HL7 Taiwan 2008

A CDA-based regional dispensing repository: a precursor to national ePharmcy

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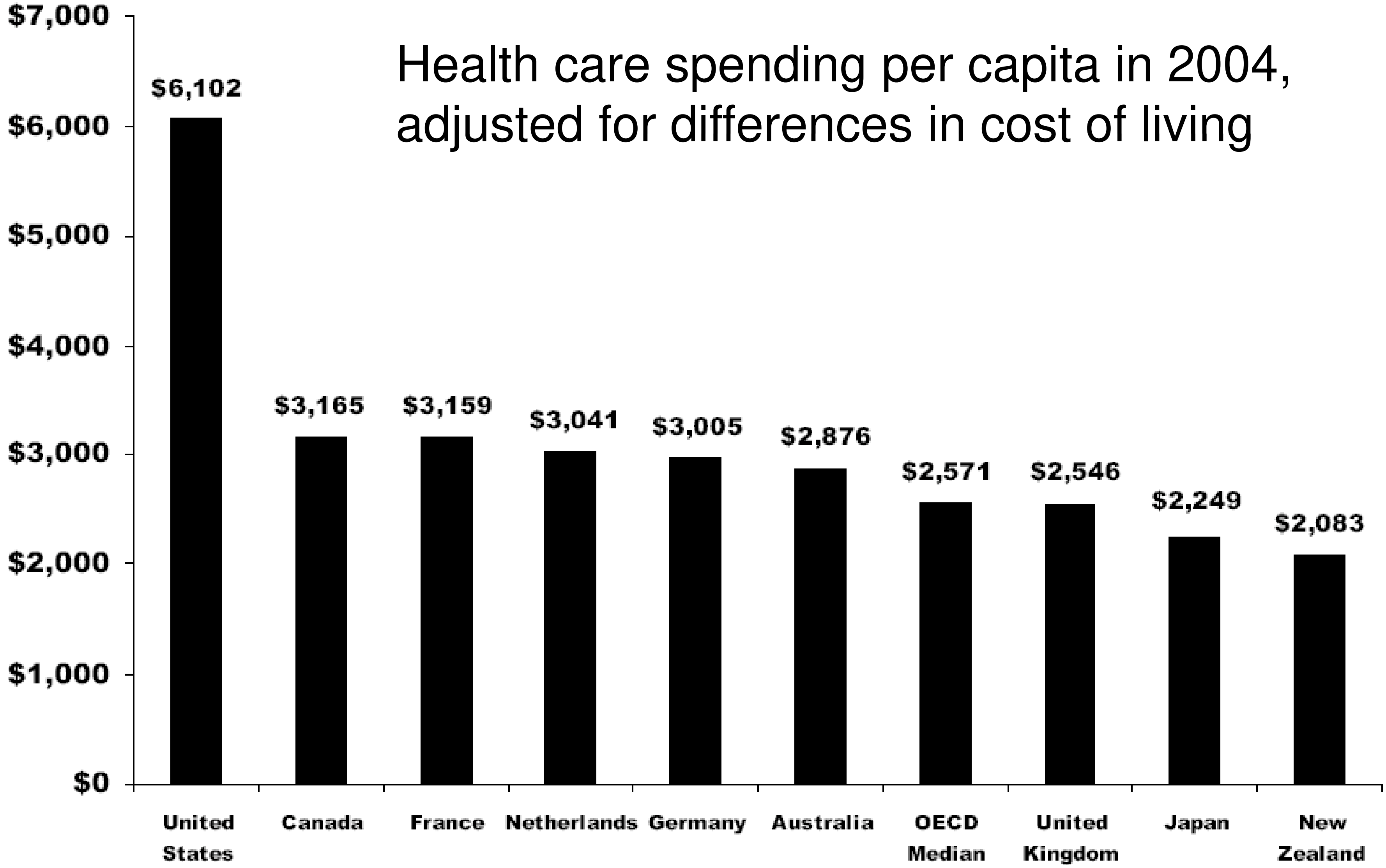
NZ: A day in life .....

157	babies are born
73	people die
105,000	**prescriptions are filled**
50,000	people take a cholesterol-lowering drug
50,000	people take 1 of the new antidepressants, eg: Prozac
40,000	laboratory tests are analysed
1,167	**people are admitted to our hospitals**
4,000	**outpatients visit hospitals for care**
432	people have elective surgical operations
1,960	**people are seen in Emergency Departments**
27	people are admitted to hospital with asthma
50,000	**people visit their GP**
21	people have heart attacks
19	people are diagnosed with diabetes
637	children are immunised
2,124	children and adolescents have a dental check up
3,000	new claims received by ACC

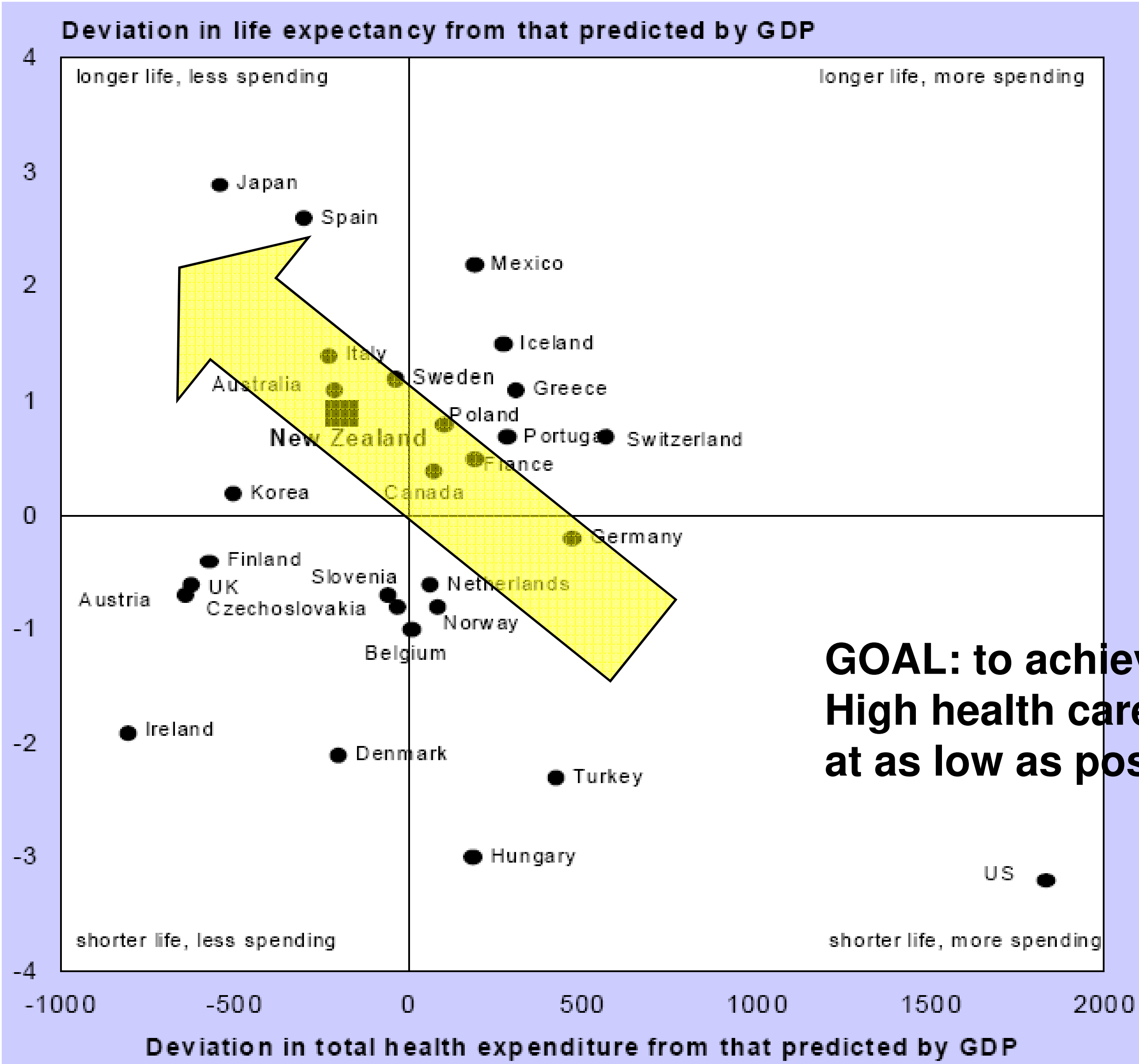
Source: NZ Ministry of Health

Health Care Expenditures



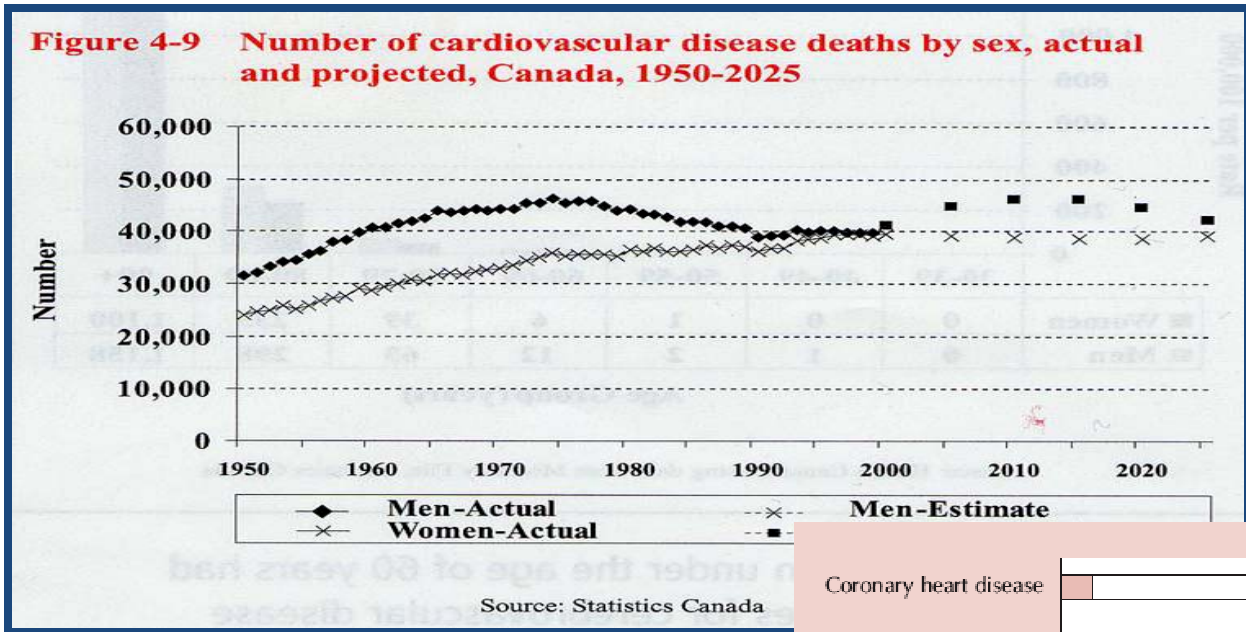
Comparison of Health Care Performance

OECD Statistics, 2003

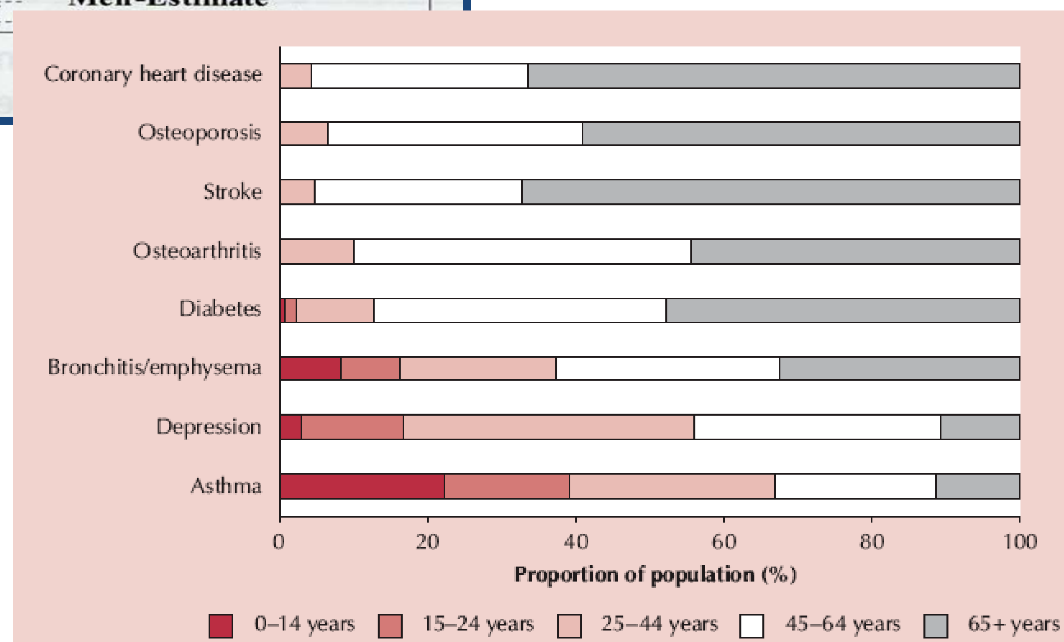


GOAL: to achieve
High health care quality
at as low as possible costs

The Chronic Conditions Epidemic Challenge



Life-style related chronic diseases
Endemic:
Increase in population morbidity
Escalating health care costs
Escalating social costs



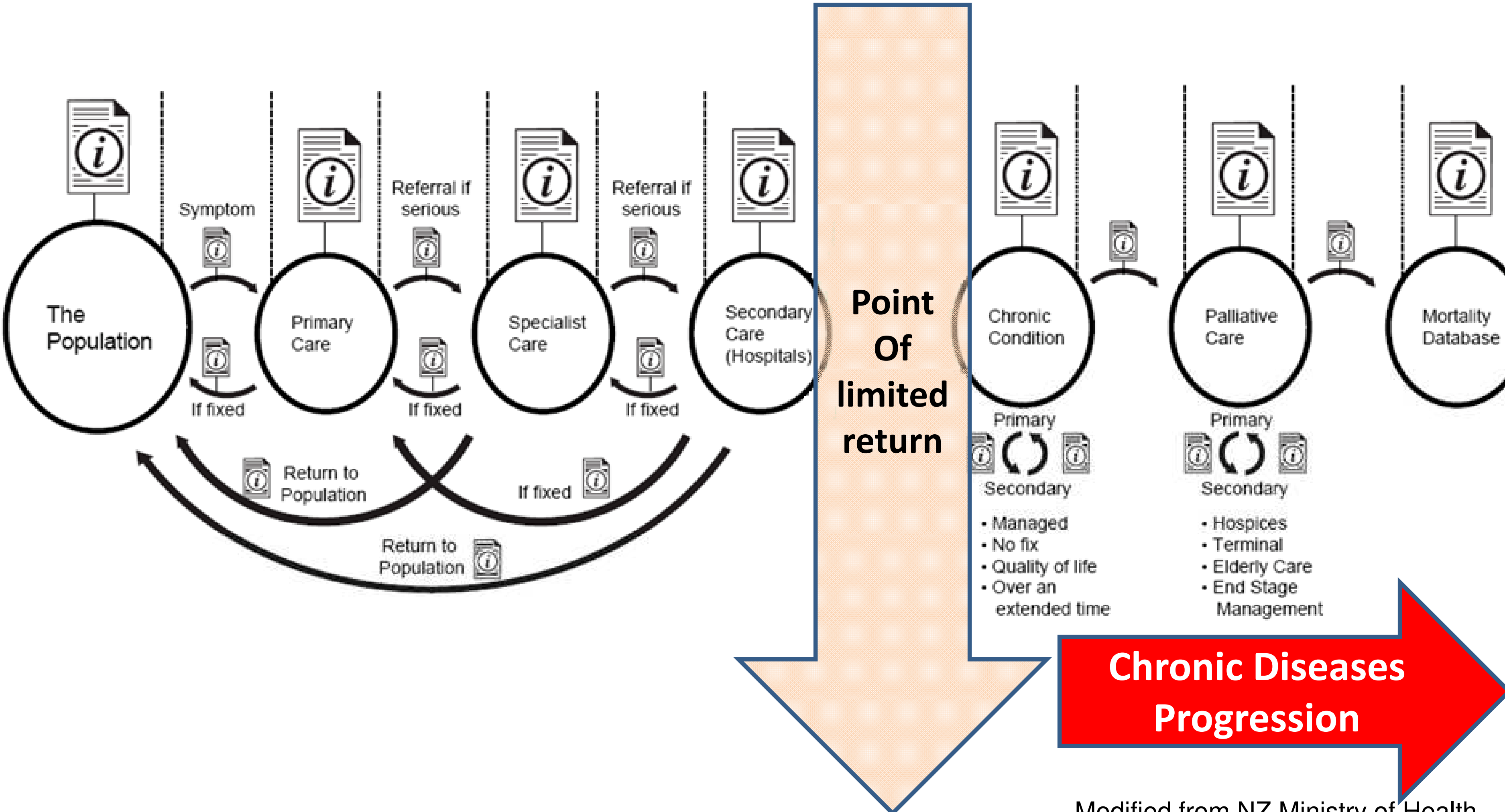
Distribution of selected long term conditions by age group, Australia 2004-05

Source: ABS National Health Survey 2004–05.

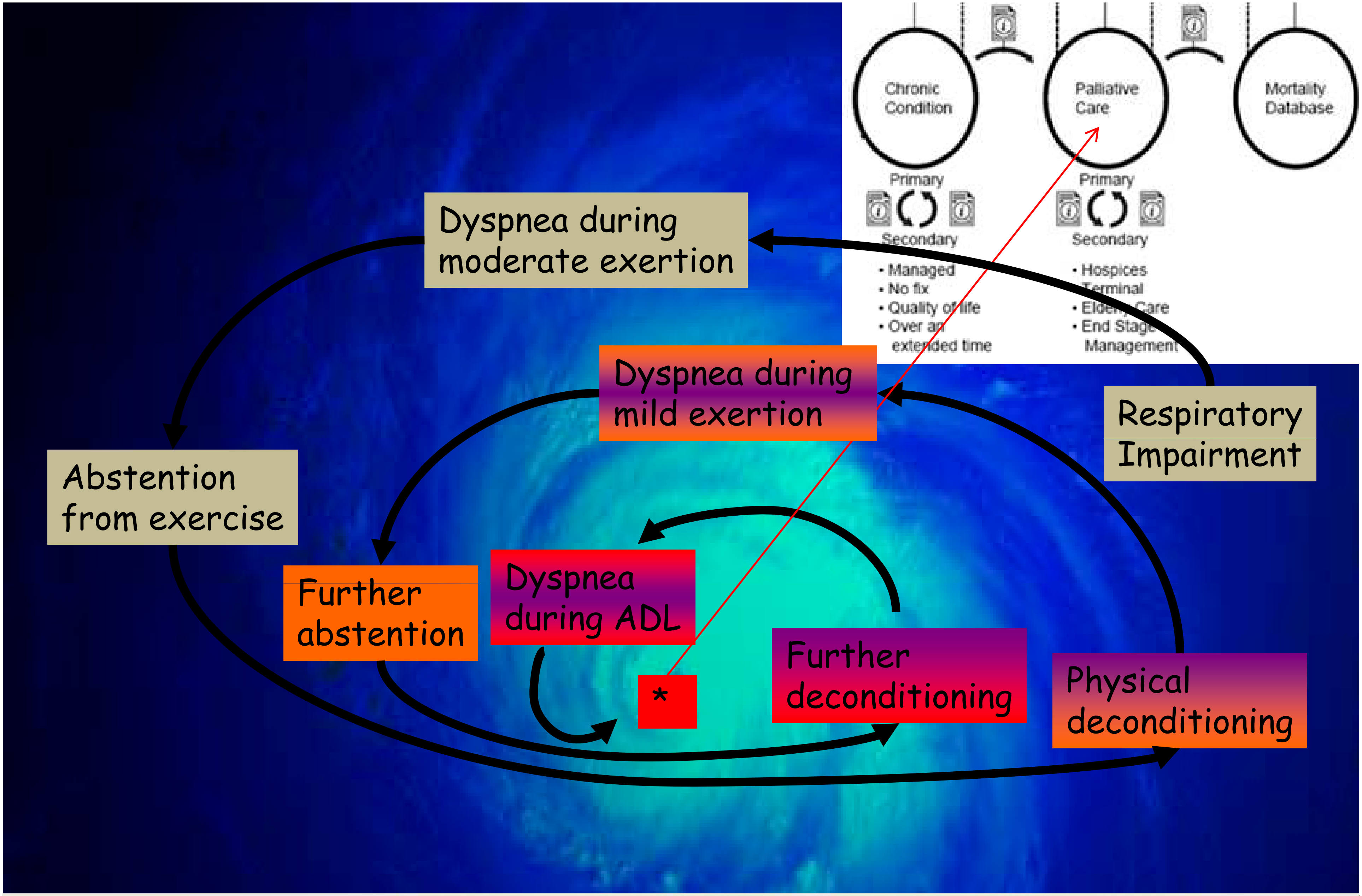
Fragmentation of Healthcare

- Patients with chronic illnesses are managed by multiple providers
  - Silos of care
  - Silos of information
- Fragmented care
  - Ineffective
  - Error prone
  - Point of limited return

The Point of Limited Return in Health Care Management

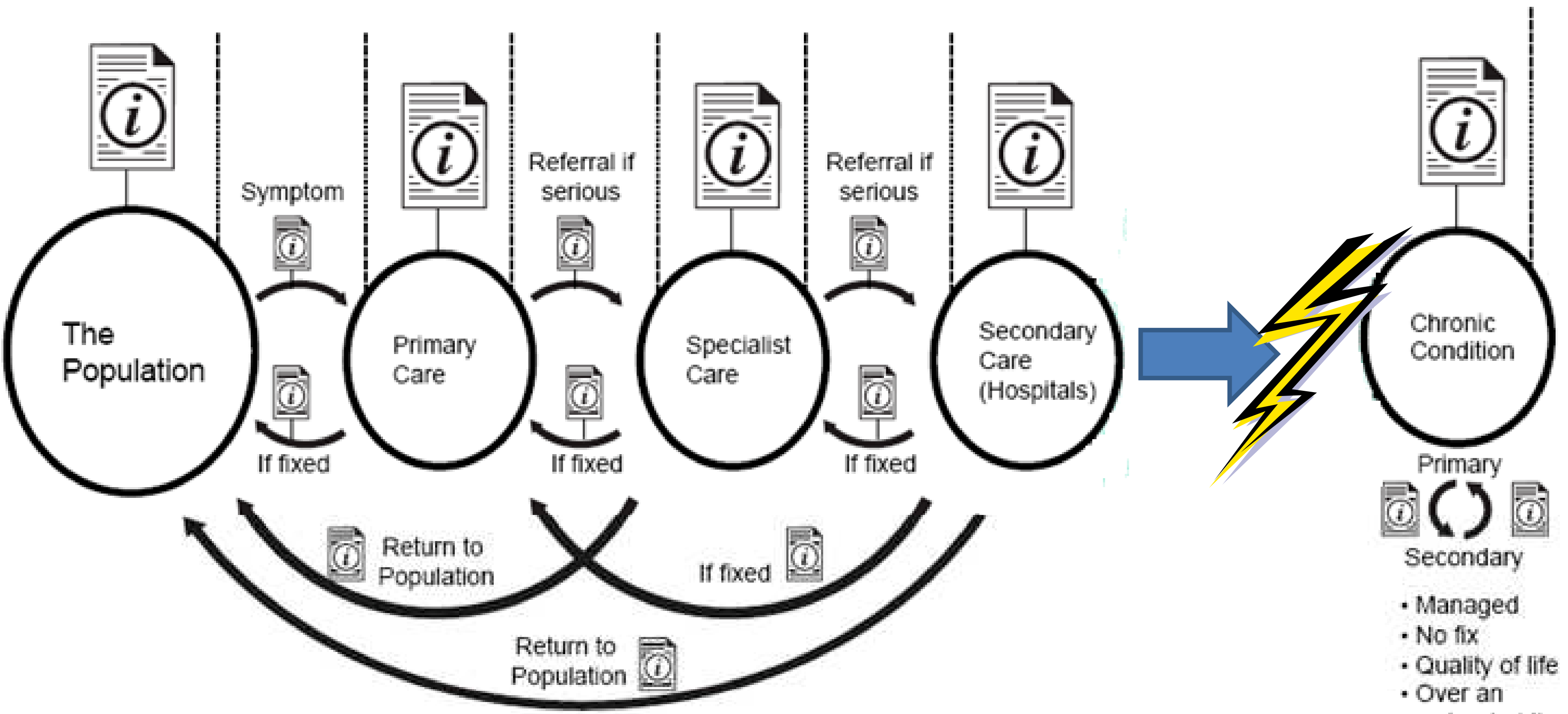


Modified from NZ Ministry of Health



COAD – Downward Spiral of Deconditioning

Goal: Prevent reaching Point of Limited Return

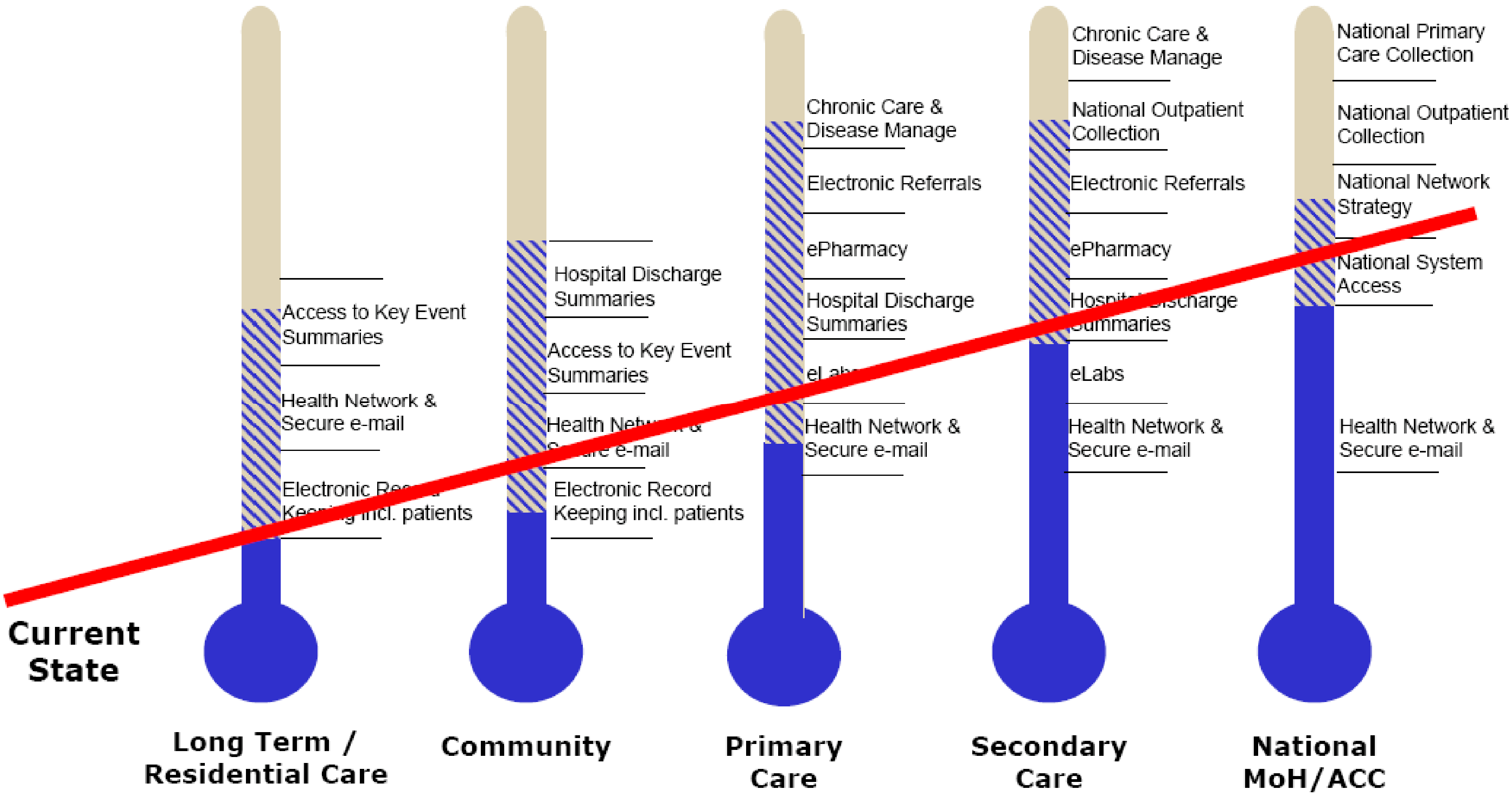


Modified from NZ Ministry of Health

Preventing road toward "point of limited return"

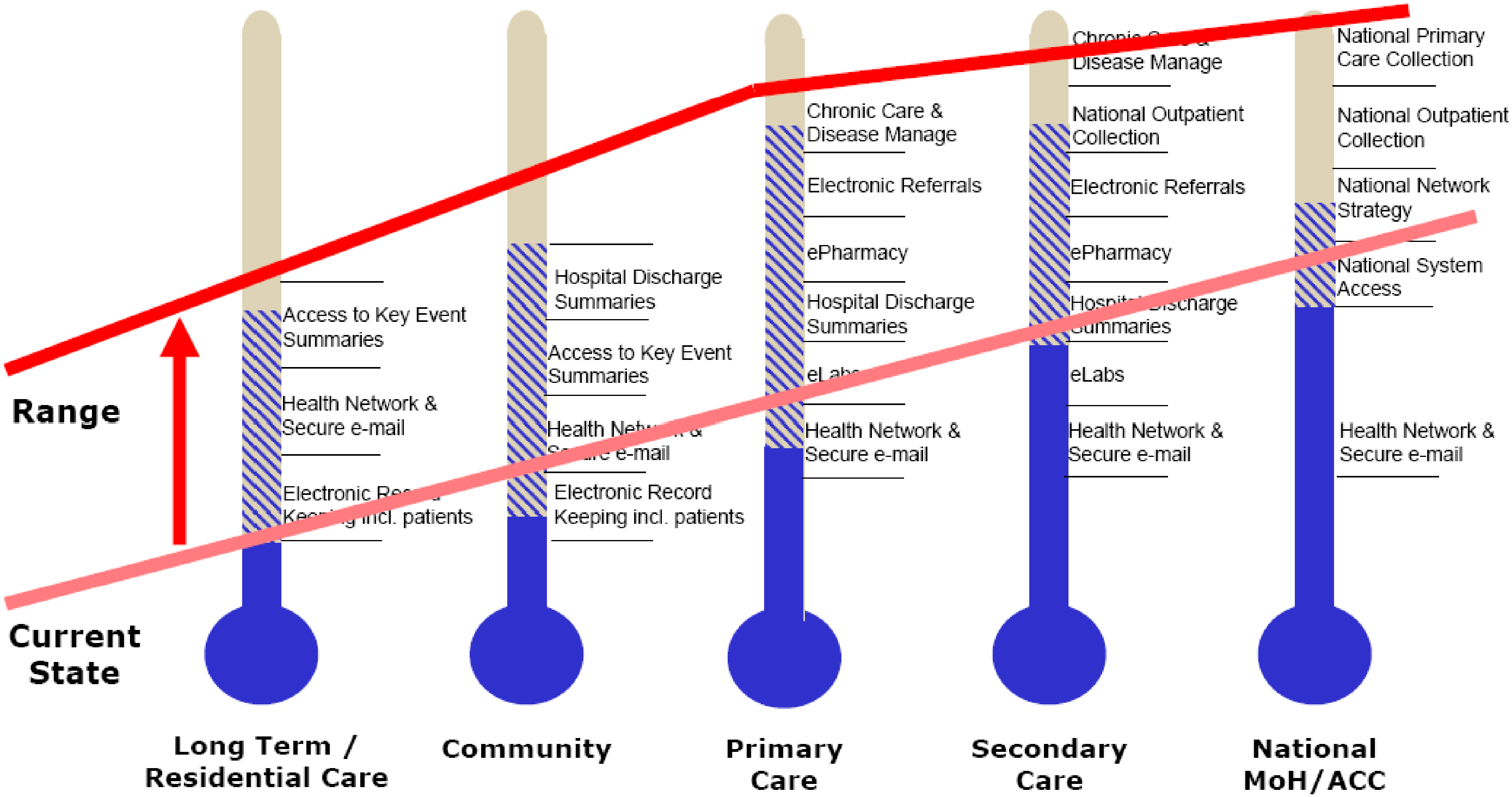
- Prevention of deconditioning downward spiral toward the point of "no return" to **stable health status** requires
  - Seamless information interchanges between health care providers
  - Coordinated care management between providers
  - Through investments in e-Health

National e-Heath: current state



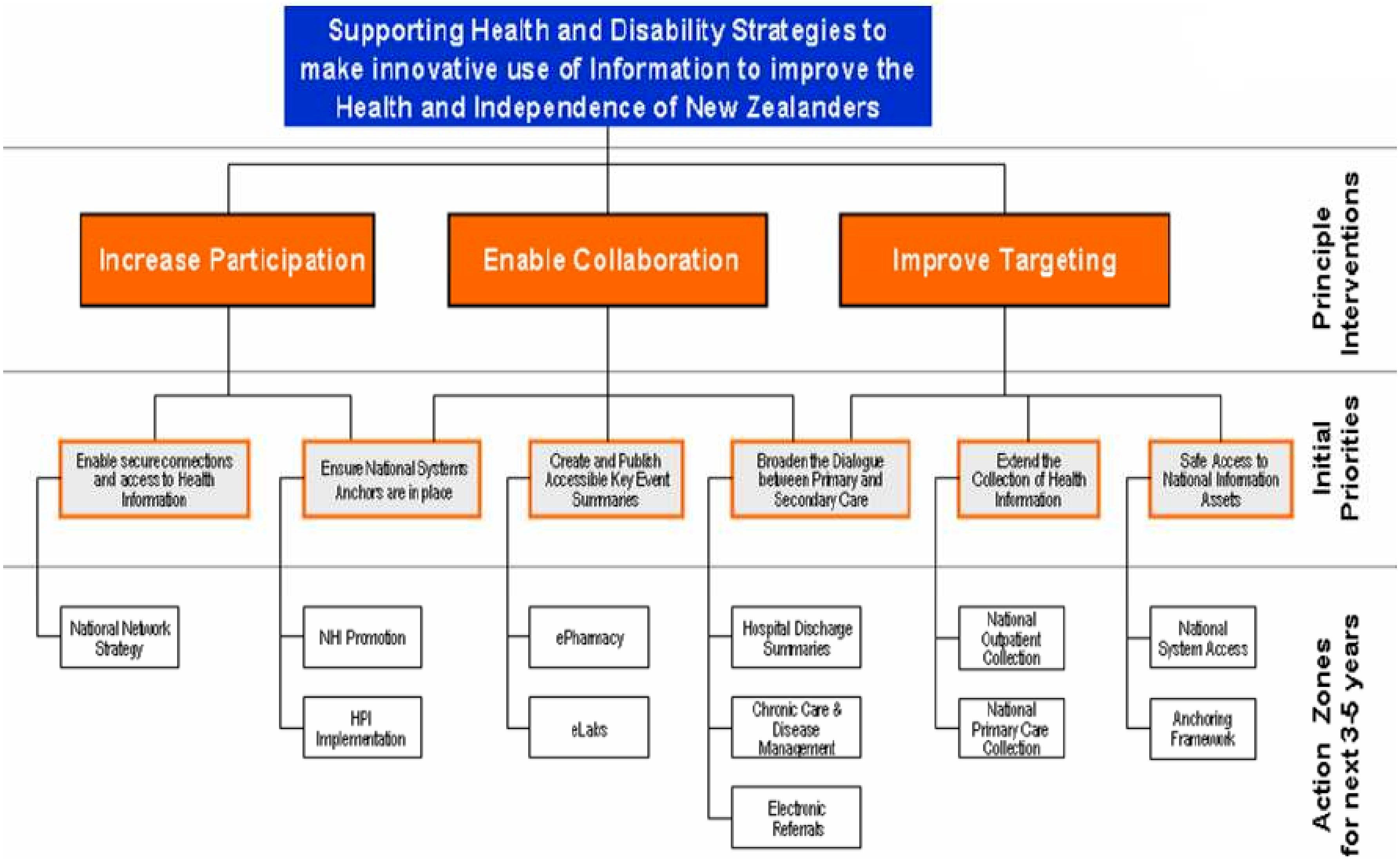
Source: NZ Ministry of Health

National e-Heath: future state



Source: NZ Ministry of Health

National e-Health Strategy



Source: NZ Ministry of Health

Strategic vision realization

Building the coordination & collaboration infrastructures

Core – Examples for National Applications:

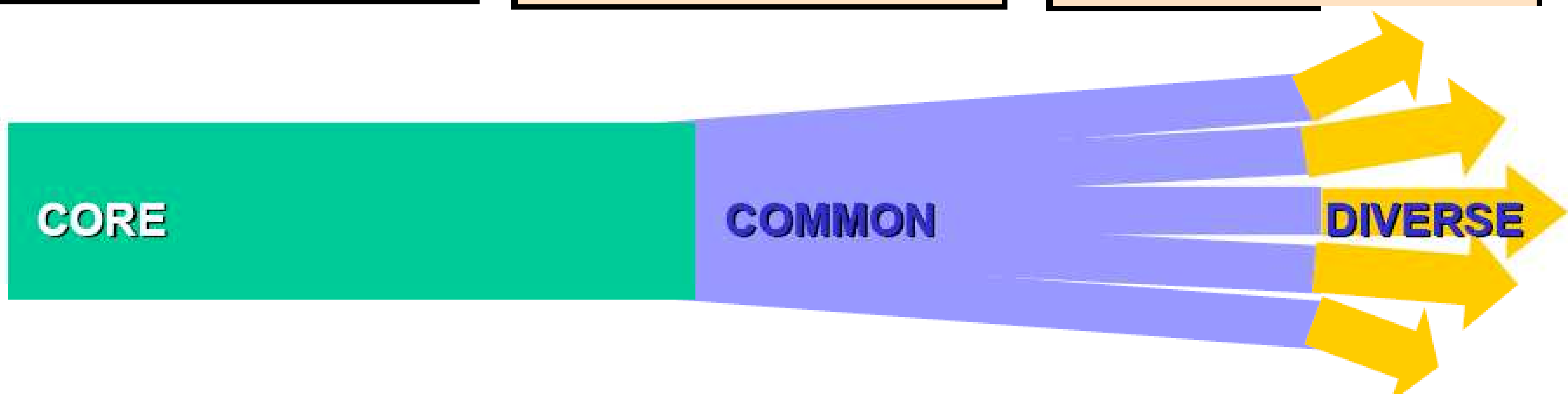
- NHI & HPI
- NMDS & Collections
- Contracting & Payments

Common – Examples for Regional Applications:

- eDischarge Summaries
- eLab Results
- ePharmacy
- eReferrals

Diverse – Examples for Local Applications:

- PHO Systems
- Practice Management
- Scheduling & Booking
- ePrimary Care Records

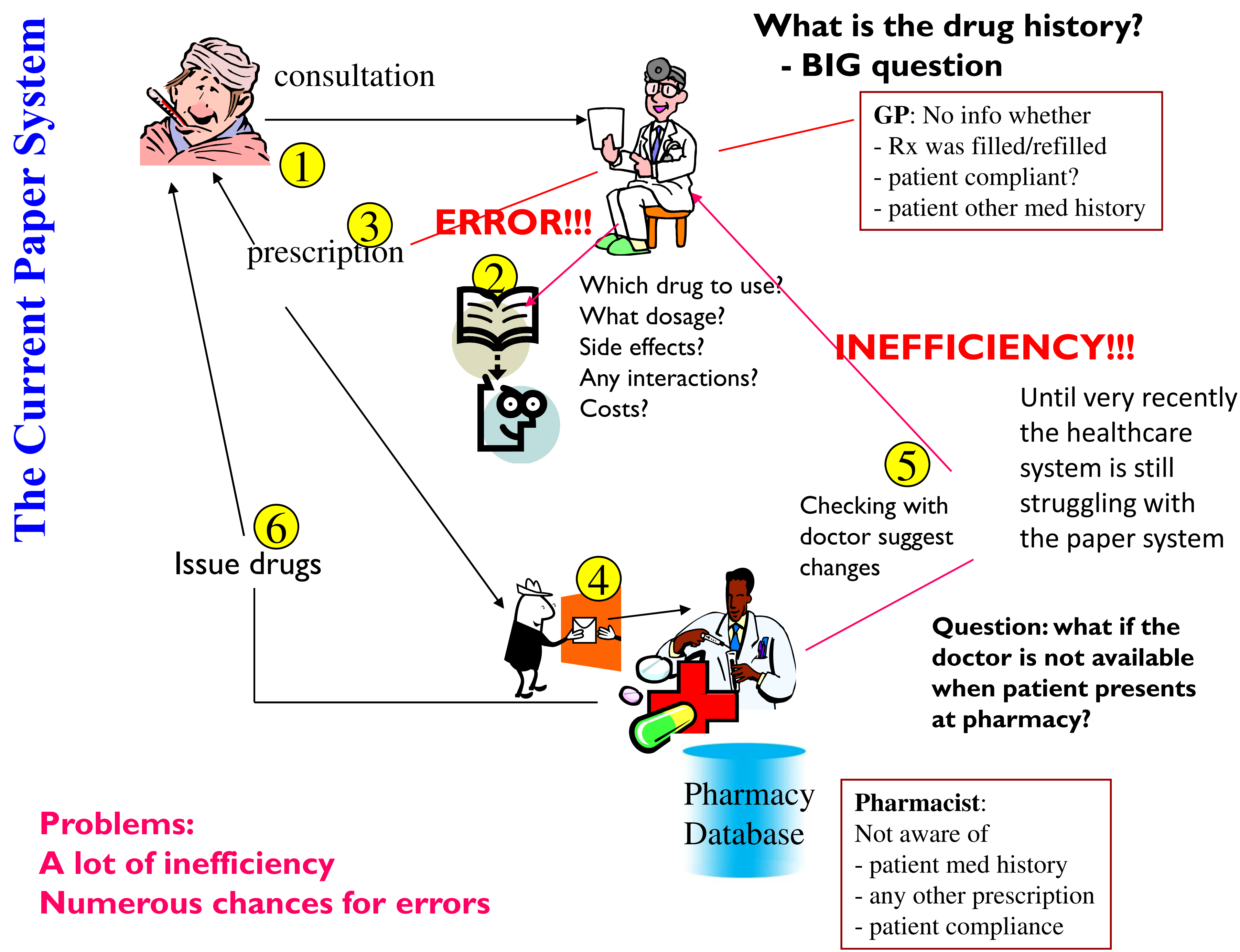


Why e-Pharmacy?

- Practice management software is currently estimated to be in use by 90% of general practices for patient administration,
- Over 50% of general practitioners are using software for clinical purposes such as electronically generating prescriptions and recording patient health encounters.
- Over 80% practices connected to Internet.
- 99% of pharmacies computerized.
- Yet information exchange between GP and pharmacies remain almost non existent

Why e-Pharmacy?

- Health Expenditure Trends in NZ 1980-2000; Pharmac Annual Review 2002:
  - Total public expenditure on community care:
    - Total public expenditure on community medicaments: $736 million (15.5% of total public expenditure [$1.69B] on community care)
    - [subsidized drugs expenditure: $504 M]
  - Total private expenditure on community medicaments: $365.5 million
  - 100,000+ prescriptions issued each day
  - Low transparency of effectiveness of medication utilization


The Current Paper System
consultation
What is the drug history?
- BIG question
GP: No info whether
- Rx was filled/refilled
- patient compliant?
- patient other med history
1
3
prescription
ERROR!!!
2
Which drug to use?
What dosage?
Side effects?
Any interactions?
Costs?
INEFFICIENCY!!!
Until very recently
the healthcare
system is still
struggling with
the paper system
5
Checking with
doctor suggest
changes
6
Issue drugs
4
Question: what if the
doctor is not available
when patient presents
at pharmacy?
Pharmacy
Database
Pharmacist:
Not aware of
- patient med history
- any other prescription
- patient compliance
Problems:
A lot of inefficiency
Numerous chances for errors

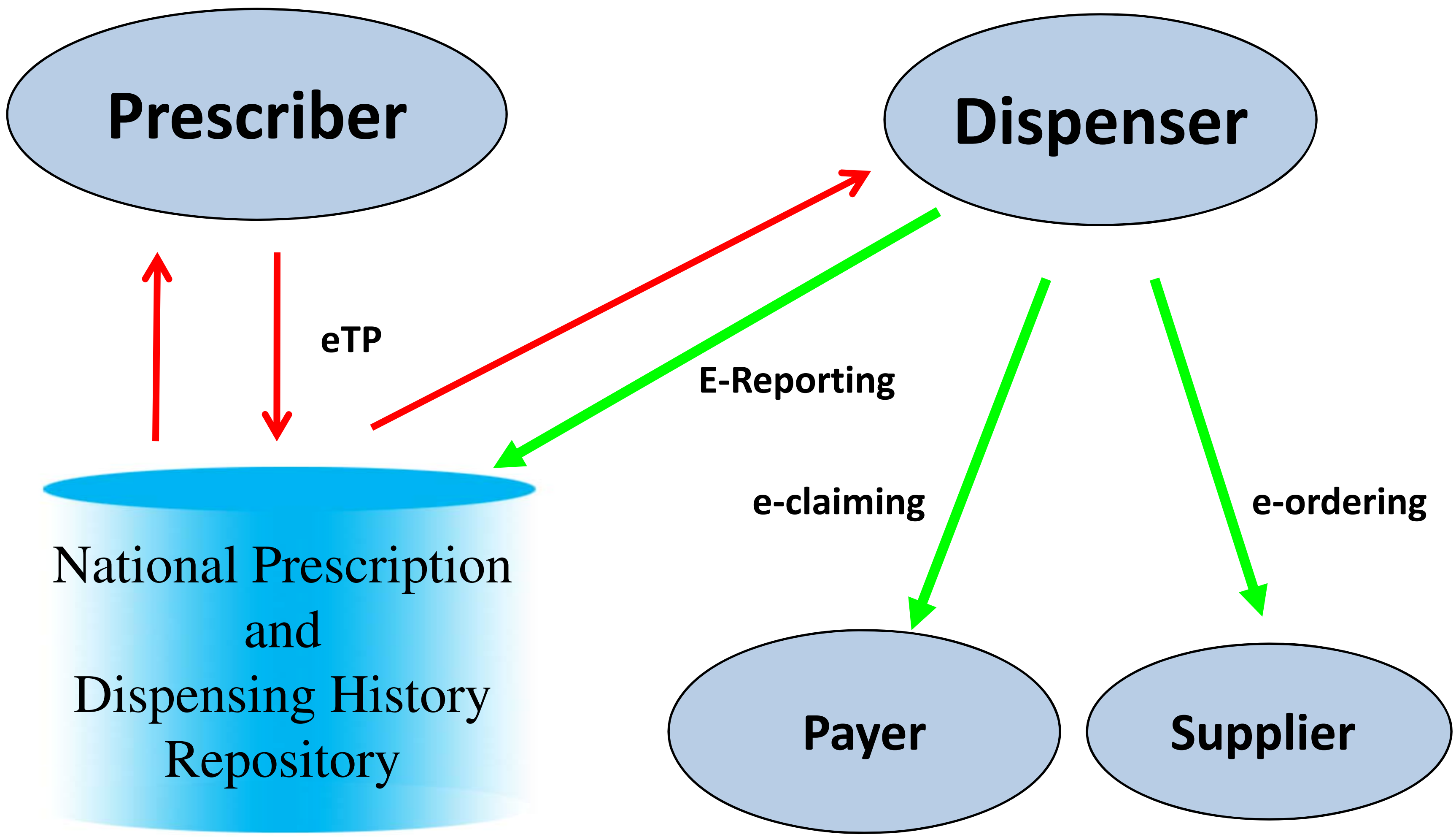
Why e-Pharmacy?

- **Error and adverse events in healthcare are significant**
  - Medication error makes up 20-40% of incidents in reporting systems
  - Medication error makes up 10-20% of adverse events
  - Identified as a priority area for action by the Institute of Medicine (USA)
  - Most errors / adverse events are preventable

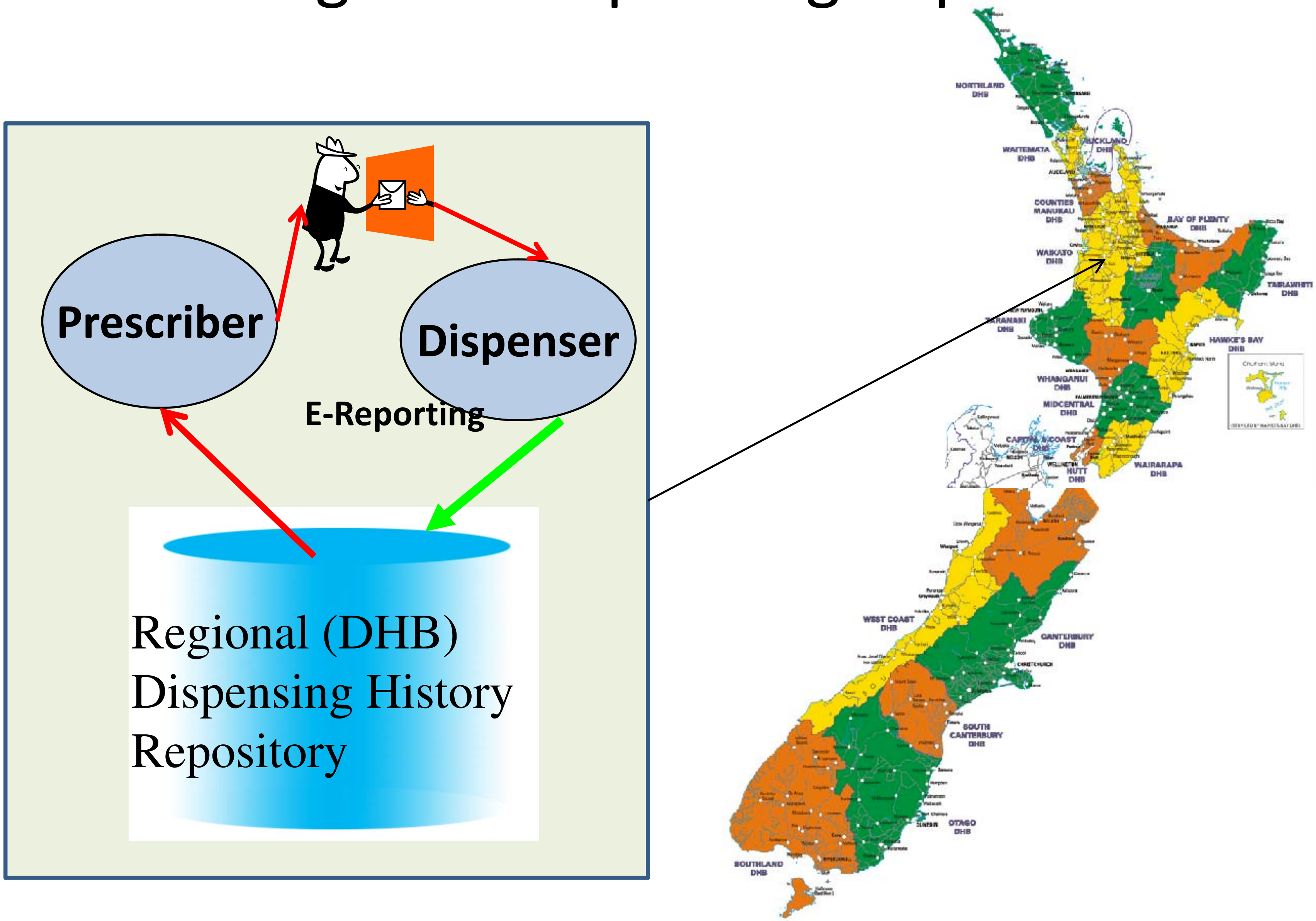
Dr Dwayne Combie (CEO, Waitemata DHB)

June 2006 – HINZ Seminar on Quality Use of Medicine

National Strategy: ePharmacy



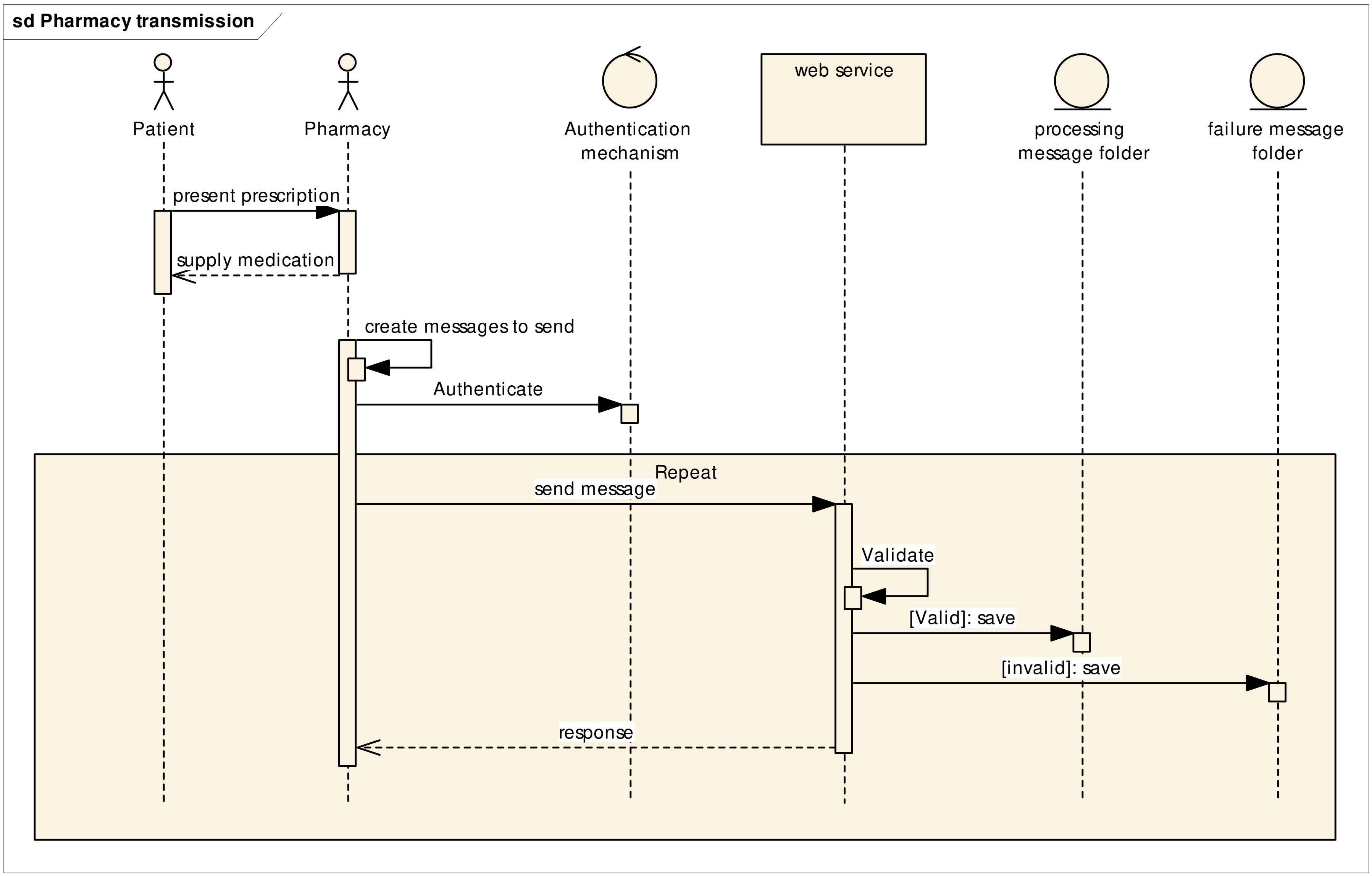
Current Implementation:
Regional Dispensing Repository



Dispensing Repository: Rationale

- To create a repository of medication dispensing that can then be made available to clinicians (Primary and Secondary) who are involved with the patients care
- Part of better medication management and disease management programs for improving quality of care

Interactions & Information Flow



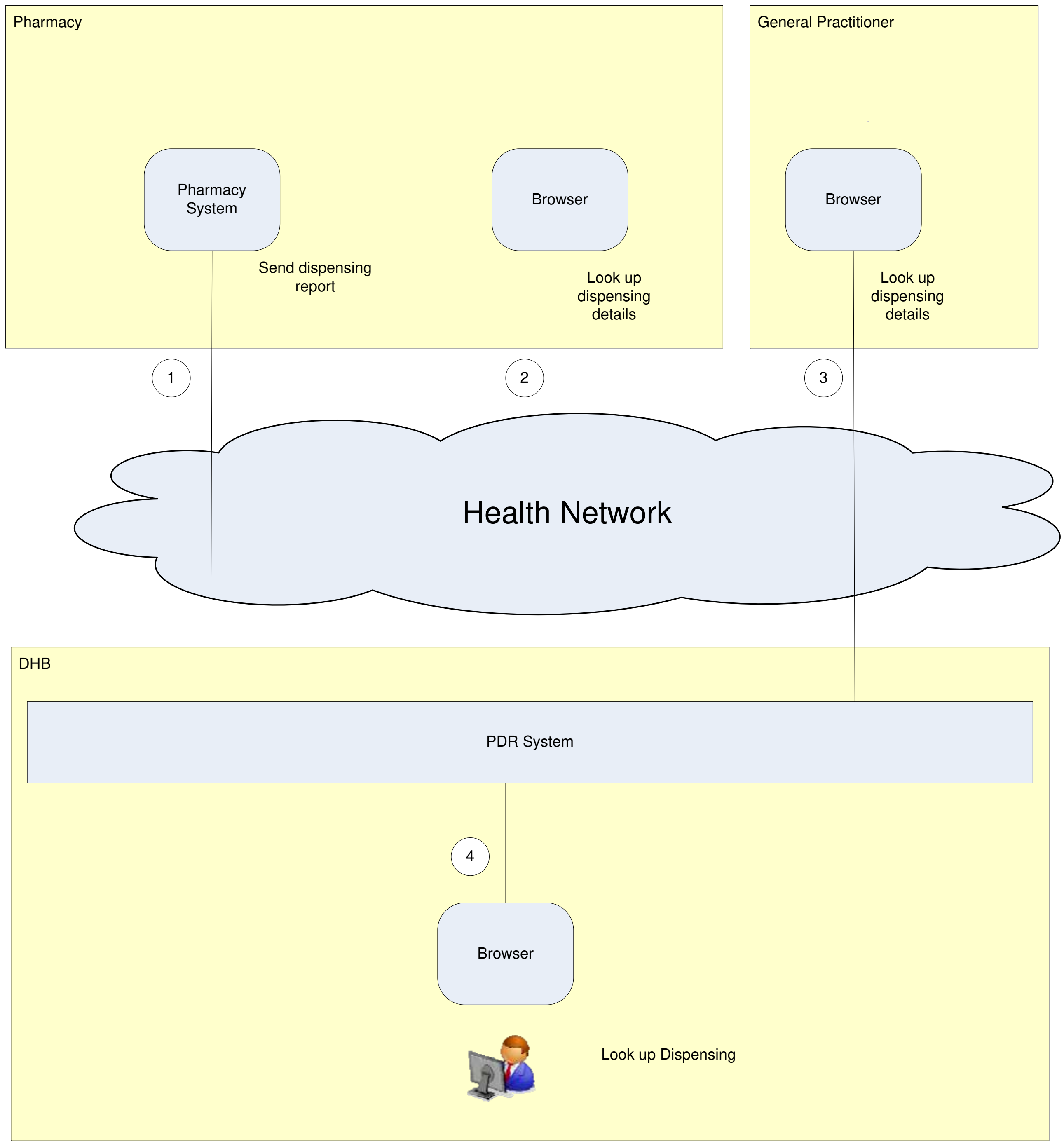
The Processes

- As dispensing is completed the pharmacy system will compile dispensing details pertinent to the patient and associate the details to the NHI (unique patient identifier)
- A CDA documents will be created – one for each patient dispensing
- The document will be sent by a series of web service calls to the regional dispensing repository system.

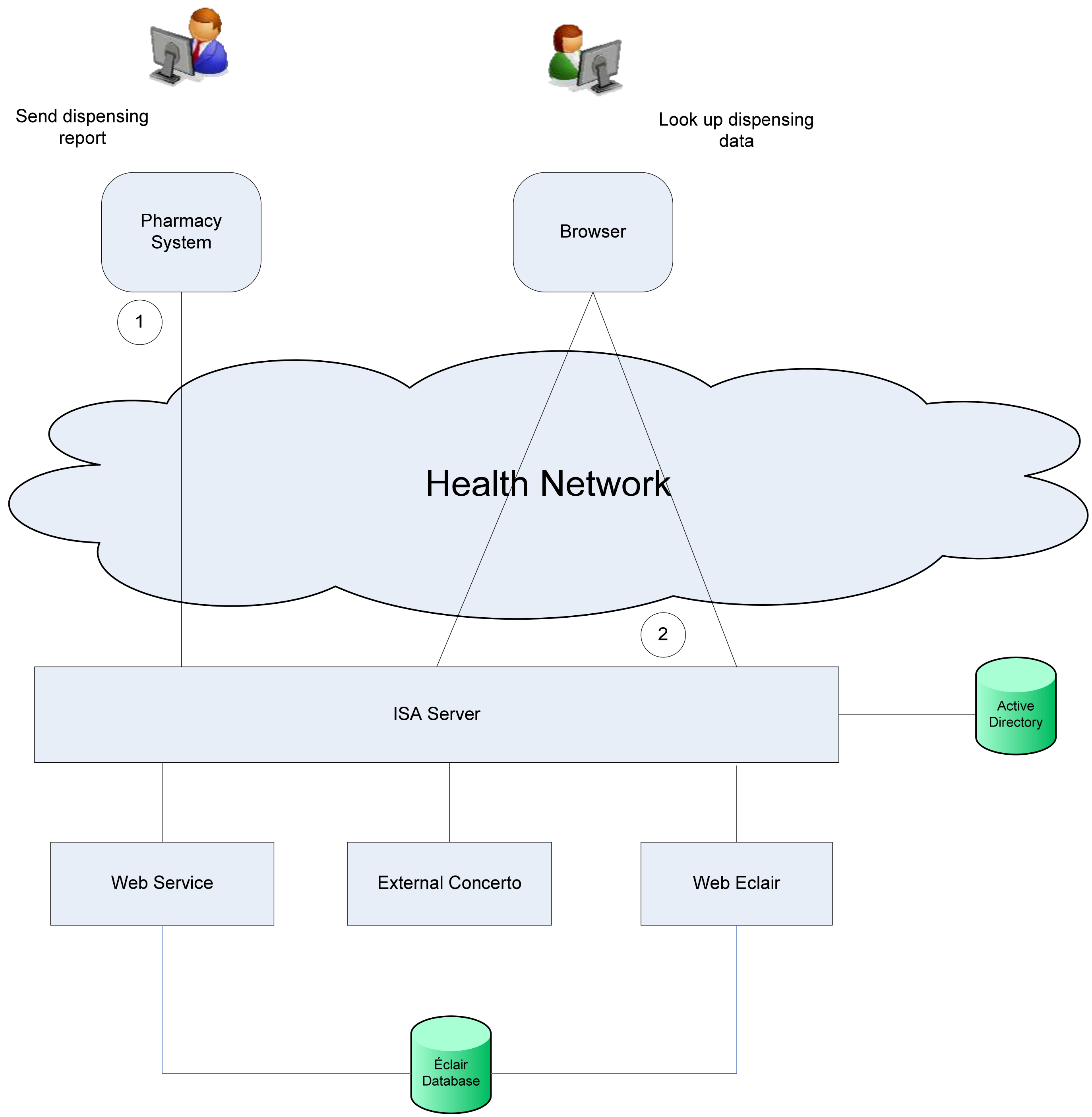
The Processes

- The dispensing repository system will perform structural validation of the messages and return any errors.
- If there are no structural errors, it will then acknowledge receipt of the message, and pass the XML documents to the repository system application for processing.

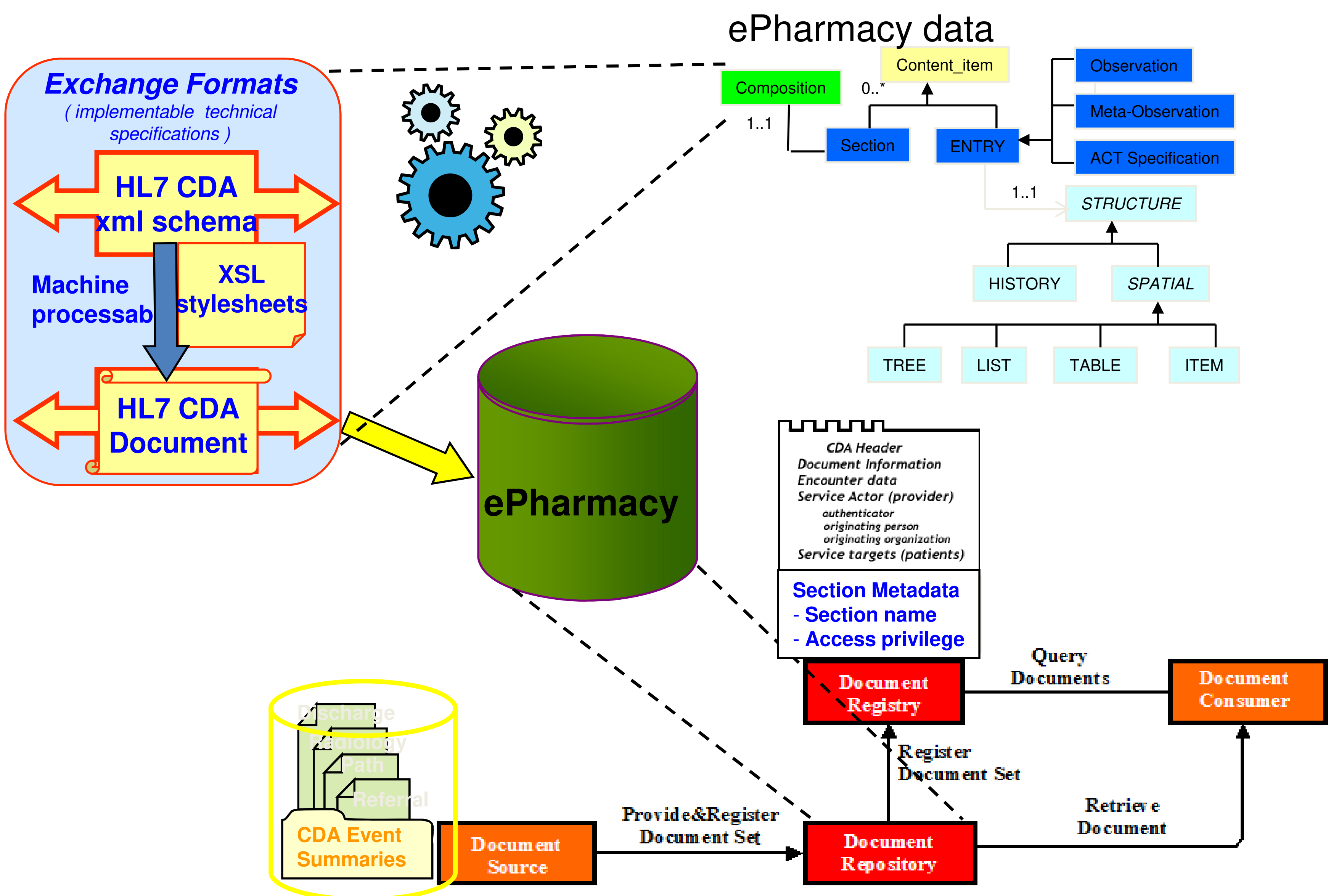
Dispensing Repository System: High Level Architecture



Dispensing Repository System: Logical Architecture



High Level Technical Architecture



Resources Developed

Document Name	Purpose
CDA Pharmacy Specification	Defines the format of the dispensing message that is sent by the pharmacy to the DHB. This message is an HL7 CDA document (level 3) with a coded body.
External Access Specification	Describes how external systems (the pharmacy computer and the pharmacist) access the system across the health network
Internal messaging Architecture	Defined the internal architecture within the DHB that accepts the dispensing message via a web service interface and sends it to the éclair repository for processing and storage.

Resources Available

- On HL7 NZ website:
  http://www.hl7.org.nz/content/view/67/54/
  - CDA Pharmacy Specification
  - External Access Specification
  - Internal Messaging Architecture
  - CDA Validators
  - Sample CDA dispensing document
- Test web services for pharmacy software vendors to use in CDA dispensing report application development

CDA Pharmacy Spec: Header Mapping

Data Item	Location in document	Notes
NHI	recordTarget/ patientRole/ id /@extension	
First name.	recordTarget/ patientRole/ patient / name/ given	There can be multiple first names
Last name	recordTarget/ patientRole/ patient / name/ family	There can be multiple last names
Date of Birth	recordTarget/ patientRole/ patient/ birthTime	Date is in YYYYMMDD format
Gender	recordTarget/ patientRole/ patient/ administrativeGenderCode	
Opt-off	confidentialityCode/ @code	Set this code to 'V' (very restricted) to indicate that the entire document is opt off
Pharmacist	author/ assignedAuthor/ assignedPerson/ name author/ assignedAuthor/ id	Contains the name and Id of the pharmacist
Pharmacy	custodian/ assignedCustodian/ representedCustodianOrganization/ id custodian/ assignedCustodian/ representedCustodianOrganization/ name	The Id & name of the Pharmacy
Dispensing date	This is actually stored in the <supply> element for each medication.	

CDA Pharmacy Spec: Body – high level view

```
structuredBody
  component (can be up to two, depending on 'opt-off')
    section
      title
      text
      confidentialityCode  (optional)
      entry   (repeats any number of times)
        substanceAdministration
          effectiveTime
          effectiveTime
          routeCode
          doseQuantity
          consumable
            manufacturedProduct
              manufacturedMaterial
                code
                  originalText
                name
          entryRelationship
            supply
              quantity
```

```
<entry>
	<substanceAdministration classCode="SBADM" moodCode="EVN">
		<effectiveTime/>
		<effectiveTime xsi:type="PIVL_TS">
			<!-- How often to take the medication-->
			<period value="12" unit="h"/>
		</effectiveTime>
		<routeCode code="PO" codeSystem="2.16.840.1.113883.5.112" displayName="oral"/>
		<doseQuantity value="2" unit="tablet"/>
		<!-- how many to take in each administration-->
		<consumable>
			<manufacturedProduct>
				<manufacturedMaterial>
					<code code="101326" codeSystem="2.16.840.1.113883.6.88" codeSystemName="Pharmac" displayName="Aspirin 10mg">
						<!-- from the pharmacode-->
						<originalText>Aspirin</originalText>
						<!-- generic name-->
					</code>
					<name>Cartia</name>
					<!-- brand name -->
				</manufacturedMaterial>
			</manufacturedProduct>
		</consumable>
		<entryRelationship typeCode="REFR">
			<supply classCode="SPLY" moodCode="EVN">
				<effectiveTime value="20080101"/>
				<quantity value="100" unit="tablets"/>
			</supply>
		</entryRelationship>
	</substanceAdministration>
</entry>
```

CDA Pharmacy Body Example

Privacy & Security

- Patient has right to opt out
- Confidentiality of dispensing data is defined by the <confidentialityCode> element and applied at CDA document Section level:
  - N = Normal – any authorized clinician can read
  - R = Restricted – only those with a current care relationship can access
  - V = Very Restricted – as determined by the privacy officer (the information will not be displayed)
- Messages encrypted, accesses authenticated and logged with complete audit trails

Project Timeline

- Specifications and architecture documents:
  – Completed
- Development of contracts with vendors
  – 2008 Q3
- Systems and Applications Development
  – 2009 Q1
- Deployment
  – 2009 Q2

Issues of Interoperability

- CDA implementation ensures
  - Technical interoperability (information exchange)
  - Human readability
- Semantic interoperability
  - pharmacode: a proprietary 7-digit code for prescribed and over-the-counter pharmacy products in New Zealand
  - Structured medication data captured using bar code system
  - Pharmacode is used in pharmacy dispensing software but not in prescribing

Pharmacode Example

```
<consumable>
        <manufacturedProduct>
                <manufacturedMaterial>
                        <code code="101326"  codeSystem="2.16.840.1.113883.6.88"  codeSystemName="Pharmac"  displayName="Aspirin  10mg">
                                <!-- from the pharmacode-->
                                <originalText>Aspirin</originalText>
</consumable>
```

```
<code code="1013267" code System="2.16.840.1.113883.6.88"
        codeSystemName−"Pharmac" displayName−"Aspirin 10mg">
```

Semantic Interoperability: Challenges

- Current implementation aims at achieving effective interchange of “human readability” information
- Significant challenges exist in achieving “machine interpretable semantic interoperability”

Semantic Interoperability: Challenges

- Developing applications to capture structured, semantically rich and interoperable medication data is relatively easy
- Getting users to enter structured, semantically interoperable dispensing data is not too hard (benefits of bar code system)
- Getting users to enter structured, semantically interoperable prescription data is much harder
- Having systems to process & use semantically interoperable clinical data is very hard

Semantic Interoperability: Challenges

- Significant investments are required to achieve machine level full semantic interoperability
  - National adoption of standardized medicine terminology pending
  - Terminology service infrastructure yet to be developed
  - Terminology expertise to be developed

Semantic Interoperability: Challenges

- Information technology/applications lack maturity to deliver even basic benefits of full machine interpretable semantic interoperability, e.g.
  - Drug interaction checking and alert: cannot take into account patient conditions
  - Drug-condition checking: inefficient / ineffective

- Resistance is likely to persist until reasonable benefits or ROI can be demonstrated

Future Developments

- Evaluation of pilot after deployment
- Address any issues identified
- Seek funding for extended deployment within region
- Seek funding for national roll out
- Seek funding to extend to electronic transmission of prescriptions

Thank You

Questions?