



## E-Laboratory: Clinical Data Repository Options



A Report by the NZ Health IT Cluster

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## 1. Executive Summary and Key Recommendations

The e-Laboratory Orders and Communications Feasibility Study (The Feasibility study) published by The NZ Health IT Cluster in 2004, concluded that the implementation of an electronic laboratory ordering and results system was financially and clinically justified and outlined a way forward for an initial implementation site. Work to progress messaging standards and LOINC coding has subsequently taken place. This progress together with the work undertaken in the Microsoft Collaborative Health Showcase removes some of the obstacles to implementation and improves the business case for early adoption.

The Clinical Data Repository (CDR) Architecture Options outlined in this report include a CDR consolidated at the local (GP or PHO), Regional, and National levels. This report recommends the scoping, design and implementation of a CDR consolidated at a Regional level. The major benefits of Regional CDRs are enhanced security, and managed access by multiple Healthcare providers which will enable decision support and audit tools to be included, will enhance the quality of patient care, and lead to reduced costs. A table summarizing the Assessment of CDR options follows.

Regional CDRs are already in existence (for limited access to pathology or radiology results) proving the model works. Expanding the functionality of a regional CDR to include an Orders Clearing House and a CDR for laboratory test results is a pragmatic and feasible step. The CDR could evolve to become the basis of a longitudinal electronic health record. This approach is supported by the laboratories, although it is noted that some members of the Cluster only support Clinical Data Repositories held by single legal entities (excluding neighboring secondary care facilities).

This report outlines two e-Laboratory pilot options. A full scoping together with an analysis of the respective benefits and costings will need to be undertaken, and a preferred option chosen before a pilot can commence. We recommend this analysis be undertaken in the near future.



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Table 1: Assessment of CDR options

CDR Assessment Criteria	CDR 1: consolidated at PMS/PHO level	CDR 2: consolidated at Regional level	CDR 3: consolidated at National level
Access	+	++	+++
Infrastructure	+	++	+
Privacy	+++	++	++
Security	+	+++	+++
Flexibility	+	+++	++
Interoperability	+	+++	++
Audit	+	+++	+++
Responsiveness	+++	++	++
Acceptance	++	+++	+
Cost	++	+++	+++

Key

- + Low
- ++ Medium
- +++ High



## 2. Introduction

Following the e-Laboratory Feasibility Study (the Feasibility Study), published by the New Zealand Health IT Cluster in November 2004 (e-Laboratory Feasibility Study (v4.75), [www.healthit.org.nz/library](http://www.healthit.org.nz/library), e-Lab Orders Project 2004), the Ministry of Health asked the New Zealand Health IT Cluster to clarify its members' position with regard to some key elements of the e-Laboratory proposal, and in particular the nature of any Clinical Data Repository that may be required under a proposed e-Laboratory system.

This document summarises the collective responses from participating cluster members, and outlines our recommendations.

### 2.1 Background

#### Current state:

As detailed in the Feasibility Study, the current state of lab order requests is characterised as "manual" and "non-standard". The flow of test order data from GPs to laboratories is still based on paper forms printed from the GP's Patient Management System (PMS) and manually entered into a Laboratory Information System (LIS).

#### Proposal outline:

The e-Lab solution discussed in the Feasibility Study proposed two fundamental components - an Orders Clearing House (OCH) and a Clinical Data Repository, or CDR. Each is an absolute requirement for the solution to operate, and while they could be combined, they do not perform the same function.

*Orders Clearing House:* The OCH is a clearing house for lab orders. Orders are created by healthcare practitioners (for example, by a GP in their Patient Management System) and submitted to the OCH. The order is then retrieved from the OCH by the laboratories at the point of specimen collection, usually within their Laboratory Information System. This eliminates the difficulty of not knowing where the specimen will be collected after an order has been created. Following retrieval, orders are deleted from the OCH system after a number of days when no longer required. A copy of the order may also be provided to the CDR.

*Clinical Data Repository:* A CDR is a real-time database that consolidates data from a variety of clinical sources to present a unified view of a single patient. The main purpose of the CDR is to allow multiple healthcare practitioners to retrieve data for a single patient, and to improve the care of patients the shared and better-informed view of their medical history. In a CDR, business procedures, rules and data stewardship processes are agreed to ensure appropriate security and privacy of individual health information.

Typical data types which may be found within a CDR, for example, include:

- patient demographics;
- medical notes;
- laboratory test results;
- pharmacy information;
- radiology reports (and images in some cases);



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pathology reports; and  
referral and discharge summaries.

Through the CDR, individual health and medical data can be collected, stored, analysed and distributed. In anonymised form, the collective data may be used for research, population health needs assessments, conducting quality assurance, and monitor needs assessments delivery. It is widely anticipated that over time a CDR and associated management systems will reduce healthcare costs and improve patient care.

A CDR has been implemented in a number of healthcare environments (DHBs etc) throughout New Zealand already. Primarily, the CDR has been implemented to allow the sharing of clinical data across multiple healthcare providers.

The CDR infrastructure can be combined with the Order Clearing House. The lab results can be returned/stored to the CDR where they will be matched with the order. The CDR can also add value by providing a single point of contact to detect order/result mismatches and incorporate decision support tools. It can also form the basis of an electronic longitudinal health record.



## 3. CDR Architecture Assessment and Options

### 3.1 Assessment Criteria

The following criteria have been used to assess the relative strengths of each CDR architecture consolidation option:

- (i) Access: Ease of access by multiple healthcare providers
- (ii) Infrastructure: Is the infrastructure currently in place?
- (iii) Privacy: Compliance with PAS standards
- (iv) Security: How robust is the security?
- (v) Flexibility: The ability to evolve and adapt to meet market/funder requirements
- (vi) Interoperability: Ease of linking to other systems
- (vii) Audit: Ability to audit access
- (viii) Responsiveness: The speed of the system
- (ix) Acceptance: How willing is the sector to do this?
- (x) Cost: Relative cost to implement

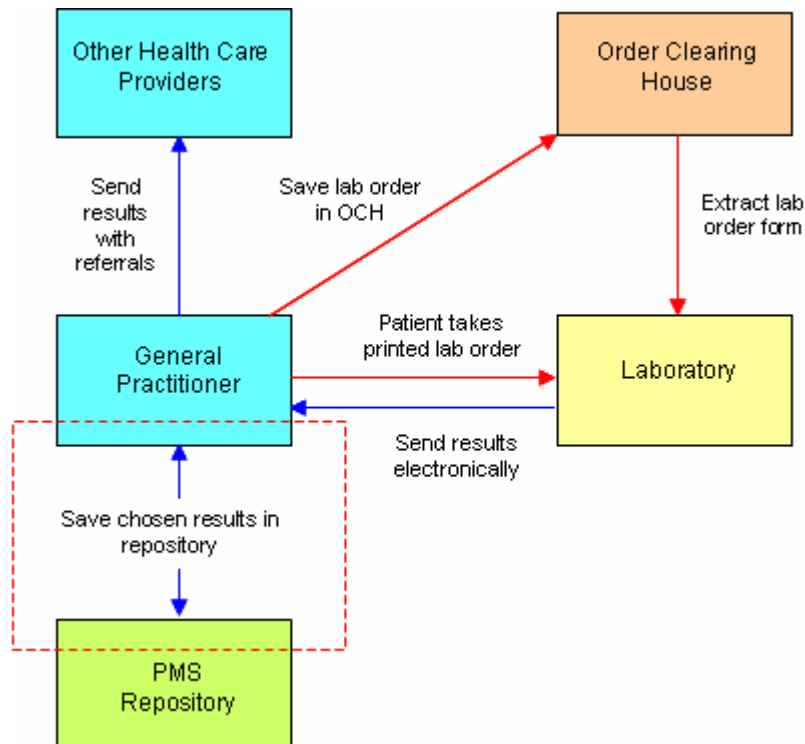
### 3.2 CDR Architecture Options

There are three broad levels at which the CDR can be positioned or consolidated:

1. Local (GP or Primary Health Organisation) level
2. Regional level
3. National level

In theory, CDR options 1 and 2 can be combined to produce a “virtual” national CDR, although, in practice, the bandwidth required and the potential infrastructure and operational costs weigh against this. It is generally accepted that a national level accumulation is unnecessary or inadvisable. Indeed, the 2005 Health Information Strategy - New Zealand (HIS-New Zealand) does not support a national CDR and favours federated or distributed CDR models. Each of the CDR options is considered below.

### 3.2.1 CDR Consolidated at Local Level



With a CDR consolidated at the local level, the GP creates a lab order which is saved in the Order Clearing House (OCH). A printout of the lab order is taken to the laboratory by the patient. The laboratory then uses the printed form to query the patient's electronic lab order through the OCH. The lab order is picked up by the lab system and the lab staff collects the required samples and sends these to be analysed.

The lab results are then sent electronically to the GP. The OCH deletes the lab order after a set number of days following retrieval of the order.

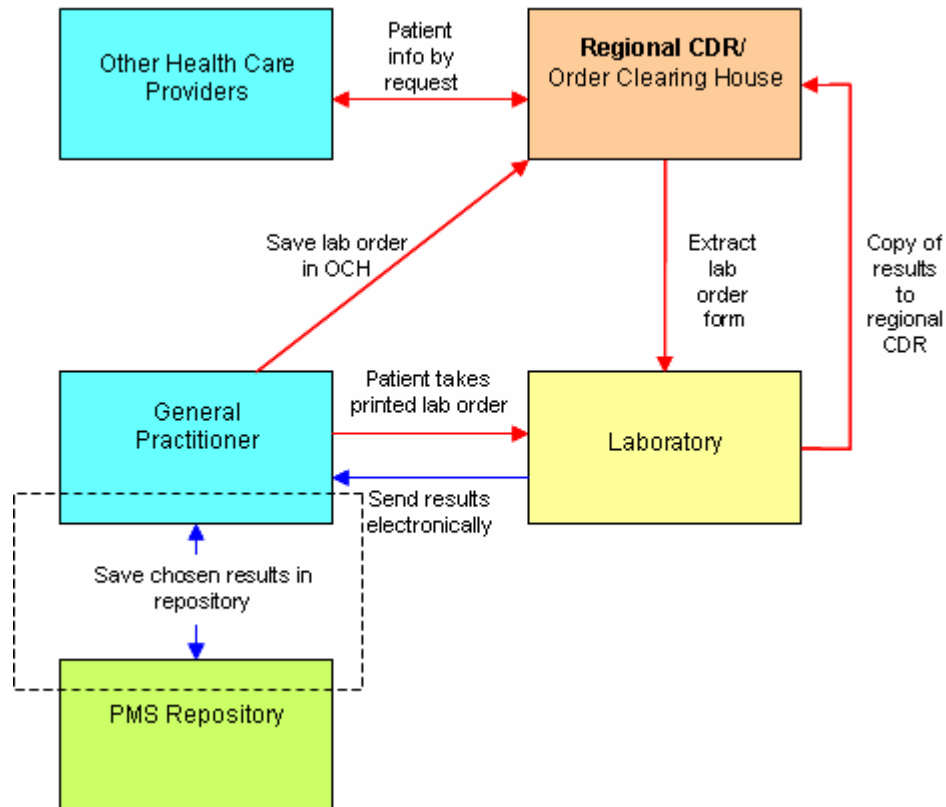
The GP saves selected results in the locally-based (PMS/PHO) Repository. Other healthcare providers, such as other GPs (except those in a shared practice setting) and the regional DHB, will only have access to the patient's lab results if they are included in referral information sent by the patient's GP.

#### Assessment against criteria

- (i) Access: Low - can only be accessed by local PMS users
- (ii) Infrastructure: Low – locally-used technology currently varies markedly between primary care providers

- (iii) Privacy: High – restricted access minimises risk of breach
- (iv) Security: Low – levels of security could vary within individual primary care environments
- (v) Flexibility: Low – changes in practice and technology difficult and costly to administer across such numerous individual systems
- (vi) Interoperability: Low – non-standardised technology between numerous providers likely to pose compatibility challenges
- (vii) Audit: Low - local systems less likely to be able to track access at the level required
- (viii) Responsiveness: High – speed of local systems should be high, as no external transmission is required
- (ix) Acceptance: Moderate – some buy-in amongst primary care providers using their own PMS, although the cost of upgrading equipment and software to accommodate efficient electronic ordering could offset perceived control benefits
- (x) Cost: Moderate – some costs associated with upgrading existing technology (hardware/software)

### Consolidated at Regional Level





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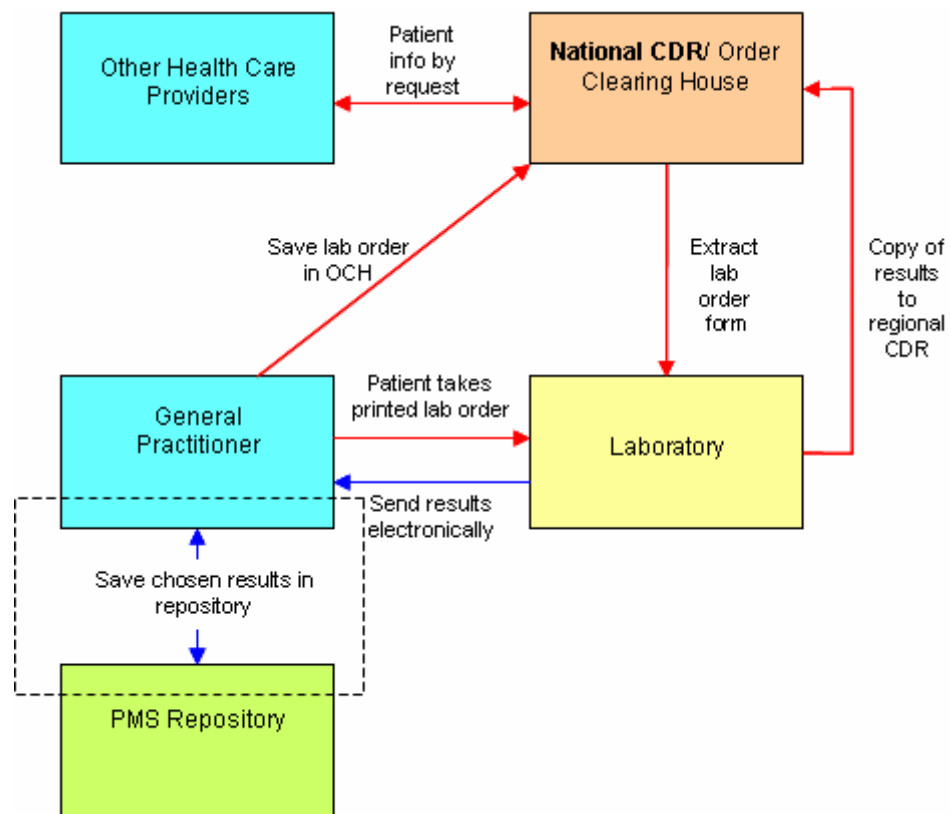
With a CDR consolidated at the regional level, the GP creates a lab order which is saved in the Orders Clearing House (OCH). A printout of the lab order is taken to the laboratory by the patient. The laboratory uses the printed form to query for the electronic lab order for the patient through the OCH. The lab order is picked up by the lab system, and the lab staff then collects the required samples and sends these to be analysed.

The lab results are then sent electronically to the GP and a copy to the regional CDR (Clinical Data Repository). GPs can also save selected results of the patient's tests in their local PMS. Other healthcare providers, such as other GPs and the regional DHB, will now have access to the patient results through the regional CDR.

### Assessment against criteria

- (i) Access: Moderate – access extended to other authorised healthcare providers in region
- (ii) Infrastructure: Moderate – existing partial CDRs in some regions; further installations and connective structuring required
- (iii) Privacy: Moderate – information available across a wider group of authorised users
- (iv) Security: High – identity and authority effectively monitored through central point of contact
- (v) Flexibility: High – changes to technology and processes speedily effected
- (vi) Interoperability: High – interaction between fewer individual systems reduces the likelihood of incompatibility issues
- (vii) Audit: High – all access logged in detail through central point of contact
- (viii) Responsiveness: Moderate – access to all information in real time, although broadband connection would be required for optimal response time
- (ix) Acceptance: High – partial CDR facilities already in use in some regions
- (x) Cost: High – some regional setup costs for equipment and software, plus the provision of broadband connectivity for primary care providers region-wide

**Consolidated at National Level**



CDR consolidated as for the Regional CDR, but at national level.

**Assessment against criteria**

- (i) Access: High – a nation-wide ‘one stop shop’ for authorised users, but reliant on the national infrastructure to support connectivity
- (ii) Infrastructure: Low – no infrastructure currently in place to support a nationally centralised repository
- (iii) Privacy: Moderate – information accessible nation-wide by authorised users
- (iv) Security: High – identity and authority could be effectively monitored through central point of contact
- (v) Flexibility: Moderate – not as readily adaptable to changes that may be required regionally



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- (vi) Interoperability: Moderate – interaction between fewer individual systems offers reduces likelihood of chances for incompatibility issues
- (vii) Audit: High – all access logged in detail through central point of contact
- (viii) Responsiveness: Moderate – information available in real time, but subject to broadband connectivity
- (ix) Acceptance: Low – Ministry of Health and other parties have previously indicated that a national CDR is not a preferred option
- (x) Cost: High – setup costs for equipment and software, plus the provision of broadband connectivity for primary care providers region-wide



## 4. Microsoft Collaborative Health Showcase

Microsoft NZ, on behalf of Microsoft Corporation, has commissioned The NZ Health IT Cluster to develop a Customer Showcase that demonstrates Microsoft's Collaborative Health Strategy. The Showcase involves the integration of applications from a number of Cluster members and through a health collaboration engine also provides a means for the Plug-and-Play of applications from other vendors.

Phase 1 of the Showcase has been delivered, and includes e-laboratory. The following table outlines the functionality of the laboratory system provides in the Showcase:

Function	Description
Provide functionality to process laboratory order requests	The user can order laboratory tests through interaction with an order entry form within the Laboratory System's Browser-based User Interface
Provide functionality to send laboratory order data	Once a Laboratory Test has been completed for a patient, the Laboratory System provides updated with the information of tests ordered for the patient. The information will be sent from the Laboratory System.
Provide functionality to enter laboratory order results	The Laboratory System provides the ability for a user to enter the results for laboratory tests within the Laboratory System's Browser-based User Interface. This interface will be used to emulate the processing and automatic entry of results which take place with a Laboratory Information Management system (LIMS) when samples are processed via analysers.
Provide functionality to send laboratory order results	Once a result is available for a Laboratory Test Order, the Laboratory System provides updated information of tests ordered for the patient. The information will be sent from the Laboratory System. The messages received contain the status in addition to details of the Laboratory Test Result.

A prototype demonstrating this functionality was shown at MSHUG and HIMSS 2006 in San Diego.



## 5. Pilot Project scope

This section deals with the key e-Lab functions to be implemented, and identifies any development requirements.

### 5.1 Approach

The preferred approach is a multi-phase implementation that will concentrate on the key components of the solution in the first instance and introduce complexity in later stages.

This proposal only considers the implications for an e-Laboratory service. This means that issues related to a full medical record; its “meaning”, distribution and accessibility are out of scope.

A common interface specification for Practice Management Systems to accept the “echoed” lab order needs to be developed. Some of this work has already been undertaken with the Collaborative Health Showcase discussed in Section 4.

This interface should ideally be defined in HL7, but could possibly be an XML standard that New Zealand PMS vendors agree upon for the purpose of the trial. Modification to this interface as the needs evolve would be relatively simple.

An alternative approach (proof of concept) to that proposed in the November 2004 e-Laboratory Feasibility study is where the practitioner orders direct from the CDR, using the lab defined interface. This approach alleviates the pressure on the sector to have standards in place before a pilot can be undertaken and may be viewed as a useful first step or proof of concept. We have therefore presented two options to include this alternative approach.

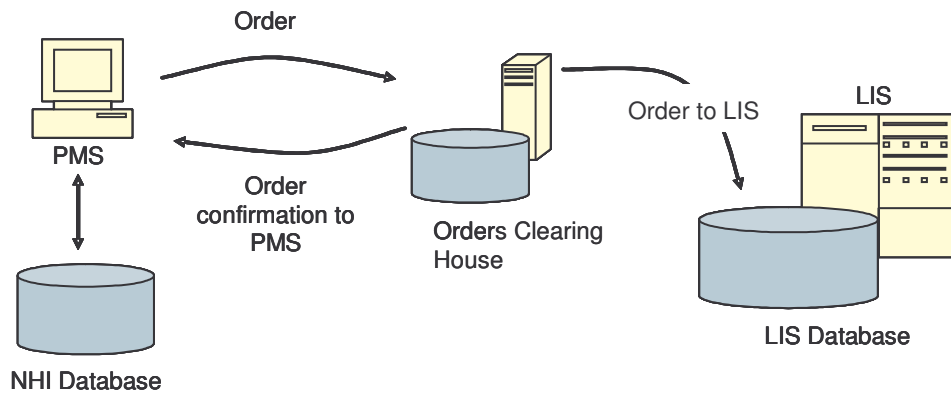
Options 1 and 2 are as follows:

#### Option 1 - Proof of Concept

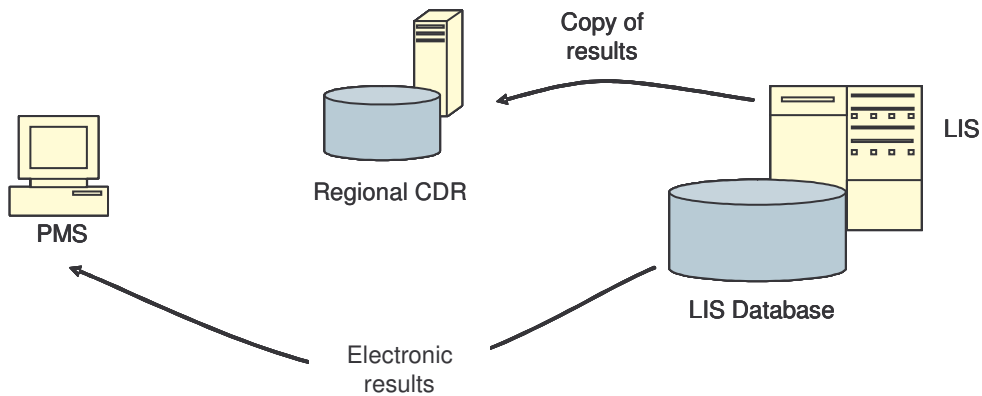
##### *Phase 1 (0- 6 months)*

- The GP accesses a community based (existing) OCH and places a lab order using PID and NHI #. The OCH stores this order and sends confirmation of the order back to the PMS.
- The PMS receives an order confirmation to enable audit against a returning result
- The GP prints a lab form for the patient (with NHI and PID bar-coded) and the patient presents this at Phlebotomy where their details are matched with the order in the OCH.
- Once the specimens have been collected, the collection is acknowledged in the OCH and the order is uploaded (HL7) to the appropriate LIS.
- Return of the results is either through the OCH or directly from the LIS (as is currently implemented).

**Proof of concept – Orders**



**Proof of concept – Results**



*Phase 2 (6-12 Months)*

- Order Generation either in PMS (at preferred pilot site) with NHI, LOINC and HL7 2.4 finalised, or, via the OCH/CDR
- HPI access added
- Lab Results held in CDR
- Result receipt by PMS from CDR
- Implementation of business rules /logic either in PMS or externally:



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- Automatic reminders set up in the PMS system to remind the clinician to follow up on certain results e.g. cervical smear results and automatic recalls on results from PMS
- Alert to GP when requested tests have not been performed
- Audit trail on PMS - the ability to track whether a results message has been sent and acknowledged successfully; i.e. the system must be able to receive and match results against a patient/event/order

### *Phase 3*

- See option 2.

### **Option 2 - (As proposed in the 2004 Feasibility study)**

#### *Phase 1 (0- 6 months)*

- LOINC and HL7 2.4 finalised
- Order Generation in PMS (at preferred pilot site) with NHI
- Receipt of order in an order repository, clearing house or broker
- Pickup of the order by the laboratory
- Return of the results (eg Via HealthLink)

#### *Phase 2 (6-12 Months)*

- HPI access added
- Lab results held in CDR or at local level
- Result receipt by PMS from CDR or HealthLink
- Implementation of business rules /logic either in PMS or externally:
- Automatic reminders set up in the PMS system to remind the clinician to follow up on certain results e.g. cervical smear results and automatic recalls on results from PMS
- Alert to GP when requested tests have not been performed
- Audit trail on PMS - the ability to track whether a results message has been sent and acknowledged successfully; i.e. the system must be able to receive and match results against a patient/event/order



*Phase 3 (12 - 18 months)*

- DHB orders & results access added
- Enhanced business logic with search facilities
- Begin CDS implementation

## **5.2 Development Requirements**

Identify the phasing and timeframes of any necessary development consistent with the existing outline below

Depending on the final project scope or option selected for an initial pilot implementation, the following would be required to support development effort:

- Direct NHI integration from the CDR (if required, and not mediated via an alternate PMI)
- HPI integration
- 3rd party systems integration (e.g. GP PMS and/or Decision Support System).
- Implementation of LOINC, including definition of subsets such as common ordering codes, templates of common order sets, consideration of standard panels related to specific diagnosis codes (e.g. ICD10).
- Extension of HL7 capabilities to allow sending lab orders to recipients able to receive standard HL7 orders.
- Matching received lab reports against original orders, determining when entire order has been met by the received report (this development is in progress).
- Upgrade of lab result storage and reporting facilities.
- Patient identifiers for international visitors etc.

## **5.3 Timeline**

The proposed development timeline would be mid/late 2006. Use of option 1 may advance this.

Development will also be dependent on external funding, although some aspects can be included as part of vendor continuing product enhancements.

The level of effort required and timeframes will be dependent on the agreed scope and deliverables for a first level implementation, and cannot be estimated here.



## **5.4 Issues and considerations**

- Protocols should be established (for example, a message flag) so that the practitioner knows when the test has been actioned by the lab.
- Business rules need to be established within the “rules server” when the result is overdue, otherwise this could delay patient care.
- Service level agreements need to be established with labs so they are compelled to pick up and process all tests when accessing the repository, and not just pick the most profitable ones. (Assuming these are not current contracted requirements.)
- Alerts should suit the clinical environment; for example, the range of “normal” could change for chronic disease. There could be other reasons and the systems should cater for such flexibility.
- Based on the priorities being currently articulated by District Health Boards, we recommend that provision of shared access to electronic results is delivered earlier in the delivery cycle - potentially in parallel with Phase 1 (Order Clearing House). This requirement is identified by clinicians in primary and secondary care as the highest priority for electronic pathology services. DHBs are prepared to commence projects with this in mind using existing infrastructure, existing standards (e.g. HL7 pathology messaging) and interim solutions (e.g. local test code mapping) to make clinical data available to appropriate audiences now, and to accommodate and adopt new standards (e.g. HL7 v 2.4 and LOINC) as and when they are adopted and supported by participant organisations.
- DHBs perceive that there is limited value in being able to see orders that are being processed without access to the full result history.
- When the systems provide HPI data, if the identity of the collector can be captured, this information can be used for audit of quality.
- Non-matching specimen to order - The parties need to clarify how the GP will know that a specimen wasn't processed?

## **5.5 Identification of a pilot site**

We suggest the following groups:

- an Auckland-based GP practice, preferably a major PHO; and
- an Auckland-based community laboratory.

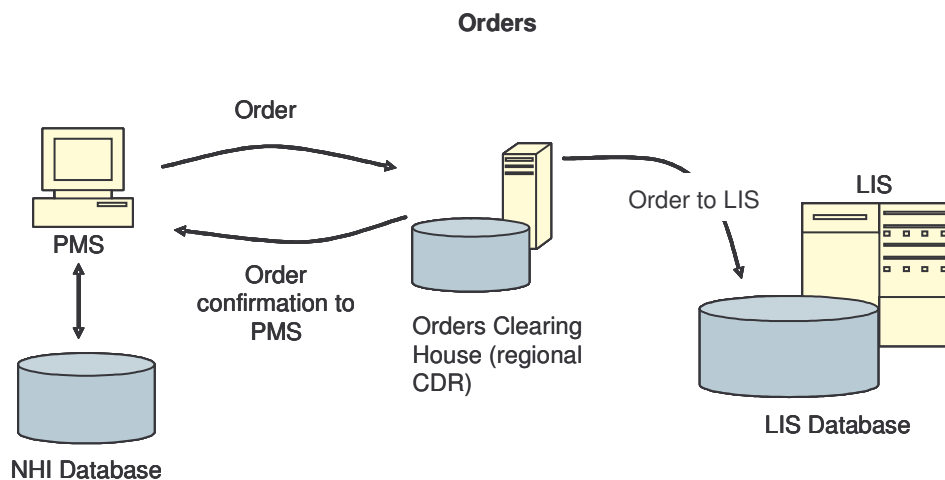


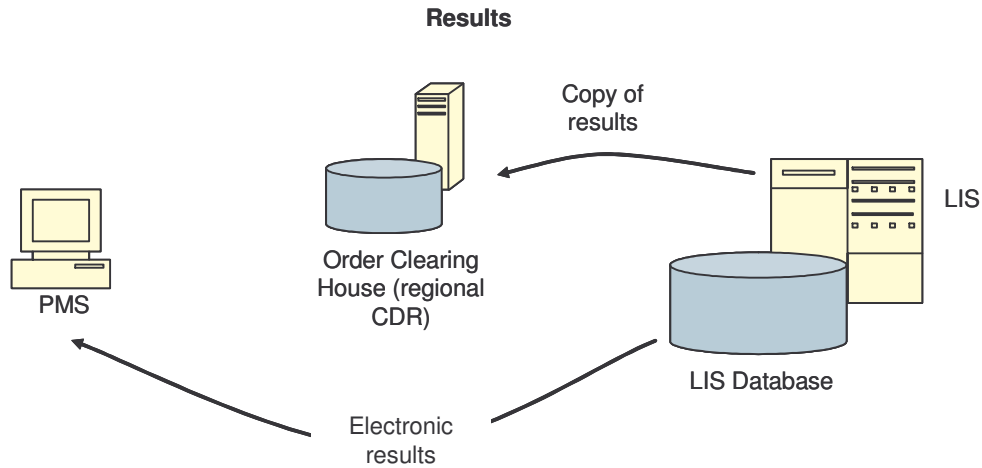
**Reasons for the selection**

- A major PHO has the technical sophistication and capability to provide good support in rolling out, training, and evaluating the effectiveness of the solution.
- All vendor participants in a pilot would be Auckland-based with no travel delays or costs.
- Auckland has an established community CDR.
- A community laboratory has an established technical delivery capability.
- The Auckland region spends the largest dollar amount on diagnostic laboratory testing; the opportunities to evaluate the savings for e-labs are therefore significant.

**5.6 What technology would be implemented and when**

- Integrate LOINC ordering codes, including common groups or sets of tests.
- Produce lab orders, transmit directly to order clearing house, print hardcopy for patient.
- Receive laboratory results electronically, store in structured database.
- Reproduce selected lab results as part of electronic referral.
- The graphic below illustrates the main technology components of the proposed Proof of Concept. In the proposed pilot site, all hardware technology exists now but would require some software development – primarily for the PMS to receive the order confirmation so that it can compare this with the result to establish the auditable link.





### 5.7 The approximate cost of the solution at the site

The scoping, relative benefits, and costings of each option will need to be undertaken and analysed, and a preferred option chosen before a pilot can commence. This is regarded as the next step in the E-lab continuum.

### 5.8 How a rollout could be funded

The costs for a national roll-out could be obtained from a number of sources:

- New Zealand Community Laboratories will invest in any infrastructure that will enable them to save processing costs.
- DHBs will invest in initiatives that are proven to save money and which are included in the NZ-HIS Key Action Zones.
- Development funding could be obtained by Cluster members from FRST in areas where development may be shown to add to a company's competitive advantage in off-shore markets.
- Funding for sector wide project management could be funded by New Zealand Trade and Enterprise where the project can be shown to have enabled collaboration, and opened opportunities for collaborative marketing offshore.
- We understand that New Zealand Treasury may be prepared to fund initiatives that build New Zealand competitive infrastructure.



### **5.9 Regional collaborative issues**

There are a number of areas where collaboration may prove difficult because of their respective lab systems.

Of the above Hamilton Medlab, Medlab South and SCL have sufficient scale in their operations to obtain the benefits of collaboration. Potentially, there also appears to be an opportunity for regional collaboration between Taranaki, Hutt Valley, Wellington, and Nelson Diagnostic which together account for 17% of current lab spending.

Potentially this allows a number of “Hubs” to be established (based almost on a regional “Super 12” basis), i.e.:

Auckland	(40%)
Waikato	(24%)
Wellington	(17%)
Canterbury/Otago	(19%)

The establishment of these hubs would overcome most issues related to local collaboration by providing scale and similarity of solution in the provision of lab IT services.



## Appendix 1: Systems Stock-take

The following sections detail the systems used by both community and hospital based laboratories.

They include, where applicable, any clinical workstation, orders and results reporting or other functionality where these are used to provide wider access to laboratory information.

### 1. Community Labs

Laboratory	LIS Deployed	CDR
Northland Pathology	Symex Delphic LIS	-
Diagnostic Med Lab	Symex Delphic LIS	Eclair
Hamilton Med Lab	In-house design	Eclair
Medlab Bay of Plenty	Symex Delphic (Multilab)	Eclair
Pathlab Waikato	Symex Delphic (Multilab)	Eclair
Rotorua Diagnostic	Symex Delphic (Multilab)	Eclair
Med Lab Central	Symex Delphic (Multilab)	Eclair
Med Lab Wanganui	Symex Delphic (Multilab)	Eclair
Med Lab Hawke's Bay	Symex Delphic (Multilab)	-
Taranaki Med Lab	Lab Solutions	-
Valley Diagnostics	Triple G	-
Wellington Med Lab	Lab Solutions	-
Nelson Diagnostic	Lab Solutions	-
Med Lab South	Triple G	-
Southern Community Labs	Triple G	Eclair



## 2. Hospitals/DHB Laboratories

Laboratory	LIS Deployed	CDR
Northland DHB	Galen/Delphic	-
Bay of Plenty DHB	Sysmex Delphic (Multilab)	Eclair
Auckland DHB	Sysmex Delphic (Multilab)	Eclair
Waitemata DHB	Sysmex Delphic (Multilab)	Eclair
Counties Manukau DHB	Sysmex Delphic (Multilab)	Eclair
Nelson-Marlborough DHB	Sysmex Delphic (Multilab)	Eclair
Canterbury DHB	Sysmex Delphic (Multilab)	Eclair
South Canterbury DHB	Triple G	
Capital & Coast DHB	Affinity LAB /Détente	-
Coast DHB	Affinity LAB /Détente	-
Wanganui DHB	Sysmex Delphic	Eclair
Waikato DHB	Galen	-
Hawke's Bay DHB	Sysmex Delphic (Multilab)	IBA
Otago DHB	Triple G	i-Health
Hutt Valley DHB	IBA	Concerto
Lakeland DHB	Galen	i-Health
Mid-Central DHB	Delphic (Multilab)	Eclair
Southern DHB	Affinity LAB /Détente	-
Tairāwhiti DHB	Galen	i-Health
Wairarapa DHB	Galen	-
Taranaki DHB	Sysmex Delphic (Multilab)	IBA



### **3. The Systems Deployed**

#### **Laboratory Management**

##### **Sysmex Delphic LIS**

The Sysmex Delphic LIS is a New Zealand-developed laboratory information management system for all community and hospital medical and diagnostic laboratory disciplines. The Delphic LIS is fully customised to the requirements of each laboratory as the core product has a user-defined setup, which allows users with little or no programming experience to define the details of their own laboratory system. Full support for the system is located in New Zealand.

The Delphic LIS can also be deployed as a regional system (Multilab) by setting up outlying laboratory service organisations as virtual laboratories. Specimens can be registered in one laboratory and then sent to the referral centre for analysis. Tests can be assigned at registration to another laboratory in the WAN and are available on-screen when the specimens arrive at the referral laboratory.

The Delphic LIS comes in both Hospital and Community lab versions. Sysmex, a multinational manufacturer of diagnostic equipment, purchased Delphic in 2003.

##### **Triple G**

GE Healthcare recently acquired Triple G Systems Group which, develops, deploys and supports software that enables a healthcare organisation to automate and integrate its laboratory processes, and manage large volumes of clinical data. The solutions are designed to streamline the operations of clinical laboratories by ensuring quick and accurate patient information at the local and regional level. First-line support for the system is located in Australia. The Triple G LIS comes in both Hospital and Community lab versions

##### **Affinity LAB /Détente**

Beginning in 1982 with the Detente laboratory system, OMNI-Lab, the company now offers Affinity LAB which is a comprehensive computer-based solution for the multidisciplinary communications and management requirements of all laboratories. QuadraMed International is based in Sydney, Australia. Only the hospital version of the product is marketed in New Zealand.

##### **Galen**

The Galen Lab system is a hospital-only application owned by ISOFT. Running under UNIX and serving all pathology departments.

##### **Lab Solutions**

This is a community lab-only solution based on Windows NT/ Client-Server based solution - no other information available.

##### **Hamilton Medlab**

This Hamilton Medlab developed solution serving the needs of this community lab. UNIX-based with Informix database - no other information available.



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### Information Portals

#### **Sysmex Eclair**

The Sysmex Eclair system is an electronic Clinical Information Repository (CIR) consisting of a central Clinical Information Repository, an Information Gateway, Orders (i.e. Service Management) Results, objects (eg documents or images) and Information Explorer to provide different data views and sign-off reports. ECB (Eclair Community Bridge) enables community labs to receive or download clinical information from a centralised CIR or to a 3rd party system such as a PMS.

#### **IBA Clinical**

IBA provide a solution consisting of a group of core modules that allow users to automate the clinical process. IBA is a global company centred in Australia. Hawke's Bay in New Zealand will be the first site to implement the IBA Solution in this context.

#### **iSOFT - i-Health**

i-Health is a single sign-on access to electronic health information from across a hospital, health organisation or community. The i-Health applications are owned and marketed by iSOFT one of the worlds largest health IT companies.

#### **Orion Concerto**

Concerto provides secure, single sign-on access to electronic health information from across a hospital, health organisation or community. As an organisation moves towards a full Electronic Health Record (EHR), Concerto can provide the access control and workflow tools that will unify all electronic health data within a single environment.



#### **4. Existing orders-related initiatives**

- No healthcare organisation in New Zealand (DHB, Community laboratory) has yet implemented a full electronic laboratory Order Entry system.
- The MedTech and Houston Medical current PMS systems receive lab results from a number of labs in several different message formats. The majority are HL7 ORU format and some HealthLink message format.
- Sysmex has worked with a number of healthcare organisations (DHB, Community laboratory) in New Zealand to look at the processes and workflow issues surrounding laboratory Order Entry.
- Sysmex New Zealand has implemented a number of order entry systems internationally - in the UK, Germany, and USA.
- Many DHBs in New Zealand are currently implementing or planning regional results repositories. These services have become more of a reality since the original labs proposal was written. The regional repositories allow the e-Labs project to “leap-frog” a number of the original hurdles to establishing an e-Labs pilot.



## Appendix 2: Team and solution providers

### 1. Products and solution set

#### MedTech

MedTech's current product is a GP-based PMS which treats lab reports as basic clinical documents.

The system uses no standard request or result coding set for creating lab orders and storing the results. The lab order is printed and given to a patient who then takes it to a laboratory and gets the relevant tests done. The lab then sends the results to the GP by post, fax or electronically. The current system does not match the lab results against the original lab order.

#### Houston Medical

Houston Medical's current product is a primary care-based PMS which treats lab reports as basic clinical documents. The system uses no standard request or result coding set for creating lab orders and storing the results. The lab order is printed and given to a patient who then takes it to a laboratory and gets the relevant tests done. The lab then sends the results to the GP by post, fax, or electronically. The system has the capability to match the lab result with the original lab order.

#### iSOFT

iSOFT's HealthViews application suite provides a web-based Electronic Health Record (EHR) solution that can be implemented incrementally within a single organisation such as a DHB or to service the information sharing requirements of an extended healthcare community covering multiple service provider organisations. The functionality complies with the e-Lab Orders initiative has been described in previous sections.

#### Sysmex

Sysmex have the software available to provide the CDR support required for the proposed solution. Sysmex's Eclair application suite offers the following e-lab orders functionality:

- Order Form Configuration and maintenance
- Order Creation
- Support Order by Profiles
- Minimum re-order intervals (duplicate Order checking)
- Production of Order Messaging in HL7 format, including sending of the original Order(s), and receipt of status updates
- Receipt and Management of Result Messaging in HL7 format
- Result Report configuration
- Result Notification to Clinicians and/or Wards (Whiteboards)
- Result Enquiry
- Result Acknowledgement



## E- Laboratory: Clinical Data Repository Options

- Order and Result storage in the Clinical Data Repository (CDR)
- Supports compulsory entry of supporting clinical data i.e. Fasting status
- Order status display by patient
- Order / Result integration
- Phlebotomy List Management (for inpatient settings)
- Standing / Repeating Order Management
- Order Management i.e. Collection lists / packing lists

### Healix

- Any Practice Management System (PMS) vendor can utilise the same (similar) interface to the CDR that Healix are using with minimal coding.
- With a common definition for entry to the lab ordering interface, the other cluster members can also partner in the proposal.
- Healix can provide the functionality that allows the ordering system to proceed as proposed in section 1.
- Telecom, TelstraClear, Vodafone, Whoosh, and HealthLink are all potential partners in secure broadband connectivity.
- Any CDR / LIS vendor can provide the same (similar) interface for lab ordering and resulting.