



**Pathology Result Reporting Package
(v1.0 Draft)**

Purpose and Scope v3.0

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Draft for comment - Commercial-in-confidence

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Document Information

Change History

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2.1	15/05/2008	Siobhan Jenks	Updated presentation to align with all the documents in the package.
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Table of Contents

Document Information	iii
Change History	iii
Table of Contents	ii
Preface	v
Document Purpose	v
Intended audience.....	v
Document Map.....	vi
1 Introduction	1
1.1 Background	1
1.2 Pathology Landscape.....	2
1.3 Identifiable Business Drivers	4
1.3.1 Business Drivers	4
1.3.2 Summary.....	9
1.4 Major Issues Identified	10
1.4.1 Variability in Standards and Systems used in Electronic Information Exchange.....	10
1.4.2 Variability in Pathology Result Information being exchanged with Respect to Structure and Terminology.....	10
1.5 NEHTA's Strategy	11
1.6 Packaging.....	12
1.7 Package Purpose	12
2 Benefits	14
2.1 Stakeholder Benefits	14
2.1.1 Individuals	14
2.1.2 Providers	14
2.1.3 Organisations.....	16
2.1.4 Healthcare System.....	17
3 Package Scope	18
3.1 Phased Delivery Approach.....	19
3.1.1 Version 1.0	19
3.1.2 Subsequent Versions	20
3.2 Business Objectives	20
3.2.1 Open Standards used in the Exchange of Electronic Information	20
3.2.2 Structured Content and Terminology.....	20
3.3 Outcomes.....	21
3.4 Community Participation.....	21
3.4.1 Individuals	22
3.4.2 Provider Organisations.....	22
3.4.3 Providers	22
3.5 Principles.....	23
3.6 Leveraged e-Health Services	23
3.7 Stakeholders.....	23
3.8 Strategic Alignment	24
3.9 Package Constraints.....	24
3.10 Areas for Future Expansion	25
3.10.1 Structured Reporting Including Terminology	25
3.10.2 Secure Messaging Additions.....	25
4 Solution Architecture	26
4.1 Architecture Overview	26
4.1.1 Provider Information Flow	26

4.1.2	Recipient Information Flow	27
4.1.3	Scenario 1.....	28
4.1.4	Scenario 2.....	28
4.2	Local Systems	29
4.2.1	Laboratory Information Systems.....	29
4.2.2	Clinical Information Systems.....	30
4.2.3	Notification Provider Systems.....	30
4.3	Connectivity.....	30
4.4	Services	31
4.4.1	Pathology Provider	31
4.4.2	Pathology Report Recipient.....	31
4.4.3	Notification Provider	31
4.4.4	Storage Provider	31
5	How will the Solution Work?.....	32
5.1	Participation.....	32
5.1.1	Individuals	32
5.1.2	Provider Organisations	32
5.1.3	Providers	34
5.2	Pathology Result Report Content	35
5.2.1	Information	35
5.2.2	Terminology	35
6	Privacy.....	37
	References.....	39
	Package Documents.....	39
	References	39

Preface

Document Purpose

The goal of the Purpose and Scope document is to define a high-level vision for a national approach to pathology result reporting, comprising objectives and scope.

Intended audience

Documentation included in the Pathology Result Reporting Package should be read and understood by:

- Software development teams (i.e. vendors of Laboratory Information Systems and Clinical Information Systems, across national jurisdictions) responsible for:
 - Planning, architecting or implementing:
 - clinical applications
 - infrastructure components
 - messaging interfaces that facilitate semantic interoperability
 - Supporting NEHTA-defined terminology via:
 - clinical interfaces and messaging interfaces
 - value generation for pick-lists
 - creation or receipt of electronic information exchanges containing clinical content
 - query writing over clinical (EHR) data
 - data constraint check implementation
 - term mapping design
- IT-aware clinicians:
 - To evaluate the clinical suitability of NEHTA-endorsed standards
- Researchers:
 - To explore specific aspects of NEHTA-endorsed standards.

This document is a draft and has been provisionally released for comment and feedback purposes.

Document Map

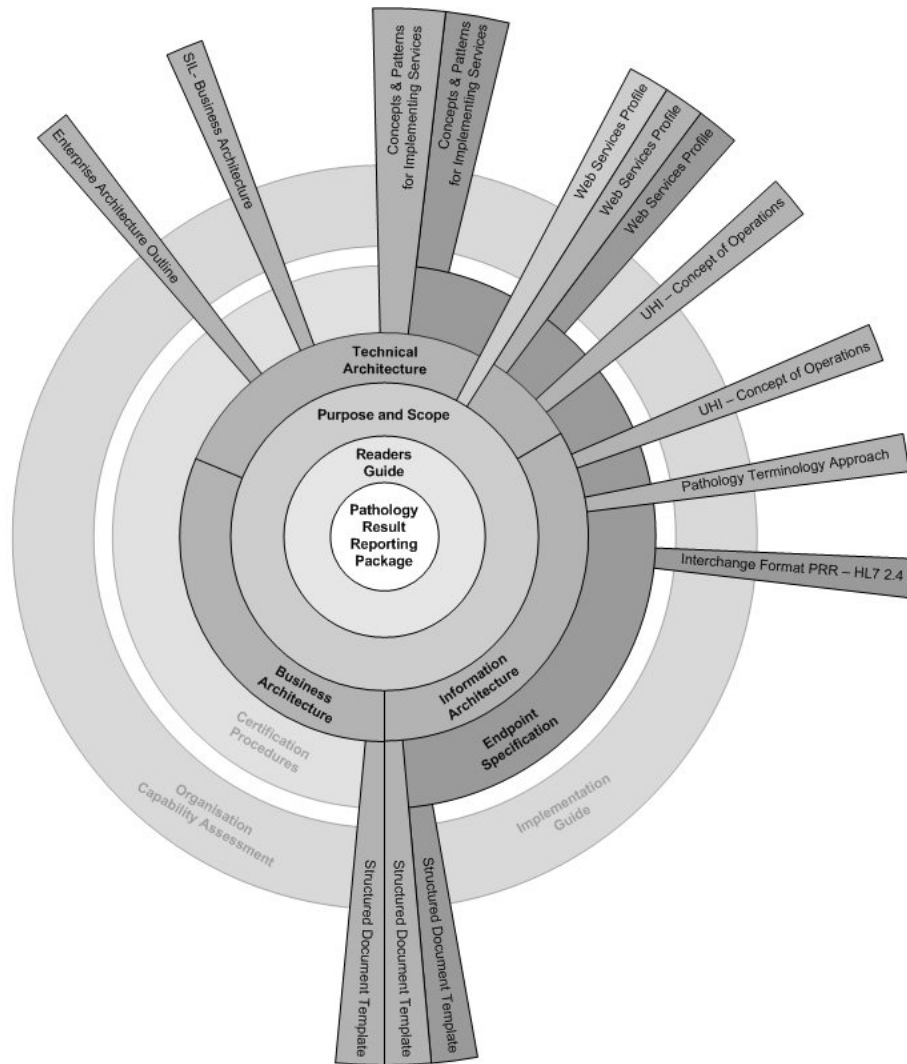


Figure 1: Pathology Result Report Package Document Map

The Package Document Map is designed to show the hierarchy of core documents within the package, and their relationships to ancillary documents. Core package documents are represented as arcs, while ancillary documents (or references to such) appear as radiating spokes. Note that, due to the 'many-to-many' relationships within the package, some ancillary documents appear more than once, and have typically been grouped for clarity.

It is recommended that readers commence with documents at the centre of the map (i.e. the 'Readers' Guide', and 'Purpose and Scope'), working outwards to the detailed, technical documents as needed. Business sponsors may wish to focus upon core documentation, while technical implementers will also likely include ancillary documents.

Core documents are explained in the Readers' Guide [PATH-PRR-RG].

1 Introduction

1.1 Background

NEHTA Limited is a not-for-profit company established by the Australian, State and Territory governments to develop better ways of electronically collecting and securely exchanging health information.

The NEHTA Review undertaken by the Boston Consulting Group (BCG) confirmed that a national electronic health system will deliver significant benefits to individuals, healthcare providers and governments when compared to existing, unconnected health systems. Following two years of consultation and research, NEHTA has made significant progress in the development of standards and specifications for an interoperable national electronic health system (e-health).

The next stage requires the involvement of industry stakeholders in the development of end-to-end e-health solutions which deploy NEHTA standards, specifications, infrastructure and services across Australia, better enabling the sharing of health information in the prioritised health domain areas of pathology reporting, discharge summaries, referrals, and medication management. This work will serve as a precursor to wider national uptake and eventually provide the connectivity and interoperable systems to support personal electronic health records and related community benefit.

The following key requirements inform NEHTA's work program for 2007/08 – 2008/09:

- **National infrastructure projects** continue to evolve, including:
 - **Unique Healthcare Identifiers (UHI)** ensuring unique identification of all individuals and healthcare providers across Australia
 - **Clinical Terminologies and a National Product Catalogue** allowing the electronic exchange of clinical information, using a common clinical language with consistent terms, descriptions and formats
 - **National Authentication Service for Health (NASH)** which supports the approval, registration and supply of encryption certificates to clinicians
 - **Conformance, Compliance and Accreditation (CCA)** allowing the acceleration of NEHTA's work towards a Reference Platform to help implementers - particularly vendors - demonstrate and validate the extent to which they have implemented national standards¹
- **National development of e-health packages**, emphasising an inclusive approach to the prioritisation of:
 - Information specifications
 - Business specifications
 - Technical specifications
- **Implementation partnerships** will be sought to deliver 'real world' proof of concept results in local situations
- **Secure messaging** and overall **national architecture** work covering the delivery of NEHTA infrastructure services (i.e. UHI, Clinical

¹ In the longer term, a National Accreditation Centre will perform CCA functions for all NEHTA standards and will provide the capability for more complex certification processes associated with Individual Electronic Health Records (IeHR).

terminology, authentication, secure messaging etc.) and the development - subject to approval - of a national Service Instance Locator (SIL) to manage applications involved in the e-health infrastructure

- **Engagement** with clinicians, vendors and other stakeholders to ensure acceptance, collaboration and take-up of NEHTA services
- **A national e-health systems roadmap** for ongoing implementation action consistent with the business case for a Individual Electronic Health record (IeHR) slated for consideration by the Council Of Australian Governments (COAG) in late 2008.

Additionally, during 2005 and 2006, NEHTA engaged in a number of requirements-gathering exercises within the pathology domain:

- **A Clinical Reference Group (CRG)** was established, comprised of nominees from relevant colleges and peak organisations to review and discuss Clinical Data Groups
- State health jurisdictions were consulted on the formulation of the **Australian Reference List** of Pathology Requests and Results (**ARL**), being an amalgamation of the pathology test lists received from existing Laboratory Information Systems or Clinical Information Systems used by States, representing the test names most commonly used in requests and reports in Australian pathology today
- **The Australian Association of Pathology Practices (AAPP)** began collaboration with NEHTA to identify the requirements for pathology communications, which have been used to create the current NEHTA package for pathology reporting, involving a representative subset of the Australian pathology community. (The requirements list is not exhaustive as not all stakeholders were included in this body of work.)

This work has been coordinated to assist the development of the deliverables for the Pathology Result Reporting Package v1.0 (PRRP).

1.2 Pathology Landscape

Pathology is the branch of medicine concerned with an understanding of the causes and processes of disease via a study of changes in body tissues, in blood, and other body fluids. Some of these changes reveal causes, while others reflect the severity of the disease and are used in diagnosis and also to track the effects of treatment [RCPA2007].

There are approximately three hundred and fifty private pathology business entities in Australia, while the top four account for over eighty seven percent of industry revenue. Conversely, fewer than twenty five public pathology service organisations are likely to remain, nation-wide, in the near future, given current trends.

Pathology is a significant contributor to healthcare costs with approximately fifteen percent of Medicare expenditures being spent on pathology alone. Industry sources estimate that approximately seventy percent of information transfers, or 'flows,' between health service providers are pathology-related.

At present, pathology has seven different areas of activity. These relate either to the testing methods employed or varying types of disease under investigation. They are:

1. **Anatomical Pathology**, which deals with the diagnosis of disease through the study of tissue samples
2. **Chemical Pathology**, which encompasses the detection of changes in substances (e.g. electrolytes, enzymes and proteins) in blood and body fluids, and the detection/measurement of tumour (i.e. potentially cancer-related) markers, hormones, poisons, drugs, etc.

3. **Genetics**, which involves the microscopic analysis of chromosomal abnormalities (i.e. clinical cytogenetics) using the tools of DNA technology to analyse mutations in genes (i.e. molecular genetics)
4. **Haematology**, which deals with aspects of diseases affecting the blood (e.g. anaemia, leukaemia, lymphoma, clotting/bleeding disorders, etc.) and blood transfusion services
5. **Immunopathology**, concerned with disease responses of the immune system
6. **Microbiology**, which deals with diseases caused by infectious agents such as bacteria, viruses, fungi and parasites
7. **General Pathology**, which spans the major aspects of all branches. A general pathologist would usually work in a medium-sized private practice, community hospital, large country town or other non-metropolitan centre, and would typically consult with more specialised colleagues if required [RCPA2007].

Pathology activities may be performed in centralised laboratories, specialised units, or in clinical near-patient situations.

Typical information flows in pathology are illustrated in Figure 2, below. The main flows are between primary pathology laboratories and individual pathology test requesters.

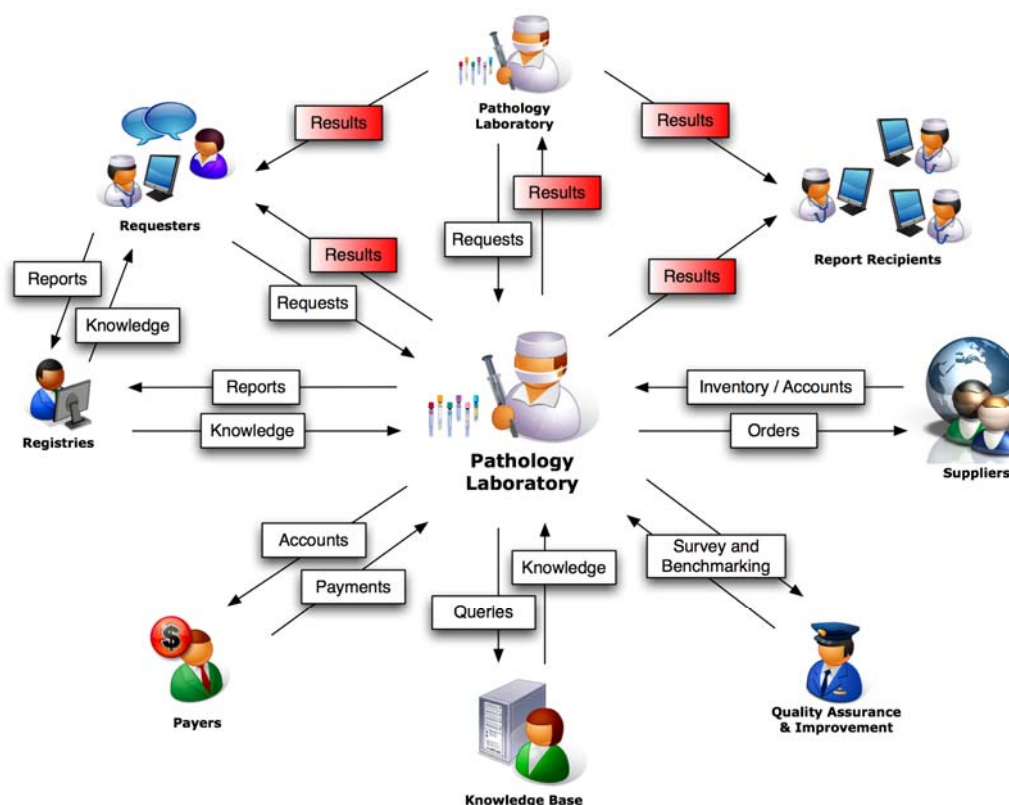


Figure 2 - Pathology Community Information Flows

The red-shaded boxes (between laboratories, requesters and report recipients) are the focus of Pathology Result Reporting Package v1.0.

Currently, the electronic reporting of results (or copies) from private pathology providers and external (i.e. outside the public health service organisations) reporting by public providers is limited by a number of factors:

- A wide variety of formats are currently used, mostly to meet the differing requirements of secure messaging and practice management systems (e.g. GP desktops); often the PIT format, but HL7 V2.3.1 is also widely used (albeit with considerable variation between

implementations), among other formats (e.g. PDF, RTF, tab-delimited text) etc.

- The private pathology sector exhibits a high volume of (increasingly mission-critical) electronic result reporting, while the public sector has tended to produce a lower volume of such traffic (now trending upwards, possibly as the value of the practice is becoming more apparent)
- Electronic reporting requires multiple interfaces to be loaded onto receiver systems (one for each sending laboratory and/or secure messaging provider) which leads to a complex and potentially unstable user interface environment for receivers, due to unintended software interactions
- Such reporting relies upon a variety of secure messaging providers as conduits.

Despite these limits, the existing penetration of electronic communications within the pathology reporting community has identified it as a priority sector for enhancement through the adoption of standardised e-health specifications, particularly those designed to improve connectivity and, subsequently, interoperability.

1.3 Identifiable Business Drivers

There are several business drivers acting upon the pathology community:

- Demand for pathology services
- Competition
- Industry regulation
- Costs and profitability
- Electronic reporting.

Two major issues are targeted by the Pathology Result Reporting Package v1.0, each relating to electronic reporting:

- The effects of variability in the encoding and formatting of pathology result information, as delivered to the clinician
- The effects of variability arising from the ways by which reports are electronically exchanged.

1.3.1 Business Drivers

1.3.1.1 Demand for Pathology Services

Many factors influence the demand for pathology testing services, including:

- Advances in science and technology
- The increasing range of available diagnostic services (e.g. the growing demand for genetically-based tests)
- The cost of pathology services to the end-consumer
- The fact that Medicare dictates the level of reimbursement available:
 - The Australian government currently limits the excessive use of pathology services for which a Medicare benefit may become payable and which is not reasonably necessary for the adequate medical care of the patient
 - Consequently, the growth of the government's expenditure on pathology services is limited to five percent per annum

- Demographic factors in both the patient and requester populations can influence the range and frequency of pathology tests:
 - ‘Bettering the Evaluation And Care of Health’ (BEACH) data from the Australian GP Statistics and Classification Centre suggests that younger GPs test more frequently but prescribe less often, while people over sixty five years of age tend to use medical services more frequently than younger people with an accompanying higher rate of pathology testing. Federal announcements of increased funding to better educate GPs on the use of pathology services may assist in focussing demand. [BEACH]
- Increases in the number of tests ordered by doctors
 - Reasons cited include higher GP activity levels overall, more precautionary testing in part due to the increasing threat of litigation and higher rates of intervention during the monitoring of chronic diseases. The latter tends to result in simpler tests (e.g. electrolytes, cholesterol, full blood, etc.). While newer, more expensive tests are becoming increasingly available, industry figures indicate that pathology growth is primarily due to increased requests for simpler, cheaper tests.
- The reporting of pathology test results back to requesters (and, in some cases, the transmission of copies to other relevant parties) is becoming increasingly electronic.

1.3.1.2 Competition

Competitive advantage in private pathology tends to be associated with:

- Speed and accuracy of processing and result delivery
- Location
 - Private pathology providers compete by locating their collection centres in areas with an adequate supply of requesters. Point-of-care (near-patient) testing remains marginal.
- Range of services provided
 - Some providers specialise in particular areas of pathology, while smaller laboratories may be unable to provide as broad a range of tests as can be offered by larger providers.
- Referral network
 - Professional reputation and relationships with referrers, particularly within the medical workforce.
- Information technology customer interfaces
 - May introduce barriers to customers switching or splitting between providers. Includes ordering/results, decision support tools and database management.
- Barriers to entry
 - The major barriers include relatively high degrees of regulation (e.g. on numbers of collection centres), regulation compliance costs, high entry costs associated with specialised equipment, workforce shortages, etc.

Price of pathology testing tends not to be a major competitive factor in this industry [IBIS2007].

1.3.1.3 Industry Regulation

Medicare benefits are payable for pathology services if the specimens are collected through an approved collection centre, the tests are undertaken by

an approved pathology practitioner in an accredited pathology laboratory, and the laboratory is operated by an approved pathology authority.

Approval usually involves (among other variables) the pathology authority holding accreditation through the joint scheme conducted by the National Association of Testing Authorities (NATA) and the Royal College of Pathologists of Australasia (RCPA) depending upon the service category.

Medicare outlays (and hence a major part of industry revenues) are capped via two main mechanisms. The memorandum of understanding between the Australian government and the industry bodies pegs growth in Medicare benefits to a nominal rate (five per cent per year until 2009). In the event that growth in government funding exceeds this stipulated rate, the government is able to cut the Medicare fee unless the industry can show that the additional growth was due to either industry cost increases, government policy changes or to government cost shifting (i.e. from public hospitals).

The other method is 'episode coning' for out-of-hospital patients, via which only the three most expensive tests for any single testing episode are eligible for a Medicare rebate. (The justification for this is the lower cost of processing several tests on a single specimen).

1.3.1.4 Costs and Profitability

Labour represents the major expense for private pathologists, accounting for around forty per cent of industry revenue [IBIS2007]. Major players have concentrated on introducing labour-saving machinery and on developing and integrating information systems to reduce/substitute labour and other costs.

The Australian Association of Pathologists (AAPP) and others are concerned about rising wages due to workforce shortages. With constraints on increasing prices (due partly to the existence of Medicare), inflation in the cost of materials and labour can have a significant effect on cost structures and margins.

Economies of scale are central to driving profitability; since fees are capped, profit is inversely proportional to unit costs, which can be reduced in automated and centralised laboratories as volumes rise.

There are potentially also some economies (e.g. in accommodation, marketing and customer relationship management) from diversification into other diagnostic services, such as radiology.

1.3.1.5 Electronic Reporting

Industry sources suggest that around seventy per cent of pathology test results are transmitted electronically and private pathology providers desire rates approaching one hundred per cent on cost containment and customer service model grounds. Current non-electronic reporting includes reporting to specialists, who tend to have relatively low IT usage, but some GPs also prefer paper-based reporting.

All of the major pathology providers have proprietary software loaded onto GP desktops, installed and maintained by the pathologists' staff. They also tend to operate call centres, which GPs and others can contact to follow up results, and websites via which results can be obtained and additional tests requested.

There are also growing demands on the nature of pathology reporting, including those from:

- Accreditation
- A desire for more structured reporting
- The transmission of images
- Point-of-care testing
- New technologies

- The use of decision support
- Commutability of results
- New demands associated with shared electronic health records.

1.3.1.5.1 Accreditation

NPAAC have now published its Requirements for Information Communication - 2007 Edition [NPAAC2007]. This document contains both standards (against which NATA will audit a laboratory for compliance) and guidelines (which are sectoral consensus recommendations for best practice). The areas for which standards and guidelines are provided include:

- Privacy principles, compliant with relevant legislation, including:
 - standards and guidelines for the collection, use and disclosure of information
 - data quality, security and retention practices
 - openness and access policies
 - inter-jurisdictional data flows
 - adoption and use of identifiers and anonymity
- Documentation
- Security of storage, data management and messaging (including user authentication)
- Business continuity planning and audit trails
- Compliance with electronic messaging standards.

According to current guidelines issued by the National Pathology Accreditation Advisory Council (NPAAC), electronic communication of requests and reports should also comply with:

- Australian Standard AS4700.2-2004, including:
 - Implementation of HL7 Version 2.3.1, Part 2: pathology orders, results, and subsequent revisions
- HB262-2002 and subsequent revisions, including:
 - Pathology electronic messaging
 - Guidelines for pathology messaging between pathology providers and health service providers
 - Implementation guide
- Relevant Medicare regulations.

These latter guidelines are expected to progress to auditable standards in 2009, after the sector has had sufficient time to adapt its systems for compliance.

Accreditation is a powerful tool in the pathology sector; all testing is required to be undertaken by certified professionals in accredited laboratories by accredited businesses. As such, the transformation to electronic health standards can be better provisioned, and implementation more readily assured.

1.3.1.5.2 Increased use of Structured Reporting

Structured reporting is required for a wide range of cancer-related testing and for reporting to some registries, and there are a number of current initiatives designed to promote this approach. Drivers include better prognoses, research via higher-quality data, and the increased application of decision support. Although the proportion of pathology result reporting affected is relatively small (estimated ten percent), its impacts are potentially significant.

In collaboration with other relevant stakeholders such as the Royal Australasian College of Surgeons and peak cancer groups, the pathology sector has self-organised to develop and pilot national approaches to - and standards for - structured pathology reporting for cancers. Led by the NSW Cancer Institute, this eighteen month project has the potential to provide industry leadership for the use of NEHTA-supported standards such as SNOMED CT (SCT-AU) and HL7 CDA in pathology reporting.

NPAAC is involved with this initiative and its results are likely to flow into the accreditation framework for the pathology sector.

1.3.1.5.3 Electronic Image Transmission

Currently, pathology imagery is primarily sent via hard copy (except in limited, high bandwidth cases such as research institutions). Industry sources consider their despatch via electronic result reports to be of limited scientific value since the receivers generally can't interpret them, and the quality isn't considered to be sufficiently high for analysis or second opinions. Higher-resolution technologies are available but are expensive and inhibited by internet speeds. Pathology business models incorporate good (physical) transport mechanisms, and it is relatively easy to move specimens and hard copy images around to get second opinions quickly.

Accordingly, the transmission of images within pathology result reports is likely to be limited for the foreseeable future.

1.3.1.5.4 Point-of-care Testing

The Quality Use of Pathology Program is currently investigating point-of-care (POC) testing at the GP practice. The trial concerns monitoring existing conditions (e.g. blood glucose) rather than diagnosis. This would account for approximately five percent of tests, and industry sources in Australia tend to see POC testing as a limited - if growing - proportion of tests into the foreseeable future.

However, the sector lacks linkages to reporting systems to make the results available more widely, and lacks pathology accreditation frameworks at point-of-care; these have both been identified as key strategic issues.

1.3.1.5.5 New Technologies

Emerging diagnostic technologies based on genetics and genomics will continue to develop into the foreseeable future and will lead to new diagnostic technologies, requiring greater rigour in the use of terminologies for integration with existing health concepts (i.e. SCT-AU).

1.3.1.5.6 Decision Support

Currently, the investigation and use of electronic decision support systems are concentrated within the laboratory and reporting systems, aiming to: reduce retests or conditionally-dependent tests; allow insertion of comments and advice; and form linkages and interpretations of time series results, among others.

Given the high priority associated with cost control, the use of decision support is likely to increase significantly over the next 5-7 years. This is also likely to be dependent on the use of higher-order terminologies.

1.3.1.5.7 Commutability of Results

There is significant professional concern about the viewing and/or use of results outside the context in which they were transmitted (e.g. when a series of results from different laboratories are assimilated in an electronic medical or health record or in a decision support application). One of the key issues involved is that differing reference ranges or contextual information

associated with differing devices or techniques can have powerful implications for the interpretation of results.

In November 2006, the Royal College of Pathologists of Australia (RCPA) published a position statement on the Electronic Communication of Pathology Results, addressing the commutability issue and having clear clinical safety implications for some of NEHTA's work items (i.e. a Shared Electronic Health Record).

1.3.1.5.8 Individual Electronic Health Record (IeHR)

Existing pathology reporting standards are unlikely to be sufficient to meet the demands of a national Individual Electronic Health Record (IeHR) system, particularly in the area of terminology. Codesets such as Logical Observation Identifiers Names and Codes (LOINC) have been designed specifically for point to point messaging and are increasingly being acknowledged as deficient for inclusion in IeHRs, where a wide range of data must be assimilated.

Accordingly, the IHTSDO and the Regenstrief Institute (developers of LOINC) are reviewing pathology reporting standards with a view to ensuring greater harmonisation between the clinical terminologies commonly used in pathology.

1.3.2 Summary

Given NEHTA's focused work program, the most important drivers for the pathology community relevant to this package are based on the cost associated with electronic information exchange for stakeholders and ensuring that this exchange is an effective, low risk means of providing pathology result information.

The five major strategic issues identified by the National Pathology Accreditation Advisory Council (NPAAC) and the Quality Use of Pathology Program in the short-to-medium term include:

1. Workforce issues relating to the impacts of shortages and – as seen by some stakeholders - a de-skilling of the pathology workforce
2. Smart requesting, the management of demand for pathology testing via the use of decision support as well as closing the request-test-result reporting cycle and, potentially, associating requests with health records
3. Positive identification of patients, specimens and providers, ensuring that the correct test is provided for the correct person at the appropriate time, before incurring laboratory test costs
4. Smart reporting, involving the use of associated information and decision support to provide better and/or more cost-effective services to customers
5. Testing "outside existing frameworks," relating to point-of-care tests, self-testing, or other contexts which are not currently covered by existing accreditation and information management frameworks.

The latter four of these issues accord with NPAAC's observation that:

"There is emerging evidence that, as the quality of laboratory testing continues to improve, the relative risk of patient harm or adverse outcome is far greater in the processes leading to delivery of the pathology specimen to the laboratory, or in the process by which the pathology result is communicated to the treating clinician."
[NPAAC2007]

1.4 Major Issues Identified

1.4.1 Variability in Standards and Systems used in Electronic Information Exchange

Although electronic reporting of pathology results is widely implemented in Australia, there is a lack of interoperability between different implementations. This has resulted in closed communities based around particular laboratories or messaging providers.

It has also forced the installation of multiple messaging client applications upon a single clinical practice to handle the receipt of pathology result messages from different pathology vendors. This causes numerous and complex issues for the clinical practice especially when messaging clients create technical issues through interaction on clinical information systems in use at the practice (i.e. software glitches).

There is variability in the mechanisms used to transfer pathology results to clinical practices (e.g. email, web services, ISDN, 'direct pull' transfers, etc.). Security also varies across these transport mechanisms, though is typically based on encryption technologies such as Public Key Infrastructure (PKI) and Pretty Good Privacy (PGP).

The impact of this issue is increased due to related technical issues and associated support costs for pathology vendors, leading lengthy delays for clinicians expecting pathology results, compromising patient care.

There is also widespread variability in the implementation of electronic information exchange standards by laboratory systems, including HL7 (v2.3.1 and v2.4), Pathology Information Transfer (PIT) format, Rich Text Format (RTF), ASCII text and combinations thereof. These variations can impact clinical information systems that receive pathology reports electronically and may affect their ability to process these reports. System vendors often have to accommodate these variations through very specific local variations.

Acknowledgement of an information exchange having occurred at a technical level is common practice, especially where clinical systems are using HL7 in a direct connection. However this is 'hit and miss' when systems such as secure email are used or other intermediary systems are involved.

The impact of this issue is that a laboratory is unable to guarantee that the information they are sending is received and processed appropriately.

Non-repudiation is the concept of ensuring that an electronic information exchange cannot be subsequently denied by either of the parties involved. It is therefore important for a laboratory to ensure that electronic information exchanges are receipted.

1.4.2 Variability in Pathology Result Information being exchanged with Respect to Structure and Terminology

There is currently no widely-adopted national standard for coding or describing pathology test names for use in clinical communications. Standards Australia (in conjunction with the HL7 messaging standard) have previously recommended the use of the AustPath code set for use within Observation Request (OBR) and Observation Result (OBX) messaging segments. This set is based on LOINC and is widely used by private pathology organisations in Australia within HL7 message communications, albeit inconsistently. It is not widely used in any State health jurisdictions, nor is it widely used by systems within private pathology organisations (outside of HL7 messaging between organisations).

It is common practice for clinicians to refer to many different pathology providers who regularly service their practice. Subsequently, a patient's samples are often tested at different laboratories over time. This issue is strengthened when trying to compare pathology results from different organisations for the same tests being done, which can limit clinicians as they try to accurately ascertain trends or otherwise compare patient's results. This creates a barrier for system developers in their implementation of decision support mechanisms for smart requesting, etc.

Similarly, there is currently no widely-adopted national standard for the structuring of a pathology report for information exchange. There is widespread variability in the way in which information is presented from a laboratory to a clinician, both electronically and on-paper. It is usually the pathologist who defines the structure of a report and often times this structure may vary from recipient to recipient based on a commercial agreement between the laboratory and the clinician. The pathologist has substantial control over the layout of a report that is presented on paper. This is not the case for electronic reports and, consequently, this difference can result in challenges for the reporting pathologist.

Presently there are two standards used for the electronic reporting of Pathology - Pathology Information Transfer (PIT) and Health Level 7 (HL7).

PIT allows for the structuring of results as formatted text, but does not allow for the reuse of clinical information. HL7, by contrast, allows for the reuse of clinical information but lacks powerful structuring capabilities for results. Consequently, the current Australian standard recommends a mixture of both, although neither of these standards recommends a standard structure for pathology reporting.

Consequently, a receiving clinician is placed at a disadvantage when trying to collate, interpret and compare results from different pathology providers.

1.5 NEHTA's Strategy

NEHTA was established to develop better ways of electronically collecting and securely exchanging health information. Electronic health information (or e-health) systems which securely and effectively exchange data can significantly improve clinical and administrative communication between healthcare providers, and promote beneficial outcomes.

NEHTA's work will help deliver these benefits through existing and future health systems and support, thereby:

- Improving the quality of healthcare services
- Streamlining multi-disciplinary care management
- Improving clinical and administrative efficiency
- Maintaining high standards of patient privacy and information security.

NEHTA's strategy for the pathology result reporting community is to deliver a suite of specifications and products (e.g. tools to assist with migration) that will assist to progress interoperability between the systems used to create, send, receive, and store clinical information in conjunction with pathology result reporting for the Australian population. It is NEHTA's intention that the information it provides will comply to national standards and frameworks for interoperability, security, privacy, safety and quality, thereby allowing the reporting community to promote the interoperability of clinically-related information.

The proposed migration path for the pathology result reporting community includes:

1. The adoption of web service architectures designed to streamline existing business functions involving electronic information exchange using existing identifiers and security protocols
2. The early adoption of clinical content specifications, prior to the full implementation of national infrastructure services, including the ability to:
 - Gather and store pathology information locally to facilitate future electronic information exchanges based on a defined content template.
 - Send nationally-agreed terminology in conjunction with content templates and interchange formats.
 - Receive and understand terminology in conjunction with content templates and interchange formats, automatically integrating this information into the receiving system where appropriate
3. A migration to National Infrastructure Services such as the National Authentication Service for Health (NASH), National Service Instance Locator (SIL) and National Health Identifiers (IHI, HPI-I, HPI-O) as part of the infrastructure services approach
4. Decision support facilitation, locally and nationally.

1.6 Packaging

NEHTA's previous work program for 2005–2008 included the development of specifications in the areas of structured reporting, clinical terminology, identifiers, identity management, interoperability, and secure messaging. To date, development effort has been targeted within these areas and it is now appropriate for the communication of these specifications to the wider healthcare community, emphasising their intended interoperation to form an overall solution basis for stakeholders.

Consequently, NEHTA is preparing guidance for stakeholders on these specifications and their potential interoperations and interrelationships. This is proposed through the delivery of 'packages' of services that are part of the solution road map to an interoperable e-health environment.

A package, as delivered by NEHTA, is intended to describe NEHTA's specifications, their adoption and use (individually or in parallel) and to provide appropriate supporting material to inform adoption and implementation across the e-health community.

NEHTA aims to identify the most appropriate implementation pathways by engaging industry stakeholders throughout this process, helping ensure that specifications developed as part of a package are well-tested and are ready for wide implementation across the user community.

1.7 Package Purpose

The Pathology Result Reporting Package (PRRP) is intended to collate specifications and standards - developed by NEHTA in conjunction with other standards bodies - and recommended their collective use within the pathology result reporting community.

The package describes how these specifications can be used within the pathology community to facilitate and enable a truly interoperable environment for ubiquitous electronic information exchange. It also aims to describe how these specifications work together in this environment.

The specifications forming the contents of the package will be ready for implementation after they have been tested by the pathology reporting community.

The delivery of the pathology package will build upon the momentum of electronic pathology information currently exchanged within the community and provide standards through which system implementations may further enhance the quality and usefulness of pathology information to encourage more widespread interoperability and enablement.

2 Benefits

NEHTA delivers a consistent set of standards intended for application across multiple health domains, allowing greater flexibility, improved responsiveness and added utility to caregivers and support organisations participating within the e-health community.

Eventual benefits, following the implementation of the Pathology Result Reporting Package v1.0 for the reporting community include:

- A new connectivity model allowing pathology laboratories and clinicians to improve the management and flow of information and diagnostic awareness
- Structured reporting via improved specifications, detailing the content and structure of information to be represented in a standardised Pathology Result Report
- Standards and services that can assist the pathology sector with several self-determined priorities including correct identification, smart reporting and the closing of the request/test/report loop.

This first release of the Pathology Result Reporting Package aims to promote open standards for secure messaging within the community and provide initial specifications for structured reporting and standardised clinical terminology for use in a Pathology Result Report.

The standards provided are a part of the national e-health infrastructure services established by NEHTA for electronic information exchange.

2.1 Stakeholder Benefits

2.1.1 Individuals

As proposed by the Unique Healthcare Identification initiative, the identity of an individual is distinct across the entire healthcare continuum.

Pathology result reports are standardised across the pathology result reporting community, meaning that the reports obtained from different pathology providers can be directly compared, with respect to structure and the terminology used to describe the results (where appropriate to do so).

A pathology result provided in a structured, granular form with standardised terminology may enable the incorporation of results into the medical record, thereby enabling decision support and ultimately improving the care provided to an individual. This could also potentially facilitate secondary use of this information, for example, for safety initiatives, research and education purposes, in ways that deliver important public benefits. Any such secondary uses will also be subject to compliance with information privacy law and other legal and governance requirements.

2.1.2 Providers

2.1.2.1 Pathologist

The identity of a pathologist providing services to an individual at the request of a community clinician will be unique across the national health sector as proposed by the Unique Healthcare Identification (UHI) initiative. Furthermore, each unique pathologist is linked to one or more pathology laboratories, helping ensure that a known person from a known organisation provides the pathology result information.

The list of professional services that a pathology laboratory offers is detailed on the UHI service. The UHI service provides the physical web location of the

pathology laboratory's Service Instance Locator (SIL). The SIL hosts and provides detailed information about the business and technical services that the pathology laboratory can receive, via a web service. Therefore, once it is known where the pathologist is from, (and their Healthcare Provider Identifier – Organisation [HPI-O]), it is possible to find out the professional services that are provided at the laboratory in question. Through subsequent accessing of the SIL, it can be determined how best to communicate with the laboratory for specific information exchanges, such as the receipt of acknowledgements for pathology result reporting transactions.

Security certificates used for both the encryption and decryption of clinical information at the provider level are obtained through services offered by the National Authentication Service for Health (NASH). Only the Public Keys are available for request through the NASH web service and these are used to encrypt all pathology result reports. Correlating private keys are only distributed on physical 'smartcards' such that a given Pathologist can only decrypt appropriately-designated pathology result reports and/or acknowledgements. The benefit is based on the fact that the type of encryption used in electronic messaging is standardised, as is the process through which encryption occurs. This means that the pathologist sending pathology result information can be confident about the confidentiality, privacy and integrity of data during transmission between the relevant laboratory and requesting entity (e.g. a general practice).

Standardised pathology result reports across the pathology result reporting community means that the reports obtained from different pathology providers can be directly compared, due to their common structure and result description terminology. A pathology result provided in a structured, granular form with standardised terminology also enables the incorporation of results into the patient's medical record, thus enabling decision support and ultimately improving the healthcare provided to an individual. Secondary use of the data (e.g. research) will also likely provide ongoing benefits.

2.1.2.2 Community Clinician

The identity of a community clinician providing services to an individual will be unique across the entire health sector as proposed by the Unique Healthcare Identification (UHI) initiative. The unique community clinician is linked to a unique general practice. This ensures that a known person from a known organisation receives pathology result information.

The list of professional services that a community clinician provides is detailed on the UHI service linked to the general practice where services are provided. Also the UHI service provides the physical web location of the general practice's Service Instance Locator (SIL) where the community clinician works. The SIL hosts and provides detailed information about the business and technical services that the general practice can receive via a web service. Therefore, once it is known where the community clinician is from, (and their Healthcare Provider Identifier – Organisation [HPI-O]), it is possible to find out the professional services that are provided at the laboratory in question. Through subsequent accessing of the SIL, it can be determined how best to communicate with the general practice for specific information exchanges, such as the receipt of acknowledgements for pathology result reporting transactions.

Security certificates used for both the encryption and decryption of clinical information at the provider level are obtained through services provided by the National Authentication Service for Health (NASH). Only the Public Keys are available to be requested through the NASH web service and these are used to encrypt a pathology result report. Private keys are only distributed on 'smartcards' so that community clinicians can decrypt any received pathology result reports. The benefit is that the type of encryption used in electronic messaging is standardised as is the process through which encryption occurs. This will mean that the community clinician as a recipient of pathology result

information can be assured of the sender, the confidentiality and privacy and integrity of data during transmission between the pathology laboratory and the general practice.

Standardised pathology result reports across the pathology result reporting community means that the reports obtained from different pathology providers can be directly compared, with respect to structure and the terminology used to describe the results. A pathology result provided in a structured granular form with standardised terminology enables the incorporation of results into the medical record thus enabling decision support and ultimately improving the healthcare provided to an individual by a healthcare provider. Secondary use of the data (e.g. research) will also likely provide ongoing benefits.

2.1.3 Organisations

2.1.3.1 Pathology Laboratory

The identity of a pathology laboratory providing services to an individual at the request of a community clinician will be unique across the entire health sector as proposed by the Unique Healthcare Identification (UHI) initiative.

The professional services that a pathology laboratory provides are detailed on the UHI service. These are provided as linkages to the specific Pathologists and the professional services they provide. Also included is the physical web location of the pathology laboratory's Service Instance Locator (SIL). The SIL hosts and provides detailed information about the business and technical services that the pathology laboratory can receive via a web service. Therefore once you know the where that the Pathologist is from (and its HPI-O) you are able to find out the professional services provided at that pathology laboratory. Through subsequent accessing of the SIL, you can determine exactly how to communicate with the pathology laboratory for specific information exchanges such as the receipt of acknowledgements for pathology reporting transactions.

Security certificates used for both the encryption and decryption of clinical information at the provider level are obtained through services provided by the National Authentication Service for Health (NASH). Only the Public Keys are available to be requested through the NASH web service and these are used to encrypt a pathology result report. Private keys are only distributed on 'smartcards' so that a pathology laboratory can decrypt any received pathology result report and/or acknowledgement. The benefit is that the type of encryption used in electronic messaging is standardised as is the process through which encryption occurs. This will mean that the pathology laboratory as a sender of pathology result information can be assured of the confidentiality, privacy, and integrity of data during transmission between the pathology laboratory and the general practice.

Standardised reports across the reporting community mean that the information structure and language used is the same for all recipients irrespective of the intended clinical information system. This enables re-use of the structured data provided in the report, promoting improved decision support mechanisms and improved individual outcomes. By structuring the data with the help of a standardised terminology, the pathologist ensures that through electronic delivery the report will be readily received and processed by a recipient's Clinical Information System (CIS).

2.1.3.2 General Practice

The identity of a general practice providing services to an individual will be unique across the entire health sector, as proposed by the Unique Healthcare Identification (UHI) initiative.

The professional services that a general practice provides are detailed on the UHI service. These are provided as linkages to specific community clinicians

and professional services. Also included is the physical web location of the general practice's Service Instance Locator (SIL). The SIL hosts and provides detailed information about the business and technical services that the general practice can receive via a web service. Therefore once you know where the community clinician is from (and its HPI-O) you are able to find out the professional services provided at that general practice. Through subsequent accessing of the SIL, you can determine exactly how to communicate with the general practice for specific information exchanges such as the receipt of pathology result reporting transactions.

Security certificates used for both the encryption and decryption of clinical information at the provider level are obtained through services provided by the National Authentication Service for Health (NASH). Only the Public Keys are available to be requested through the NASH web service and these are used to encrypt a pathology result report acknowledgement. Private keys are only distributed on 'smartcards' so that the general practice can decrypt any received pathology result reports. The benefit is that the type of encryption used in electronic messaging is standardised as is the process through which encryption occurs. This will mean that the general practice as a sender of pathology result report acknowledgement can be assured of the confidentiality, privacy, and integrity of data during transmission between the general practice and the pathology laboratory.

Standardised pathology result reports across the pathology result reporting community mean that the information used to create pathology result reports is standardised as is the structure of the report for all recipients irrespective of the intended clinical information system. It enables re-use of the structured data provided in the report promoting improved mechanisms of decision support, resulting in improved healthcare provided to an individual. By structuring the data together with standardised terminology the general practice ensures that through electronic delivery the report will be readily received and processed by their clinical information system. Secondary use of the data (e.g. research) will also likely provide ongoing benefits.

2.1.4 Healthcare System

2.1.4.1 Software Vendors

Adoption of standardised mechanisms by which pathology result report information is electronically exchanged, software vendors will ensure reduced costs associated with development and implementation of software applications in both the pathology laboratory and in general practice.

Adoption of the national infrastructure services ahead of the shared electronic health record will ensure the ability to interact with shared electronic health record systems in the future.

The ability to create, transfer and store pathology information using the Structured Document Template – Pathology Result Report, the Interchange Format – Pathology Result Report and HL7 v2.4 and associated terminology, will ensure that software vendors mitigate the risk associated with errors in handling pathology result information.

Over time this will promote an immediate interoperability guarantee for software vendors for their software application.

3 Package Scope

In its initial release, the Pathology Result Reporting Package v1.0 has been scoped to provide immediate benefits to the pathology reporting community, while introducing foundations for future outcomes and synergies.

Therefore, the primary transactions scoped for inclusion in the package are limited to those associated with the electronic transfer of pathology result information between a pathology laboratory and a community clinician. This holds true whether or not the clinician who requested the pathology service to be performed is the only recipient of the results.

These transactions include:

- The generation of pathology result information suitable for electronic exchange
- The transfer of this information
- Acknowledgements that the information was received and processed by the receiving system.

In conjunction with this package release, NEHTA has been tasked with developing specifications for the pathology domain that are ready for adoption and use in the areas of interoperability, structured reporting, clinical terminologies, secure messaging, unique healthcare identification and identity management. Consequently, as NEHTA develops and publishes specifications in these key areas, they will be packaged for release as they become available as part of a phased release schedule. In the event that a suitable standard is unavailable at release time, NEHTA has developed interim standards for temporary adoption as a framework for future maturation, intended to promote the ongoing drive towards industry-wide interoperability.

As a result, the Pathology Result Reporting Package logically provides specifications for solution architectures relating to results reporting within the pathology community. Additional packages, scoped for activities such as electronic pathology requesting, will extend and interrelate solution aspects for the pathology community, concordant with broader e-health initiatives.

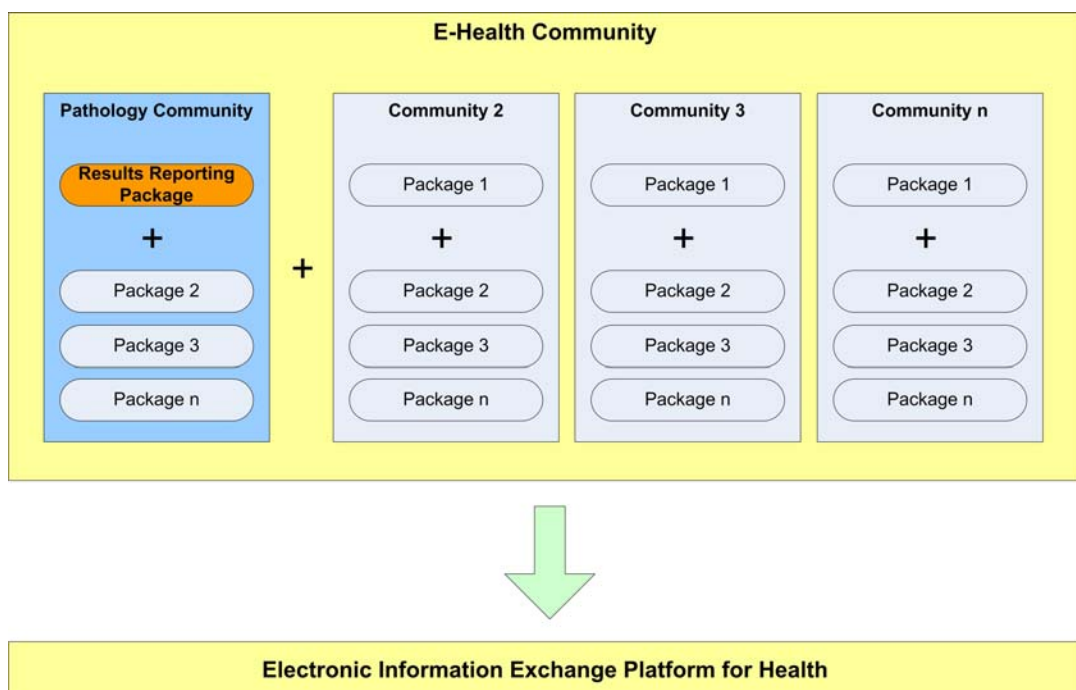


Figure 3 - Pathology Packaging in the E-Health Community

3.1 Phased Delivery Approach

An iterative development approach has been adopted for the development and publication of pathology-related solution packages. Specific areas of the pathology community are the focus of each package, starting with the Pathology Result Reporting Package (PRRP). Each package is versioned, and each version will extend functionality and add refinements to existing specifications.

Additional packages will be created in parallel to provide solutions for other areas within the pathology community, and allow for increasing integration between solution aspects through time. These additional packages provide a standardised basis for pathology-related requesting, notification, and reporting, among others.

Components within package releases will be flagged as to their intent, and will differentiate between components ready for implementation and others that have been provisionally included to encourage discussion, testing and review.

3.1.1 Version 1.0

The initial version of the Pathology Result Reporting Package (PRRP) delivers a framework for pathology results reporting services and will include secure messaging specifications for use in conjunction with AS4700.2 (2007) using HL7 v2.4.

This version of the package contains initial specifications developed by NEHTA for the areas of secure messaging, structured reporting and terminology and identity management. The package also provides immediate enhancement of the pathology community via electronic information exchange, based on established practises and emerging trends. Lastly, the package recommends new standards required for the ongoing development for the pathology community, aligned with broader e-health initiatives.

The initial implementation version of the Pathology Result Reporting Package contains:

- **A Reader's Guide**, detailing the documentation within the package and the stakeholders associated with the published specifications
- **Package architecture** documentation, outlining the three architectural supports for pathology result reporting:
 - Information architecture
 - Business architecture
 - Technical architecture
- **Technical endpoint specifications** for web service interfaces that receive and acknowledge pathology result information exchanges, including references to web service interface specifications for the Service Instance Locator (SIL), the National Authentication Service for Health (NASH) and the Unique Health Identifiers² (UID).
- **An Implementation Guide**, providing practical advice and guidance for the use of package specifications
- **A Structured Document Template** and initial supporting terminology for detailing the structured reporting, suitable for electronic exchange together with an interchange format specification demonstrating the binding of the structured clinical content to HL7 v2.4 (AS4700.2 [2007]).

Due to its phased development and release cycle, early industry partners will initially be able to implement a subset of the structured reporting

² An interim version pending the release of Medicare specifications.

specifications and terminology developed as part of the Pathology Result Reporting Package (PRRP), with others to follow.

Initial terminology development supports the specific procedure undertaken by the pathology service, the specimen type (including any qualifiers, including the body site from which the specimen was taken) and the testing method (where appropriate). The complete SCT-AU terminology component will be included in subsequent versions as national standards and directions are confirmed.

3.1.2 Subsequent Versions

Subsequent versions of the Pathology Result Reporting package may include features such as amendments and additions of new features for web services, based on feedback received from industry stakeholders.

3.2 Business Objectives

The following business objectives emerge from a strategic objective to ensuring standardisation.

3.2.1 Open Standards used in the Exchange of Electronic Information

Open standards constitute fundamental building blocks for interoperability, and underpin the business and technical services required for the beneficial exchange of clinical information.

Consequently, the Pathology Result Reporting Package v1.0 will:

- Provide secure messaging specifications that form part of the roadmap towards an interoperable electronic information exchange platform
- Encourage the adoption of open messaging standards and common technical services.

The pathology reporting community already make significant use of electronic messaging, and are in an advantageous position to be implementation leaders of open interoperability standards and messaging specifications, thereby realising benefits including a reduced reliance on the multiple, proprietary software solutions currently used to receive pathology result information.

3.2.2 Structured Content and Terminology

The Pathology Result Reporting Package v1.0 will:

- Create and encourage the adoption of a nationally-endorsed clinical terminology
- Create and encourage the adoption of a defined clinical content structure for reporting purposes, and apply this to a standard interchange format.

A nationally-endorsed data structure and associated terminology is needed for improved and more consistent understanding and interpretation of exchanged pathology results. This in turn promotes information interoperability (also referred to as semantic interoperability) leading to improved communication between systems, allowing the comparison of results from varying pathology providers and the integration of the results via clinical information systems.

3.3 Outcomes

As reflected by the business need, the primary desired outcome of a national approach to pathology result reporting is to improve the quality of care of individuals as they move between multiple points of care.

The adoption of standards contained in the Pathology Resulting Reporting Package v1.0 by the pathology community offers the potential to significantly improve quality of care. Furthermore, it is aligned with the framework requirements described by the Institute of Medicine [IOM1996] in the following areas:

- **Effective care giving**, through the use of scientific assessments to provide services to those most likely to benefit, and refraining from the provision of services to those unlikely to benefit (i.e. avoiding under use and over use respectively) while also:
 - Facilitating better decision support within local systems through the standardised structure of pathology result report information and terminology used within the report, enabling local systems to compare, and store similar information from multiple pathology episodes
 - Providing a major opportunity to facilitate secondary uses in ways that both protect privacy and deliver important public benefits such as better targeting of health initiatives, public health planning, research, education and disease detection
- **Timely care**, reducing delays for caregivers and receivers by:
 - Providing a technology platform that allows pathology result information to be securely exchanged electronically, with assurance of delivery, using open standards and common services, and taking into consideration different connectivity circumstances among stakeholders in the pathology result reporting community³
 - Improving the current connectivity issues where pathology report recipients require multiple proprietary software solutions in order to receive pathology reports from discrete pathology providers, leading to potential software conflicts and potential delays in the receipt of electronically-transmitted pathology result information
- **Efficient care**, by avoiding waste (i.e. equipment, supplies, ideas, and energy) by:
 - Reducing differences in reference ranges (where feasible) or different contextual information associated with differing devices or techniques, which have powerful implications for the interpretation of results⁴
 - Facilitating more effective test ordering processes through the standardisation of report structure and language, also allowing the direct comparison of pathology information received from differing pathology providers, further reducing unnecessary pathology services.

3.4 Community Participation

The following entities interact with the pathology result reporting community to facilitate the electronic transfer of pathology result information between a pathology laboratory and a community clinician.

³ This will reduce the reliance on unintegrated, multiple messaging clients installed on systems within a community organisation.

⁴ Using a standard terminology and data structure will greatly assist with these issues.

Further information regarding the pathology result reporting community is detailed in the Pathology Result Reporting Package v1.0 – Business Architecture. The following is a summary of the major interactions within the community.

3.4.1 Individuals

Individuals attend a community practice to seek the assistance of a community clinician for health related issues.

As part of this process the community clinician may request services of a pathology laboratory to be performed on a pathology specimen obtained from the individual.

The community clinician and the individual discuss the results obtained from the pathology laboratory's requested investigation, which may instigate further services of the pathology laboratory.

3.4.2 Provider Organisations

3.4.2.1 Pathology Laboratories

Pathology laboratories act upon a request from a pathology requester and perform the requested procedures on the pathology specimen obtained from the individual.

The pathology laboratory completes the requested service and constructs an electronic message for the pathology requester and any other authorised recipients as detailed on the pathology request.

The pathology laboratory transfers the electronic message containing the pathology result information to the appropriate Provider Organisations.

3.4.2.2 Community Practices

Community practices are the physical location where a community clinician provides healthcare to the individual.

Computer systems at the community practice are the recipients of electronic messages containing pathology result information. The pathology result information is accessed by a clinical information system and presented to the community clinician.

3.4.3 Providers

3.4.3.1 Community Clinicians

The community clinician provides healthcare to an individual. In the pathology result reporting community the community clinician assumes a more detailed role; either as a pathology requester or as an authorised recipient.

Both pathology requesters and authorised recipients receive and interpret pathology result information from a pathology laboratory.

3.4.3.1.1 Pathology Requesters

A pathology requester is a community clinician who requests pathology services of a pathology laboratory on the behalf of an individual.

3.4.3.1.2 Authorised Recipients

The pathology requester may wish to provide another community clinician with the results of this pathology investigation.

An authorised recipient is a community clinician who is selected to receive the results at the discretion of a pathology requester.

3.5 Principles

In developing the Pathology Result Reporting Package a number of key principles have been employed. Consequently the specifications contained within the package:

- Are consistent with NEHTA's strategy for a secure communication environment enabling the safe exchange of clinical information between health care providers
- Form architecturally-consistent building blocks, intended to drive the incremental development of an electronic information exchange environment that not only supports pathology but the broader e-health community
- Supports the concept of a Individual Electronic Health Record (IeHR)
- Improves and streamlines interoperability of information exchanged between health organisations through clear separation between organisational, information and technical concerns, by way of the adoption of national standards and a service oriented architecture
- Improves the quality of pathology information being exchanged
- Enables industry partners to determine if the specifications meet the requirements of the e-health community through early adoption trials.

3.6 Leveraged e-Health Services

In the absence of the Unique Healthcare Identification Service (UHI), NEHTA recommends that existing systems continue to be used for the identification of individuals, providers and provider organisations.

In the absence of the National Authentication Service for Health (NASH), NEHTA recommends that existing security certificates are used in the secure electronic transfer of pathology result information.

In the absence of the Service Instance Locator (SIL), NEHTA recommends that existing systems maintain a repository of the provider organisations that they communicate with and the means by which to facilitate that communication.

3.7 Stakeholders

The following stakeholders have been identified as having a direct interest in the Pathology Result Reporting Package:

- Vendors, associated with:
 - Laboratory information systems
 - Clinical information systems
 - Messaging intermediaries
- Clinical
 - Community clinicians
 - System implementers
- Laboratory
 - Pathologists
 - Laboratory workers
 - System implementers.

3.8 Strategic Alignment

The solution will be designed to strategically align with NEHTA's Strategy (see section 1.5).

More broadly, the solution will also need to align with:

- Existing Federal, State and Territory Health Strategies
- Recommendations of the newly formed Hospital and Healthcare Reform Commission
- Recommendations from the Peak Pathology Bodies.

Alignment with NEHTA's strategy for e-health will involve a staged implementation approach, aiming to provide a migration path to a pathology community transformed by e-health services, including interoperable systems, information and business processes that are supported by a national Individual Electronic Health Record. There will need to be an understanding and awareness of national standards, frameworks for interoperability, security, privacy, safety and quality. These factors will need to be incorporated into systems and processes.

Consequently, the aim of packages developed for the pathology community is to deliver specifications which promote and enable interoperability between systems used to create, send, receive, and store clinical information in conjunction with pathology testing and results for the Australian population.

This strategy will ultimately provide:

- Secure messaging required to communicate with the national Electronic Health Record, including a backbone for local information exchange, while supporting other e-health opportunities within the pathology community
- Standardised terminology to allow information to be incorporated into the local clinical information systems and patient records, but also the re-use of this information to support other domain package requirements, including:
 - Summary health profiles
 - Discharge summaries
 - E-Referrals
 - Medication management.

3.9 Package Constraints

Although the following list is considered vital to ensure coverage of the pathology result reporting community into the future, not all can be immediately accommodated as part of the Pathology Result Reporting Package v1.0. The items therefore out-of-scope for this version are:

- Electronic pathology requesting as a precursor to electronic pathology result reporting, including the nomination of authorised clinicians to receive a copy of the pathology result
- Pathology reports pertaining to the issue of blood and blood products
- Notifications to public health bodies or registries (other than those included in a standard report transmission)
- Pathology reporting for use by a Individual Electronic Health Record (IeHR) system
- Pathology communications involving non-standard data formats (i.e. non-standard report formats, cumulative report types, commercially unique transmissions, etc.)

- Specification of communication methods other than Web services (i.e. email, fax, etc.);
- Specification of exchange formats other than HL7 V2.4 as part of AS4700.2 (2007) (i.e. CDA, CEN 13606, etc.)
- Other forms of diagnostic reporting (e.g. radiology) as detailed in AS4700.2 (2007)
- Specific requirements related to secondary uses of pathology reports (e.g. research, statistical analysis).

Structured reporting specifications are provided, however only six of the data elements designated to be populated with terminology content are provided as part of the Pathology Result Reporting Package v1.0.

3.10 Areas for Future Expansion

3.10.1 Structured Reporting Including Terminology

The Pathology Result Reporting Package v1.0 will be expanded in subsequent versions to incorporate further guidance regarding structured results (such as cancer reporting and other anatomical pathology reporting, microbiology reporting, blood and blood product issue reporting, etc.).

Harmonisation is underway between SCT-AU and LOINC at an international level to determine the most appropriate use of a standardised clinical terminology in the pathology domain, reducing duplication and/or lowering unnecessary complexity.

Test Result Observable names and identifiers are required to be selected and/or added to the terminology for pathology report, as is terminology for coded results, units, interpretations and status.

Beyond the pathology domain, further work is needed to develop or identify terminologies used for demographics and other data elements which span multiple domains.

Exploration of additional messaging formats is to be considered. NEHTA has recommended the use of HL7 CDA in the future as the electronic communication standard and, consequently, work in the discharge summary, referral and e-medication management spaces is focusing on CDA development. Given that the pathology domain currently makes use of electronic messaging for result information using HL7 (v2.3.1/2.4), a decision has been made to allow an implementation pathway using HL7 v2.x. in the short term, together with secure messaging standards and structured reporting specifications.

3.10.2 Secure Messaging Additions

As national e-health infrastructure components (UHI, NASH and SIL) come online, further detail regarding the technical aspects involved in information exchange between these services will be provided.

There have been some emerging business process changes relating to the transfer of clinical care. Suggestions have been made regarding the possibility of providing a technical solution for an acknowledgement that a given report has been read and actioned by a clinician. NEHTA has explored this option and work has been undertaken to develop web services to enable this functionality. However, whilst technically feasible, the data that should be provided in such an acknowledgement needs to be clarified further with input from stakeholders, and appropriate discussions regarding the business processes and legal ramifications involved.

4 Solution Architecture

4.1 Architecture Overview

The architecture of the Pathology Result Reporting Package v1.0 brings together NEHTA's existing standards of secure messaging, structured reporting and clinical terminology, and national e-health services. These standards are used to provide a solution for the business processes identified for exchanging pathology results reports between the entities in the pathology reporting community.

The roles that have been identified as participating in the exchange of pathology result reports are:

- **Pathology provider**, an entity that provides pathology services (typically a pathology laboratory)
- **Pathology report recipient**, an entity that receives the pathology result report (e.g. a community clinician)
- **Intermediary**, an entity that exists between the pathology provider and recipient, typically storing reports and notifications of reports for collection, which are later passed onto a recipient who is not permanently connected to the e-health network
- **National e-health infrastructure**, the authentication, service location and identification services that will enable a common approach to e-health across the entire health community.

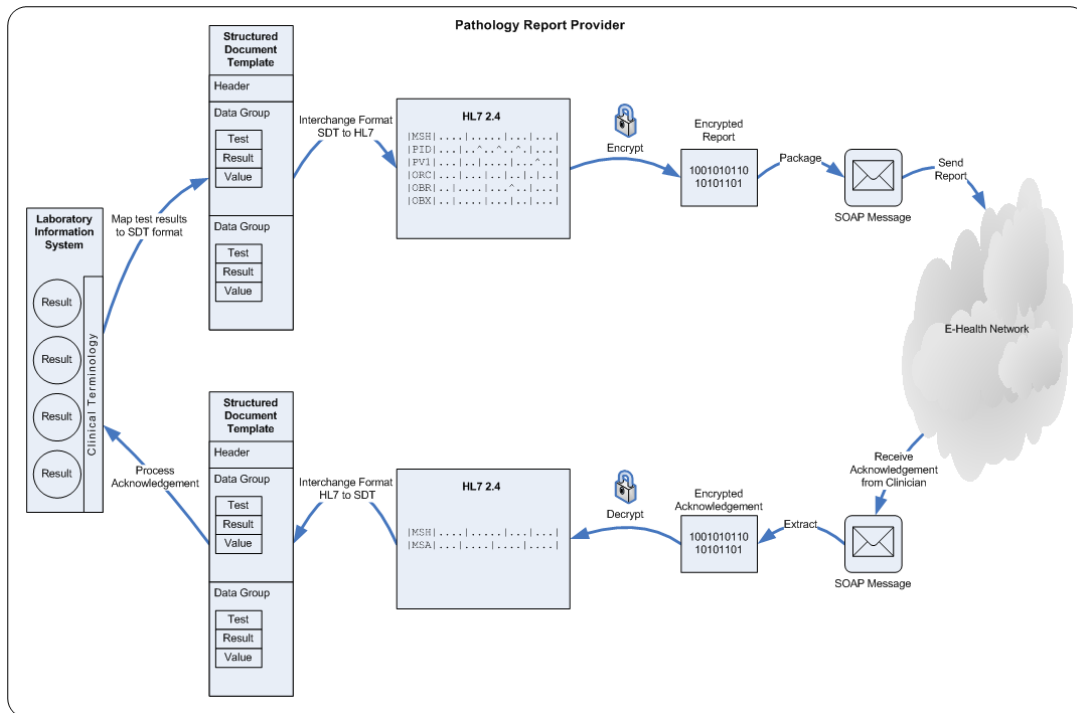
The infrastructure platform chosen to enable these entities to exchange pathology result reports is based upon the exchange of messages via web services. Web services allow a service oriented architecture to be deployed on the e-health network using vendor-neutral technologies.

Pathology result report messages exchanged between entities in the community will be formatted using the Extensible Mark-up Language (XML) and Health Level 7 (HL7) v2.4 standards. The format of the HL7 messages and their segments for the pathology result reporting package are defined in the Pathology Result Reporting Package v1.0 – Structured Document Template - Pathology Result Report [PATH-PRR-SDT] and Interchange Format - Pathology Result Report to HL7 v2.4 [IF-HL72.4] documents.

The security and integrity of messages sent over the public e-health network are assured by the use of public key encryption and digital signatures of the result report content. Full details of encoding and transportation between end points in the e-health network are documented in the Web Services Profile 2008 [WSP2008] document.

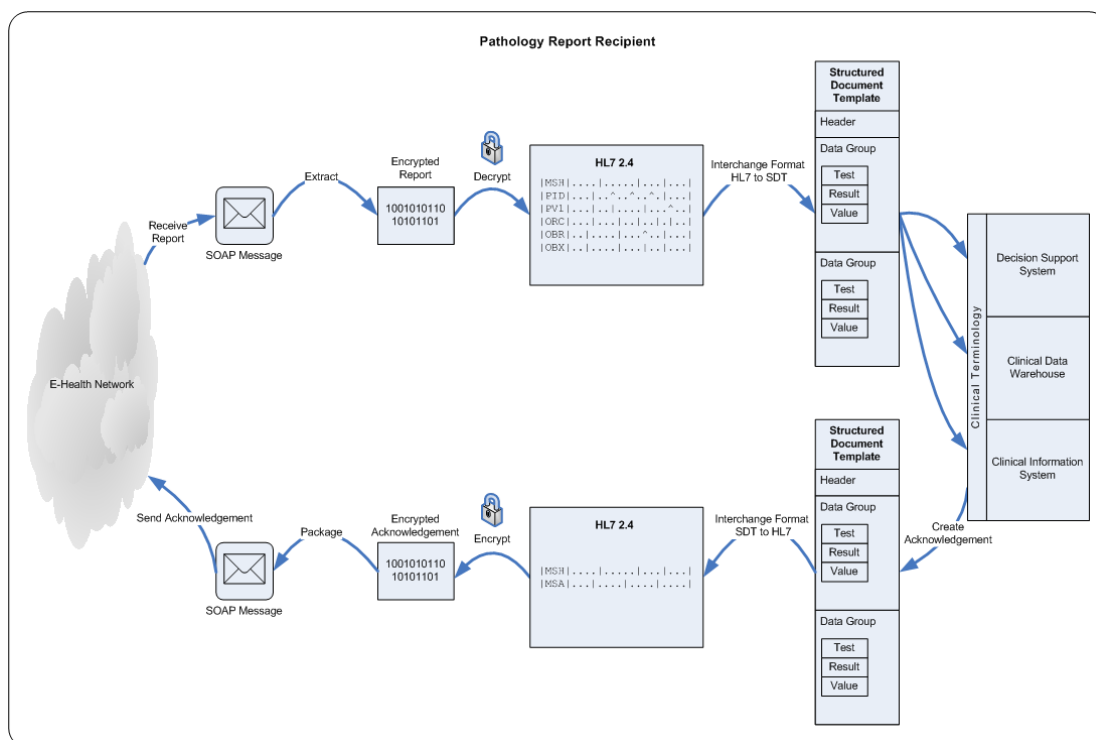
4.1.1 Provider Information Flow

This diagram shows how the test results in the laboratory information system are mapped to the clinical terminology before being grouped into a report. The report is then created using HL 7 2.4 and sent over the network. The provider then receives an acknowledgement message indicating that the report has been processed by the recipient.



4.1.2 Recipient Information Flow

The following diagram shows the information flow from the point of view of the report recipient. Once the report has been received the structured format of the report allows various applications to take advantage of the different information.



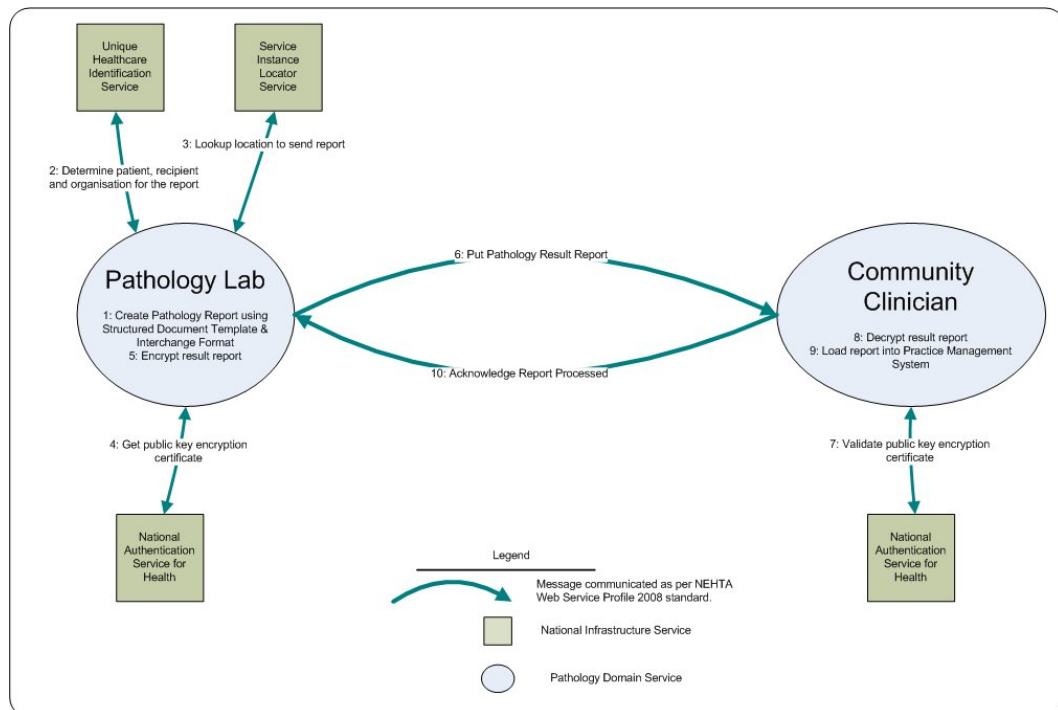
The messages sent between the various entities in the solution are transported using web services. The security and integrity of messages sent over the public e-health network are assured by the use of public key encryption and digital signatures of the result report content. Full details of how messages will be encoded and transported between end points on the e-health network are documented in the Web Services Profile 2008 [WSP2008] document.

The solution architecture assumes that the pathology provider is permanently connected to the e-health network and capable of hosting web services. Pathology report recipients may not be capable of being permanently connected to the e-health network. Hence the solution caters for recipients who are permanently connected and can host services, and those who are unable to host web services.

This combination leads to the following pair of scenarios for the exchange of pathology result reports between a provider and recipient.

4.1.3 Scenario 1

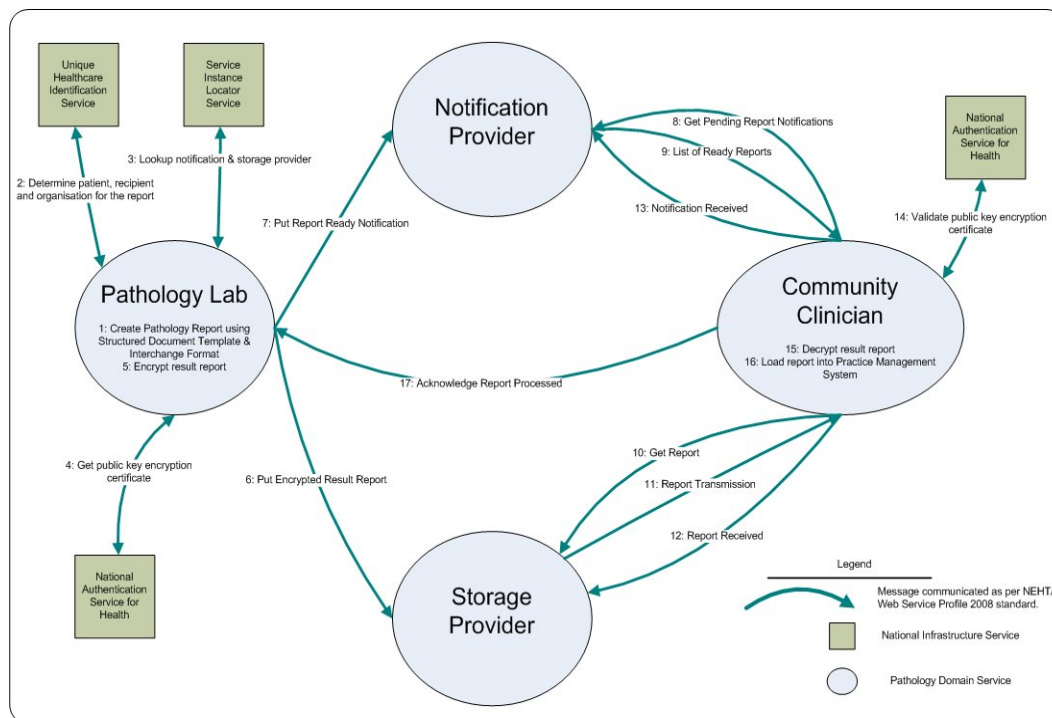
This scenario shows the processes and message flows across the national e-health infrastructure between a pathology provider and recipient who are both capable of hosting web services and are both permanently connected to the e-health network.



In this scenario there is no requirement for any intermediary services; both the provider and recipient can communicate directly with each other.

4.1.4 Scenario 2

This scenario shows the processes and message flows where the recipient is not permanently connected to the e-health network.



In this scenario the role of the storage provider can be accommodated by the pathology laboratory if they are able to store the generated report for collection at a later time by the community clinician's system. The significant difference between this scenario and the previous one is that the community clinician is only a client in the e-health network. This difference means that the clinician must poll the notification provider periodically to discover if there are any completed reports available.

4.2 Local Systems

The options for the potential ways by which laboratory information systems, clinical information systems and notification provider systems are integrated with the pathology result reporting solution are threefold.

4.2.1 Laboratory Information Systems

Pathology providers that are permanently connected to the e-health network have a key role in establishing the pathology result reporting community. This requires that such laboratory information systems will need to fully implement the standards outlined by NEHTA. This will involve the implementation of the following features:

- Production of electronic result reports that are formatted according to the Standard Document Template, Interchange Format, HL7 2.4 and SCT-AU (SCT-AU) specifications
- Authentication and encryption of reports using credentials provided by NASH
- Referencing of the UHI for identity management
- Deployment of web services according to NEHTA's secure messaging standards
- Implementation of web service endpoints specific to the pathology result reporting solution.

4.2.2 Clinical Information Systems

For community clinicians, there are two options for participating in the pathology result reporting solution.

The first involves an adjunct software application that implements either the web service endpoints for the direct receipt of result reports, or which behaves as a web service client for the purpose of fetching reports over the network. The report would then be stored for importation into the existing clinical information system.

The second option involves the relevant clinical information systems directly implementing NEHTA's specifications, providing clinicians with a total solution for integrating with the e-health network. The clinical information systems would implement the standards and specifications to either host web services (scenario 1, above) or consume web services as a client (scenario 2, above).

Either of these options involves the clinical information systems utilising the following features of the solution:

- The ability to read HL7 2.4 pathology result reports formatted as per the NEHTA specifications
- The deployment and/or consumption of web services according to NEHTA's secure messaging standards
- Integration with the secure messaging components of the e-health network for authentication and identity management
- Implementation of the specific web service endpoints to allow a pathology laboratory to send a result report, or consume the existing web services of pathology labs and notification providers.

4.2.3 Notification Provider Systems

Notification providers will be permanently connected to the e-health network to provide their services on behalf of those community clinicians that are unable to host web services. Notification providers will implement the following features of the solution:

- Integration with the national e-health infrastructure such as NASH to provide authentication and UHI for identity management
- Deployment of web services according to NEHTA's secure messaging standards
- Implementation of the specific web service endpoints to allow pathology laboratories to send notifications and community clinicians to retrieve pending notifications.

4.3 Connectivity

The connectivity between the entities involved in the pathology result reporting community will be communicated using the national e-health infrastructure (e.g. NASH, SIL and UHI).

Web services will be used to support application-to-application communication. The use of web services supports interoperability between the different applications in the domain. The various applications may be based on different technologies and platforms. However, by adhering to the web service standards a common framework can be deployed that facilitates integration.

The transport mechanism used is the HyperText Transfer Protocol (HTTP) providing a ubiquitous method of transporting messages throughout the network. The contents of the result report messages will be encrypted during transport. This protects the contents from being viewed by third parties who

may handle the message before it arrives at the destination by providing end-to-end encryption.

The use of web services allows for a Service Oriented Architecture (SOA) to be built, by combining different services together, delivering higher levels of business functionality.

The pathology result reporting solution will use the secure messaging architecture to achieve secure connectivity between a pathology provider and consumer. The secure messaging layer will orchestrate communication with the components of the national infrastructure services, such as NASH, UHI and SIL.

4.4 Services

Each of the entities in the pathology result reporting solution provides various services to the others (via web services).

4.4.1 Pathology Provider

The two services provided by the pathology provider allow report recipients to retrieve reports directly from the provider and send acknowledgements to the provider (i.e. that reports have been successfully received and processed by the information systems within the general practice).

4.4.2 Pathology Report Recipient

Pathology report providers send reports to the clinical information systems (CIS) of nominated recipients. In addition, a receiver's CIS is able to accept reports from other e-health entities (e.g. discharge summaries, medication management, etc.).

4.4.3 Notification Provider

The services provided by the notification provider enable a pathology provider to send notifications that reports are ready to be retrieved, and allow a recipient to get a list of waiting notifications.

4.4.4 Storage Provider

The storage provider's services allow pathology providers to place encrypted reports for collection and allow recipients to retrieve these reports.

5 How will the Solution Work?

5.1 Participation

5.1.1 Individuals

Individual participation is as follows:

- Essentially an individuals' participation in the pathology result reporting process remains unchanged
- Pathology requests containing all required information will continue to be generated by a community clinician and be provided to an individual as per normal practice
- Pathology specimens will continue to be collected from the patient by an appropriate specimen collector as per normal practice
- Individuals may or may not obtain an Individual Healthcare Identifier.

5.1.2 Provider Organisations

5.1.2.1 Pathology Laboratory

Pre-process requirements:

- The pathology laboratory will obtain a Healthcare Provider Identifier – Organisation (HPI-O)
- The pathology laboratory will have unique healthcare provider identifiers for individual pathologists linked to it in the UHI service (i.e. HPI-Is will be linked to HPI-Os)
- The Service Instance Locator (SIL) will have information for the pathology laboratory regarding the specific web services able to be utilised by general practices wishing to transact electronically (in this case the web service for Acknowledge Report Processed)
- The pathology laboratory will have a server located on the web that is hosting the specific web services that are accessible by a general practice
- The pathology laboratory will have a private and a public key provided by the National Authentication Service for Health (NASH):
 - The public key may be obtained through queries to the NASH, and the private key located at the pathology laboratory used for decrypting electronic information exchanges.
- The pathology laboratory will have the ability to generate HL7 messages for electronic information exchange, based on NEHTA's:
 - Structured Document Template – Pathology Result Report
 - Interchange Format – Pathology Result Report to HL7 v2.4
- The pathology laboratory will have the ability to receive HL7 messages for electronic information exchange of Pathology Result Report Acknowledgements based on HL7 v2.4 specifications
- The laboratory information system will have the ability to make use of SCT-AU terminology, informed by the Structured Document Template and associated Value Domains, for both the recording and storing of pathology result information.

Processing involves a variety of stages.

1. Pathology specimens will be transported to the laboratory as per normal practice.
2. Pathology testing will be completed as per normal practice.
3. The laboratory information system will generate an HL7 message directed to a specific community clinician at a specific general practice. The HL7 message will contain a pathology result report, based on the Structured Document Template and the Interchange Format specification inclusive of SCT-AU terminology.
4. Based on the Recipient of the HL7 message, a call to the NASH is made to obtain the public encryption key for encrypting the HL7 message in preparation for transfer.
5. Based on the Recipient's Organisation (HPI-O) the UHI service provides details as to where the recipient's SIL is located.
6. The SIL is contacted to determine how to interact with the specific web service Web Service Definition Language (WSDL) for Pathology Result Reporting. Based on the information obtained from the SIL, this may be a direct connection with the general practice or via an intermediary.
7. The specific web service is then located, contacted, and the encrypted HL7 message is transferred and interface layer acknowledgements are obtained.
8. At some following point in time, a general practice will electronically transfer an encrypted HL7 acknowledgement message via a dedicated web service when the pathology result report has been received and processed by the general practice clinical information system.

5.1.2.2 General practice

Pre-process requirements:

- The general practice will obtain a Healthcare Provider Identifier – Organisation (HPI-O)
- The general practice will have the unique healthcare provider identifiers for individual clinicians linked to it in the UHI service (i.e. HPI-Is will be linked to HPI-Os)
- The Service Instance Locator (SIL) will contain information for the general practice regarding the specific web services which pathology laboratories may use when transacting electronically (in this case the web services for Put Pathology Result Report, List of Ready Reports and Report Transmission)
- The general practice will have a server located on the web that is hosting the specific web services that are accessible by a pathology laboratory
- The general practice will have a private and a public key provided by the National Authentication Service for Health (NASH), such that the public key may be obtained through queries to the NASH, while the private key is located at the general practice used for decrypting electronic information exchanges
- The general practice will have the ability to receive HL7 messages for electronic information exchange, based on NEHTA's:
 - Structured Document Template – Pathology Result Report
 - Interchange Format – Pathology Result Report to HL7 v2.4
- The general practice will have the ability to generate HL7 messages for the electronic information exchange of Pathology Result Report acknowledgements based on HL7 v2.4 specifications

- The clinical information system will have the ability to make use of SCT-AU terminology, informed by the Structured Document Template and associated Value Domains for both the recording and storing of pathology result information within the health record.

The process for requesting pathology services will remain essentially unchanged.

1. The community clinician makes the request and documents this on a paper request form, before handing this to the individual.
2. A general practice may also be nominated to receive a copy of the pathology results for an individual if required by the requesting community clinician.
3. Once the processing of the pathology investigation is complete, a general practice will be provided with an encrypted pathology result using web service technologies.
4. Once received, the general practice will generate an HL7 message acknowledging the specific pathology result report.
5. Based on the sender of the HL7 pathology result report, a call to the NASH is made to obtain the public encryption key for encrypting the HL7 acknowledgement message in preparation for transfer.
6. The UHI service provides details on where to locate the pathology laboratory's SIL.
7. The SIL is contacted to determine how to interact with the specific web service Web Service Definition Language (WSDL) for Pathology Acknowledgement Reporting. Based on the information obtained from the SIL this may be a direct connection with the pathology laboratory.
8. The specific web service is then located, contacted and the encrypted HL7 message is transferred and interface layer acknowledgements are obtained.
9. The structured information provided in the pathology result report is then placed into the recipient's clinical information system for review by the relevant clinician and for use with decision support for future clinical care.

5.1.3 Providers

5.1.3.1 Pathologist

Pre-process requirements:

- The Pathologist will obtain a Healthcare Provider Identifier – Individual (HPI-I).
- The Pathologist will be linked to one or more organisations in the UHI Service (i.e. HPI-Is will be linked to HPI-Os).
- The laboratory information system that the Pathologist uses will have the ability to make use of SCT-AU terminology, informed by the Structured Document Template and associated Value Domains for both the recording and storing of pathology result information.

Processing involves a number of stages.

1. A pathology laboratory will receive a pathology request form together with a pathology specimen for processing.
2. Once the laboratory has completed testing, the pathologist (or another authorised laboratory worker) will make use of the SCT-AU terminology and the structured document template to construct a pathology result report.

3. Once the report is created the laboratory information system process the report by encrypting it for the recipient and using web services to transfer the pathology result report to the appropriate general practice.
4. At some point in the future an acknowledgement for the pathology result report will be received by the laboratory information system. The acknowledgement will enable the pathologist to verify that the report was received and processed correctly into the recipients clinical information system.

5.1.3.2 Community Clinician

Pre-process requirements:

- The community clinician will obtain a Healthcare Provider Identifier – Individual (HPI-I).
- The community clinician will be linked to one or more organisations in the UHI Service (i.e. HPI-Is will be linked to HPI-Os).

Processing involves a number of stages.

1. A community clinician will create a pathology request and provide the request form to an individual during a medical consultation at a general practice.
2. At some time in the future a pathology result report will be received by the community clinician's clinical information system.
3. The community clinician will then review the structured pathology result information and use the information in association with the provision of healthcare provided to an individual.

5.2 Pathology Result Report Content

5.2.1 Information

The *Structured Document Template – Pathology Result Report* [PATH-PRR-SDT] is a contextual template outlining the data elements and respective groupings for clinical information associated with the reporting of pathology result information. The template defines the data elements for population and the associated terminology (and its location within SCT-AU) for inclusion when providing pathology information for this data element as part of a pathology result report.

Clinical and Laboratory Information Systems are required to use the template to ensure that data can be entered and extracted from local system implementations. The template defines the level of data granularity that is required for pathology result reporting to promote interoperability and facilitate decision support in the future.

The *Interchange Format – Pathology Result Report to HL7v2.4* [IF-HL72.4] is a mapping specification between the Structured Document Template and the HL7 messaging format (version 2.4). Version 2.4 of HL7 is the most recent Australian Standard stated for use in AS4700.2 and aligns with statements in the NPAAC guidelines [NPACC2007].

5.2.2 Terminology

SCT-AU will be predominantly used in Australia as the terminological data to be transferred in association with an information structure for pathology result reporting.

Some data elements specified for the pathology domain have a datatype of coded text or codeable text. These will have an associated SCT-AU 'reference

set' assigned to them. The reference set contains SCT-AU concepts, allowing a clinician to select from the numerous descriptions assigned to the concept for use within clinical communications. The reference set also doubles as a validation step to ensure when a data element is tightly controlled and - whenever a SCT-AU description is used - that it represents a valid SCT-AU concept. Each SCT-AU concept has exactly one Preferred Term and multiple synonyms that may be used to describe the concept.

For additional detail on the six reference sets proposed for use in conjunction with the data elements used, refer to the Structured Document Template – Pathology Result Report [PATH-PRR-SDT], including:

- Request Test Name
- Result Test Name
- Specimen Type
- Specimen Qualifier
- Specimen Anatomical Site
- Testing Method.

Additional background information on SCT-AU and the development approach to providing terminology for the pathology domain is provided on the clinical terminology section of the NEHTA website.

6 Privacy

NEHTA is committed to developing the national foundations for e-health in a manner that ensures personal privacy is appropriately protected.

Any NEHTA project that involves the collection and handling of personal and/or health information will raise privacy issues. NEHTA has taken a structured approach to privacy management to ensure its work complies with privacy law, and takes into account broader community expectations around what appropriate 'privacy protection' should comprise.

Consistent with this structured approach, a *Privacy Management Framework* [NPMF2008] has been designed to guide NEHTA's development of the Pathology Result Reporting Package v1.0.

This framework recognises that electronic exchange of personal information between pathology laboratories and healthcare providers has been in place for some years. Apart from the privacy obligations imposed under Commonwealth, State and Territory legislation, the NPAAC has published privacy standards and guidelines on the collection, handling, storage and transmission of pathology data. Existing privacy foundations, policies and procedures are therefore likely to be in place for use when implementing the package.

NEHTA's approach provides for privacy work to be undertaken incrementally, aligning with the package's phased development approach and reporting arrangements. The framework requires a range of privacy tools to be utilised at each of the development, consultation and implementation phases, to assist privacy analysis, consideration of options for the mitigation of privacy risks, and the promotion of privacy benefits. These tools include privacy checklists, mapping of information flows and privacy reports.

This framework reflects the view that - when developing pathology results, reporting specifications and producing supporting material for national adoption and implementation - NEHTA must:

- Ensure its publications and specifications are compliant with privacy law
- Promote privacy awareness when interacting with other parties regarding adoption and implementation.

However, the constraints on NEHTA's privacy analysis in the context of phased development and delivery are also acknowledged. By way of example, the identification and consideration of potential privacy impacts requires that the appropriate pathways to implementation have already been determined, and that roles and responsibilities of other parties have been established. Some of the potential privacy impacts of the Pathology Result Reporting Package also overlap with other future packages, such as a pathology requesting package. In many instances, the privacy issues concern implementation, and need to be assessed on a context-specific basis, taking into account the existing privacy foundation, policies and processes for electronic exchange of personal information, among other factors.

The framework assists NEHTA to exercise its privacy responsibilities in a necessarily incremental manner whilst recognising these constraints.

Privacy analysis completed by NEHTA, to date and into the future, will assist the pathology results requesting community in undertaking future context-specific privacy analysis. For example, NEHTA is currently analysing the impact the infrastructure services approach (including NASH, SIL and the UHI Services) may have on message integrity, security and confidentiality. This work is being pursued to guide parties considering implementation of the package.

As it implements and tests the package with industry partners, NEHTA will also remain alert to privacy impacts raised by the package, with a view to amending the Package documents (if require), and promoting privacy awareness during adoption and implementation.

However, pathology laboratories, general practices and individual pathologists and clinicians will still need to assess whether their implementation of the Pathology Result Reporting Package complies with privacy laws applicable to their particular practices. These laws vary from jurisdiction to jurisdiction and from the public to the private sector. This assessment will also need to take into account context-specific information flows and existing privacy policies and practices, and to identify where changes may need to be made to mitigate any privacy risks.

These assessments will vary depending on where these implementations occur on the migration path. For example, if implementation of the package is assessed prior to the UHI services becoming operational, the privacy impacts of leveraging an existing system of identity management need to be considered. If assessed prior to the NASH or SIL becoming available, the impact of using existing security certificates or maintaining a repository of provider organisations also needs to be taken into account.

NEHTA is confident that, following this privacy work, implementation of the Pathology package is likely to result in a 'visible', ubiquitously-deployed approach to the exchange of personal information, which has the potential to significantly enhance patient privacy.

References

This section lists NEHTA specifications and other documentation either referenced in this document or providing useful reference material.

At the time of publication, the document versions indicated are valid. However, as all documents listed below are subject to revision, readers are encouraged to use the most recent versions of these documents.

Package Documents

The documents listed below are part of the suite delivered in the Pathology Result Reporting Package.

Discharge Summary Package Documents			
[PATH-PRR-BA]	Pathology Result Reporting Package v1.0 – Business Architecture v2.0	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)
[PATH-PRR-EPS]	Pathology Result Reporting Package v1.0 – Endpoint Specification v2.0	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)
[PATH-PRR-IA]	Pathology Result Reporting Package v1.0 – Information Architecture, NEHTA v2.0	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)
[PATH-PRR-PS]	Pathology Result Reporting Package v1.0 – Purpose and Scope v3.0.	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)
[PATH-PRR-RG]	Pathology Result Reporting Package v1.0 – Readers' Guide v3.0.	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)
[PATH-PRR-TA]	Pathology Result Reporting Package v1.0 – Technical Architecture v2.0	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)

References

The documents listed below are non-package documents that have been cited in this document.

Reference Documents			
[IBIS2007]	IBISWorld, Pathology Services in Australia, IBISWorld Industry Report O8631, 12 July 2007	-	Reference in preparation for future release.
[IF-HL72.4]	Interchange Format - Pathology Result Report and AS4700.2 (HL7 v2.4)	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)
[IOM1996]	Institute of Medicine, Crossing the Quality Chasm: The IOM Health Care Quality Initiative, 1996.	IOM 1996	Reference in preparation for future release.
[NPAAC2007]	National Pathology Accreditation Advisory Council, 2007, Requirements for Information Communication (2007 Edition), ISBN: 1-74186-343-0,	NPAAC 2007	http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/health-mpaac-docs-gudatco.htm
[PATH-PRR-SDT]	Structured Document Template – Pathology Result Report, NEHTA, April 2008 v1.0	NEHTA 2008	http://www.nehta.gov.au/ (Home > Publications)
[RCPA2007]	Royal College of Pathologists of Australasia, Pathology - the Basis of Medicine	RCPA 2007	http://www.rcpa.edu.au/public/pathology/basis.cfm

Reference Documents			
[WSP2008]	NEHTA, Web Services Profile, 2008	NEHTA 2008	Reference in preparation for future release.