised data available for consumption by other sectors and systems from WA hospitals.</i></p> <p>WA feedback also typifies the impact on care providers:</p> <p><i>The NaCS predecessor at Royal Perth Hospital was an unstructured, free text system known as TEDS. TEDS was simpler and it took less time to curate a discharge summary largely because it was free text. Junior registrars having used both systems claimed NaCS takes more time to author the discharge summary. However the beneficiaries of the higher quality NaCS discharge summary include any other care providers, as well as the patient.<sup>14</sup></i></p>	<ul style="list-style-type: none"> <li>• Clinical terminologies (SNOMED CT-AU and AMT) enable improving data quality from unstructured paper documentation or free text to shareable, interoperable, atomised, and structured. However, innovation is required to ensure high quality data generation does not overly compromise end user experience.</li> <li>• NEHTA’s experience with the NT MyEHR evaluation and the Clinical Usability Program (CUP) show that where providers use the full range of (relevant) functionality within their clinical information systems, high quality, and structured data that is suitable for sharing and secondary uses can be produced with minimal additional effort. However this is not to say that the full range of functionality is necessary at that point in time in every situation – this is where the cost lies.</li> <li>• Possible compensatory advantages:             <ul style="list-style-type: none"> <li>○ reduce patient : clinician volume</li> <li>○ institution accepts accountability for lower quality data</li> <li>○ vendors innovate to ease documentation burden</li> </ul> </li> <li>• Alternate funding models that allow for data generation should be considered, e.g. like those payments being introduced as part of the forthcoming trial of the Health Care Home model. [68]</li> </ul>	<ul style="list-style-type: none"> <li>• Barriers to high quality data include:             <ul style="list-style-type: none"> <li>○ minimal accountability mechanisms in place to ensure clinicians consistently produce high quality documentation;</li> <li>○ prevalence of paper and free text documentation;</li> <li>○ multiple siloed systems within individual organisations e.g. hospitals;</li> <li>○ episodic remuneration models restricting time to document;</li> <li>○ low clinical skill levels using clinical information systems;</li> <li>○ lack of capacity or demand to exploit opportunities to use data analytics; and</li> <li>○ ‘Clunky systems’ without the tools and level of usability necessary to enable efficient, high quality data entry.</li> </ul> </li> <li>• A benefit asymmetry occurs where there is little to no direct and immediate benefit to the individual provider received in return for generating high quality, shareable data. Instead, the benefits from this effort are often realised downstream by different care providers. An interviewee commenting on the NT’s experience stated: <i>[Engagement was] complicated by the fact that you get benefit from what someone else from another healthcare setting does... really some clinicians got nothing; others got the dividend. This requires a cultural shift.</i></li> </ul>

<sup>14</sup> Commentary provided to the NEHTA Benefits and Evaluation team by clinicians at Royal Perth Hospital.

<p>As noted in section 5.2.4 on page 51, imposing additional burdens on providers such as requiring high quality data generation without compensating advantages can lead to dissatisfaction and burnout. Healthcare organisations and governments therefore have to accept that requiring care providers to 'document' (i.e. generate data) in a way that improves data quality costs time and effort.</p> <p>In addition to this, care providers themselves need to recognise that they are part of a system that cares for patients, and that high quality data is a prerequisite for high quality care. There are downstream implications of their documentation, i.e. other providers receive benefit because of their documentation effort. As ex-AMA president and current NEHTA Chair Steve Hambleton stated in an address to NEHTA:</p> <p><i>Information is not memory aids in a vault; it has become data to be shared to help that patient get the best possible care from the health system.</i></p>		<ul style="list-style-type: none"> <li>• Because of this benefit asymmetry, creating data for sharing is, by itself, arguably not a sufficient motivator to improve data quality in local systems. Therefore, the focus of change and adoption activities for providers should not be on data quality as an end, but rather it should be on encouraging optimal use of their clinical information system as an integral part of delivering high quality care. Optimal use of clinical information systems will generate improved data quality as a by-product (though not without some additional effort), and thereby provide the benefits conferred by high quality data.</li> </ul>
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### 5.3.5 'Document' paradigm must give way to information assimilation



Why the shift is necessary	Implications	Challenges
<p>There are four basic processes for manipulating health data:</p> <ol style="list-style-type: none"> <li>1 Assemble – Curation, authoring of clinical documentation</li> <li>2 Dispatch – Send, transport, distribute information</li> <li>3 Receive – Obtain, accept, collect information</li> <li>4 Assimilate – Incorporation, amalgamation, consolidation of health information</li> </ol> <p>At the moment, assimilation of data from multiple data sources to create consolidated views is not occurring. The dominant paradigm is that clinical information comes in the unit of 'documents'.</p>	<ul style="list-style-type: none"> <li>• It is acknowledged unlocking data from documents has not yet been implemented in clever ways; but is a necessary advancement in the delivery of care.</li> <li>• Like integrated care, assimilation requires transparency of the provenance of data and of the mechanisms employed to impart trust and help minimise data errors.</li> <li>• Assimilation also requires a routine, systemic expectation that patients have a role in checking, correcting and confirming the quality of data.</li> </ul>	<ul style="list-style-type: none"> <li>• At the moment, there is not a framework or process for assessing the veracity of information in shared record systems back to the source. That is, it is not yet algorithmically possible to determine whether or not something (e.g. a medications list) is 'correct' and that it is safe to assimilate it from different sources.</li> <li>• There is however recognition of this issue. The National eHealth Security and Access Framework attempts to give principles to address data provenance by "ensuring that all electronic health information is traceable from its creation at a verifiable trusted source, and through its transition and</li> </ul>

In order for health data to be utilised to its full potential and thus provide substantial value to individuals and the health system, thinking needs to evolve beyond limiting clinical documentation to discrete documents, and building instruments to ensure discrete data is capable of being assimilated (Figure 18).

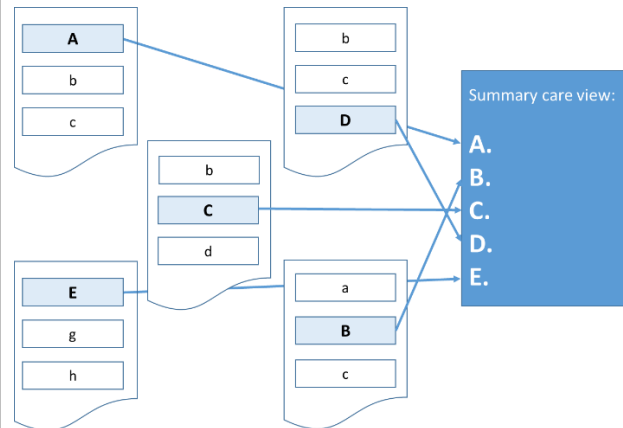


Figure 18 – Assimilation of data from multiple sources

possible augmentation en route to its destination for immediate and potential futures uses.” [71]

### 5.3.6 eHealth infrastructure, services, and specifications comprise a platform for innovation

‘eHealth’ means discrete clinical information systems (i.e. standalone software programs)

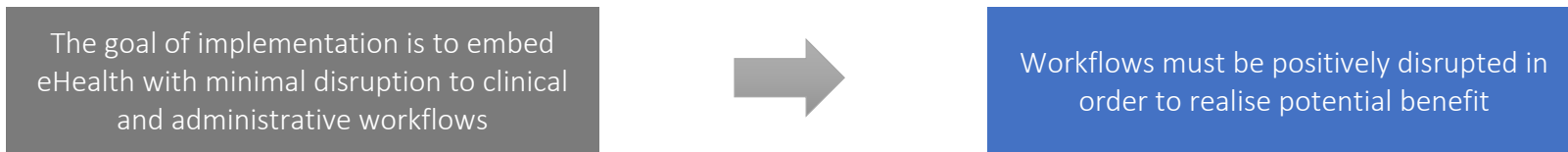


eHealth infrastructure, services, and specifications comprise a platform for innovation

Why the shift is necessary	Implications	Challenges
<p>The current dominant perception of ‘eHealth’ and digital health technologies is that they are discrete clinical information systems (i.e. standalone software programs). For instance, the My Health Record system was originally conceived as a platform, however it has been sold as a system that acts as supplementary source of information only capable of limited integration with local clinical information systems. As</p>	<ul style="list-style-type: none"> <li>• Terms of use, supporting policies, and licence agreements regarding eHealth infrastructure, services and solutions must be flexible to allow innovation, as it cannot be predicted how systems will be used, or how healthcare delivery will be provided in future.</li> <li>• The infrastructure services have been ‘implemented’ but are not being used to their full potential. Some examples of where organisations have capitalised on the potential value</li> </ul>	<ul style="list-style-type: none"> <li>• A number of challenges relating to this cultural shift are described in section 5.2.5 on page 52 (<a href="#">Using structural adjustment and market alignment mechanisms</a>), including commercial barriers, and inefficient markets, and uncertainty around government commitment reducing the willingness of private organisations to invest.</li> </ul>

<p>a result, the My Health Record system is not currently being utilised as a platform for innovation.</p> <p>Similarly, widespread integration and usage of foundation infrastructure services has not occurred – they are mostly being used only in the context of the My Health Record system.</p> <p>What is required is a shift in the perception of eHealth infrastructure, services and solutions to where they are utilised as a platform to enable innovation in care delivery. Simply ‘electrifying’ current workflows through basic clinical information systems does not improve healthcare delivery.</p>	<p>have emerged. For example, by using the IHI in the management of duplicate records, the ACT is the only jurisdiction using the Healthcare Identifiers Service for something other than the My Health Record system. ACT Health has been able to quantify significant benefit: through the use of Healthcare Identifiers and the Patient Master Index, ACT Health has avoided administrative costs of \$234,000 using IHIs to identify duplicate records. [72]</p>	
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### 5.3.7 Workflows must be positively disrupted in order to realise potential benefit



Why the shift is necessary	Implications	Challenges
<p>Experience of eHealth in Australia suggests a common approach to implementation is to attempt to embed eHealth within existing clinical and administrative workflows <i>with minimal disruption</i>. However, it is unrealistic to expect that eHealth can be both embedded with minimal disruption, while at the same time realising a significant positive effect. You can only have one or the other.</p> <p>Exemptions to standards and design compromises are symptomatic of the mindset that tries to minimise impact on workflow. This compromise reduces potential benefit. For example, reinforcing the position that the My Health Record system is “a supplementary source of information that may, but does not always need to be, used by clinicians in caring for their patients” [5] is arguably inconsistent with the system’s expected benefits.</p>	<ul style="list-style-type: none"> <li>• In order to realise value from eHealth it is necessary to positively disrupt clinical and administrative workflows. <i>You cannot make an omelette without breaking a few eggs</i></li> <li>• Imison and colleagues write: “Transformation comes from new ways of working, not the technology itself – what is needed is a transformation programme supported by new technology, not the other way round.” [57]</li> </ul>	<ul style="list-style-type: none"> <li>• As noted in section 5.2.4 on page 51, it is extremely difficult to introduce disruption by changing the way health care providers work. Past experience suggests there are structural, attitudinal, and aptitudinal barriers (see for instance [55]).</li> <li>• A number of challenges relating to this cultural shift are described in section 5.2.5 on page 52 (<a href="#">Using structural adjustment and market alignment mechanisms</a>), including first mover disadvantage, benefit asymmetry, and parties with a vested interest in the status quo resisting change.</li> </ul>

## 6 Conclusion

Important implications and opportunities arise from these findings which are relevant to future digital health implementations and policy. NEHTA has endeavoured to incorporate these lessons into its work, which will assist with ongoing and future digital health planning in Australia.

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