

IHE Overview

Medica - November, 2007

Charles Parisot, GE Healthcare, IHE IT Infrastructure Co-chair



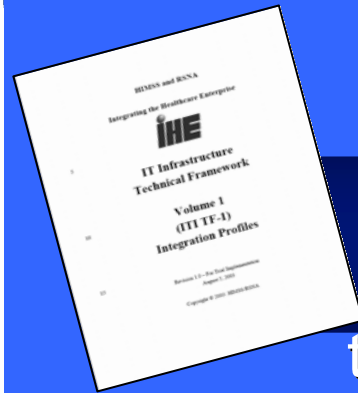
Presentation Objectives

- Standards adoption and implementation – The IHE process
- Application to Regional and national Health Information Exchange
- Application to Laboratory Workflows
- The IHE-Europe Connectathon-Oxford April 7-11, 2008

IHE: A Framework for Interoperability

- A common framework for harmonizing and implementing multiple standards
- Enables seamless health information movement within and between enterprises, regions, nations
- Promotes unbiased selection and coordinated use of established healthcare and IT standards to address specific clinical needs
 - HL7, DICOM, W3C, ISO, IEEE, etc.

Standards Adoption Process

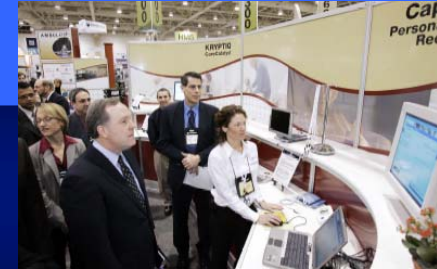


Develop technical specifications

Testing at Connectathons



IHE Demonstrations



Products with IHE

The image shows a sample "IHE Integration Statement" form. It includes fields for "Vendor", "Product Name", and "Version". Below these is a table with columns for "Integration Profiles Implemented", "Actions Implemented", and "Options Implemented". The form also contains a "Product address" field and a "Links to Standards Conference Statements for the Implementation" section.

Identify available standards (e.g. HL7, DICOM, IETF, OASIS)



Document Use Case Requirements



Timely access to information



Easy to integrate products

IHE Participants and Relationships

- Sponsorship: Healthcare Professional Organizations
- Open World-wide - Participants include:
 - Users - Clinicians, Staff, Administrators, CIOs, Governments.
 - Vendors - Information Systems and Equipment
 - e.g., imaging, cardiology, devices
 - Consultants
- Maintains formal liaison with Standards Development Organizations (SDOs):
 - HL7, DICOM, ISO (Liaison D), others
- ISO TC215 approved IHE Process and Profiles to be published as technical reports

IHE Organizational Structure

IHE (International) Strategic Development Committee

Regional Deployment

IHE North America

Canada

USA

IHE Asia-Oceania

China

Japan

Korea

Taiwan

IHE Europe

France

Germany

Italy

Netherlands

Norway

Spain

Sweden

UK

Global Development

Radiology

IT
Infrastructure

Laboratory

Cardiology

Patient Care
Coordination

Pathology

Radiation
Oncology

Patient Care
Devices

Pharmacy /
Medication Admin

Professional Societies / Sponsors

ACC
ACP
HIMSS
RSNA

GMSIH
SFR
SFIL

COCIR
EAR-ECR
DRG

SIRM
BIR
EuroRec

ESC

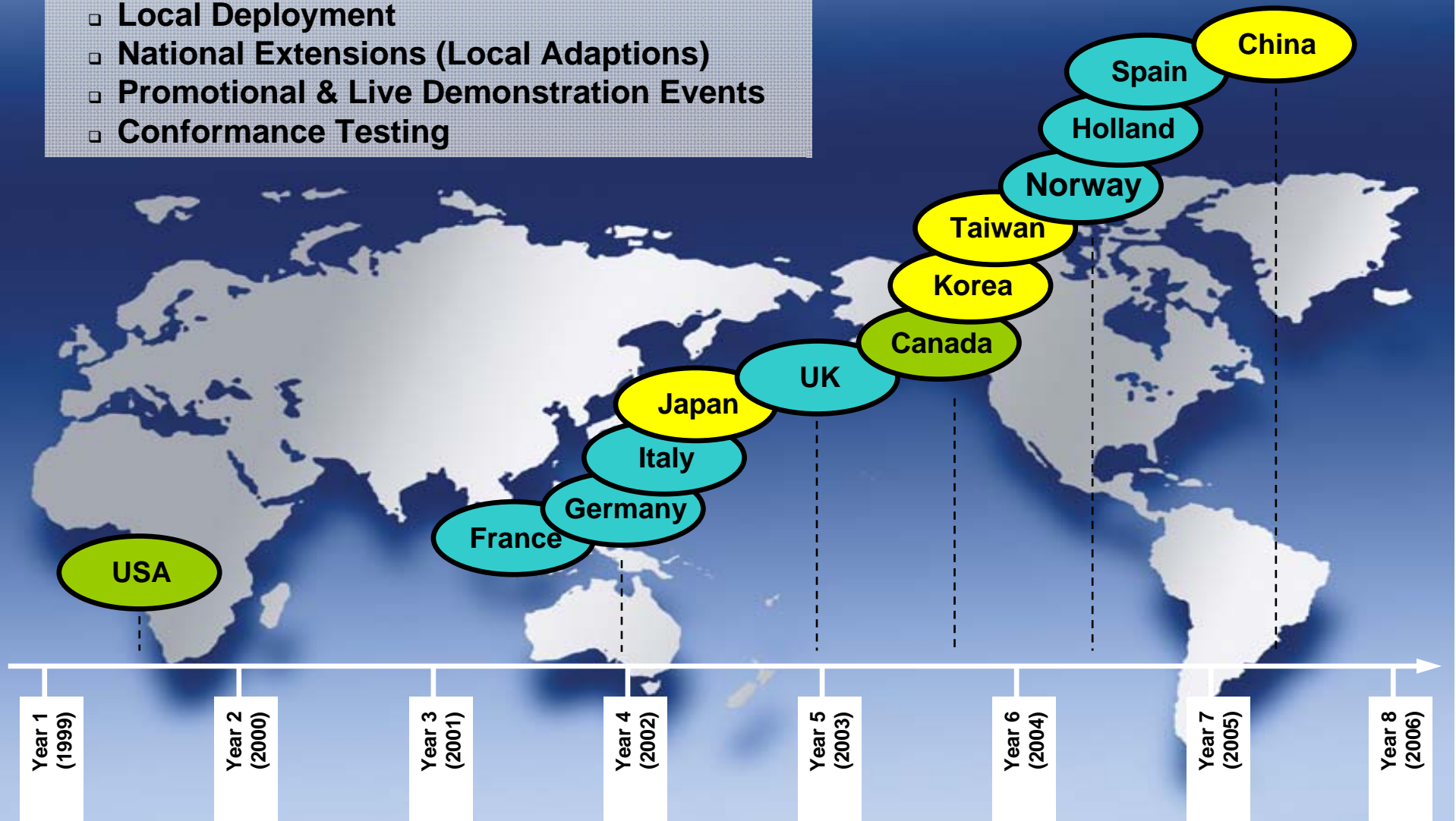
JAHIS
JIRA
JRS

METI-MLHW
MEDIS-DC
JAMI

Contributing &
Participating
Vendors

International Adoption of IHE

- ❑ Local Deployment
- ❑ National Extensions (Local Adaptions)
- ❑ Promotional & Live Demonstration Events
- ❑ Conformance Testing



Pragmatic global standards harmonization + best practices sharing

IHE Connectathons

**Connectathons 2007: 430
engineers, 80+ organizations,
160+ systems and applications**



**Vendors do not pass...
until an IHE Project Manager attest it !**

IHE-Europe Connectathon

● Open to all implementers

- Next EU Connectathon: Oxford, UK, April 7-11, 2008
- Pick one or more IHE profiles and Actors
- Apply before December 15th

● Efficient

- Need to pass pre-connectathon tests against lab test tools
- To pass required to pass tests against at least three others. May test more.

● Result Attested

- User Experts form jury under Technical project Mgr
- Results (only passing) formally published on web

Stakeholder Benefits

● Healthcare providers and support staff

- Improved workflows
- Information whenever and wherever needed
- Fewer opportunities for errors
- Fewer tedious tasks/repeated work
- Improved report turnaround time

● Vendors

- Align product interoperability with industry consensus
- Decreased cost and complexity of interface installation and management
- Focus competition on functionality/service space not information transport space

● SDOs

- Rapid feedback to adjust standards to real-world
- Establishment of critical mass and widespread adoption

Growth in IHE Domains

IHE Global Developments

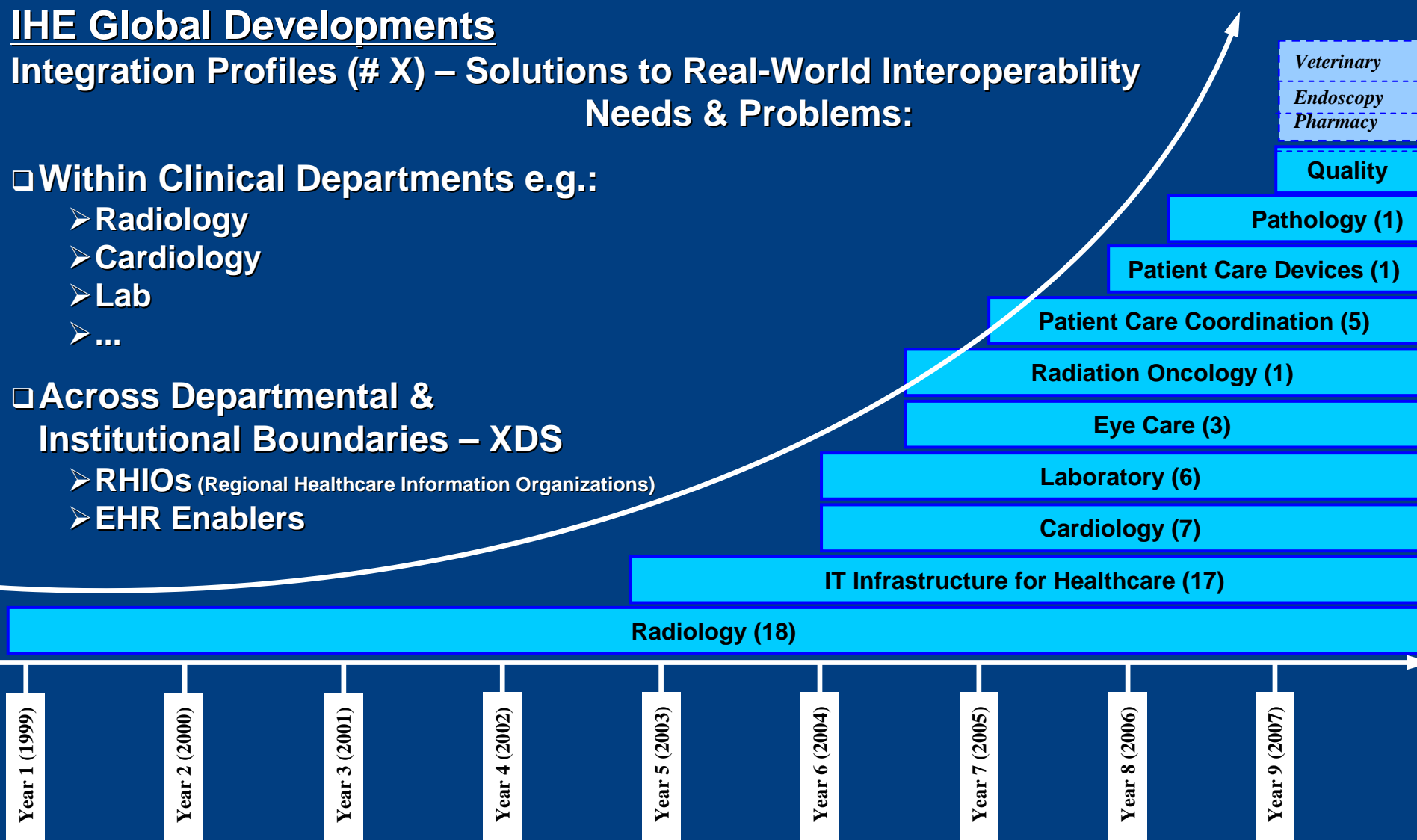
Integration Profiles (# X) – Solutions to Real-World Interoperability Needs & Problems:

□ Within Clinical Departments e.g.:

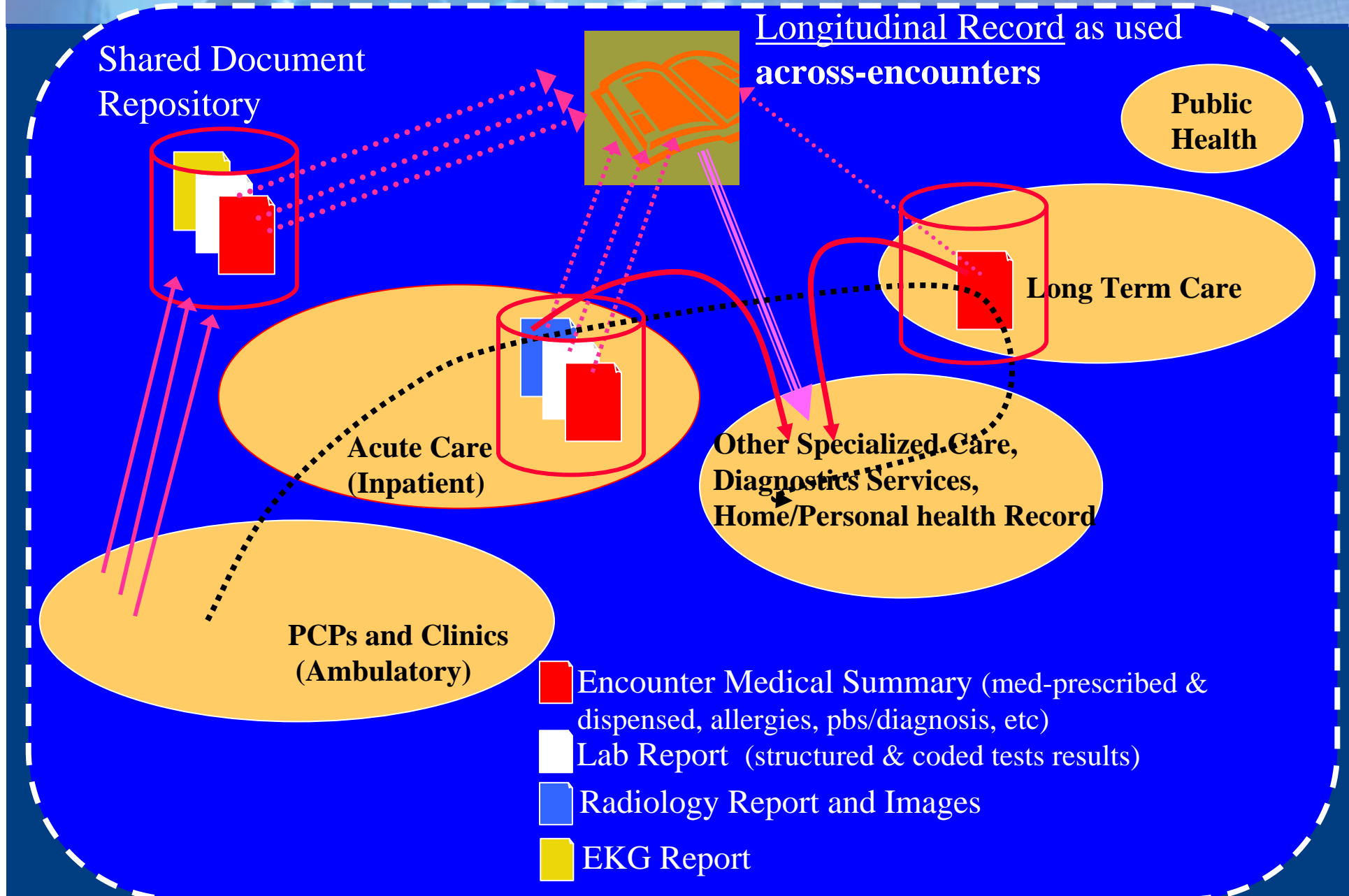
- Radiology
- Cardiology
- Lab
- ...

□ Across Departmental & Institutional Boundaries – XDS

- RHIOs (Regional Healthcare Information Organizations)
- EHR Enablers



Example: Providing Access to Prior Health Information

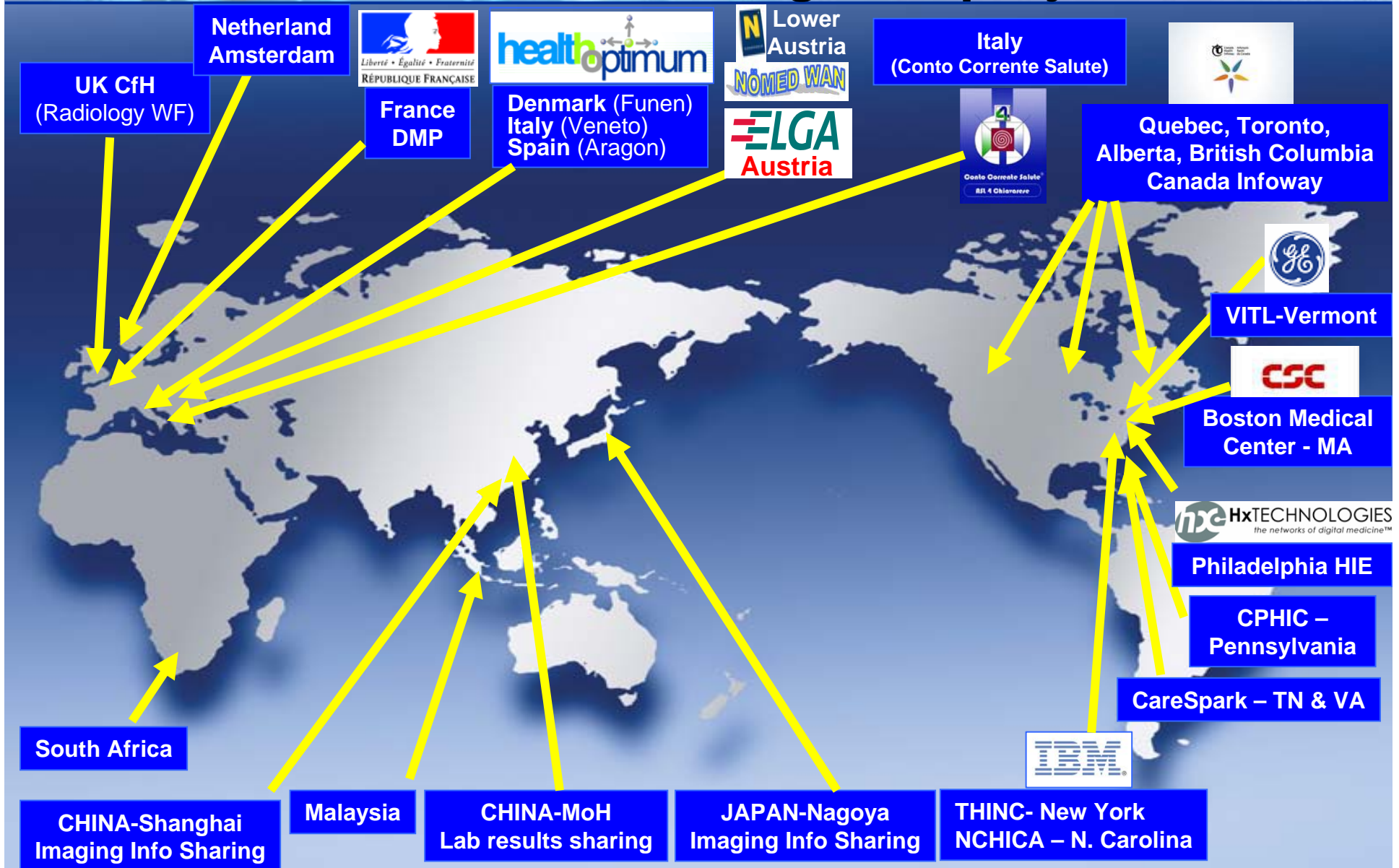


Health Information Exchanges Interoperability: Cross-enterprise Document Sharing (XDS)

- **Performance, Scalability and Cost:** Registry and Repository are simple and efficient
- **Content Evolution:** Registry and Repositories support any document content (e.g. enable use of HL7 CDA, DICOM, PDF, etc.).
- **Real end-to-end structured data:** not only a portal view, easy to integrate in healthcare applications
- **Supports centralized and distributed approaches.** Repositories centralized or distributed. XDS Domains may be federated.
- **Real Interoperability:** Standards and profiles in place, proven and in use
- **Products are available:** over 100 vendors world-wide. Tested at IHE Connectathons.

→ Selected by a significant number of regional and national programs world-wide

IHE, global standards-based profiles adopted by several national & regional projects



Committed National Programs:

IHE XDS, PIX, PDQ, ATNA, CT, etc.

- **Austria**
 - Lower Austria Region (NOMED WAN): live since end of 2006, 1.5 Million Patients, Entire Country (ELGA) by 2008.
- **Italy**
 - 4 regional projects. Genoa region, live since early 2006. National deployment planned.
- **Canada**
 - 7 regional projects coordinated by Infoway. Scheduled to go on-line in 2008.
- **France**
 - Implementation tender to be awarded in September 2007.
- **USA**
 - IHE Profiles adopted formally by HHS at Federal level (HITSP). Several regional projects: VT, NC, CareSpark, CPHC, Philadelphia Ex, CT, etc.
- **Netherlands**
 - Amsterdam region network project launched with NICTIZ. Implementation early 2008.
- **Japan**
 - One implemented project. One pilot (Nagoya) to be on-line late 2007.
- **China:**
 - MoH selected XDS and XD*-Lab (CDA) for two large pilots (2008). XDS-I in Shanghai.
- **South Africa**
 - One regional network project awarded in 2007 - 2008 production.

IHE Laboratory Domain

Update - November, 2007

Cochairs of the Laboratory Technical Committee:

Francois Macary - Agfa HealthCare

Nobuyuki Chiba - A&T Corporation



Contributing countries & sponsors

● Permanent contributors

- France & Japan

● Regular contributors:

- The Netherlands, Italy, Germany, UK, US, Belgium

● Sponsors

- US: RSNA
- Japan: JAHIS
- France: GMSIH, SFIL

General scope of LAB TF

- Ordering, placing, scheduling and performing clinical laboratory tests on in vitro specimen, within acute care settings
- Tests in lab as well as at the point of care
- Microbiology included
- Anatomic pathology excluded (a separate domain in IHE)
- Sharing laboratory reports within a wide community of care providers

Organization of LAB Technical Framework rel 2

- Volume 1: profiles, actors, dependencies
- Volume 2: Description of message-based transactions
- Volume 3: Document-based transaction (lab report)
- Volume 4: Common subset of LOINC test codes

Openly available at: www.ihe.net/technical_frameworks

Lab TF Rel 2: Integration Profiles

HL7

V2.5

POCT1-A

Laboratory Testing Workflow (LTW)
Laboratory Device Automation (LDA)
Laboratory Point Of Care Testing (LPOCT)
Laboratory Code Sets Distribution (LCS)
Laboratory Barcode Labeling (LBB)

Workflow

Subset of LOINC test codes

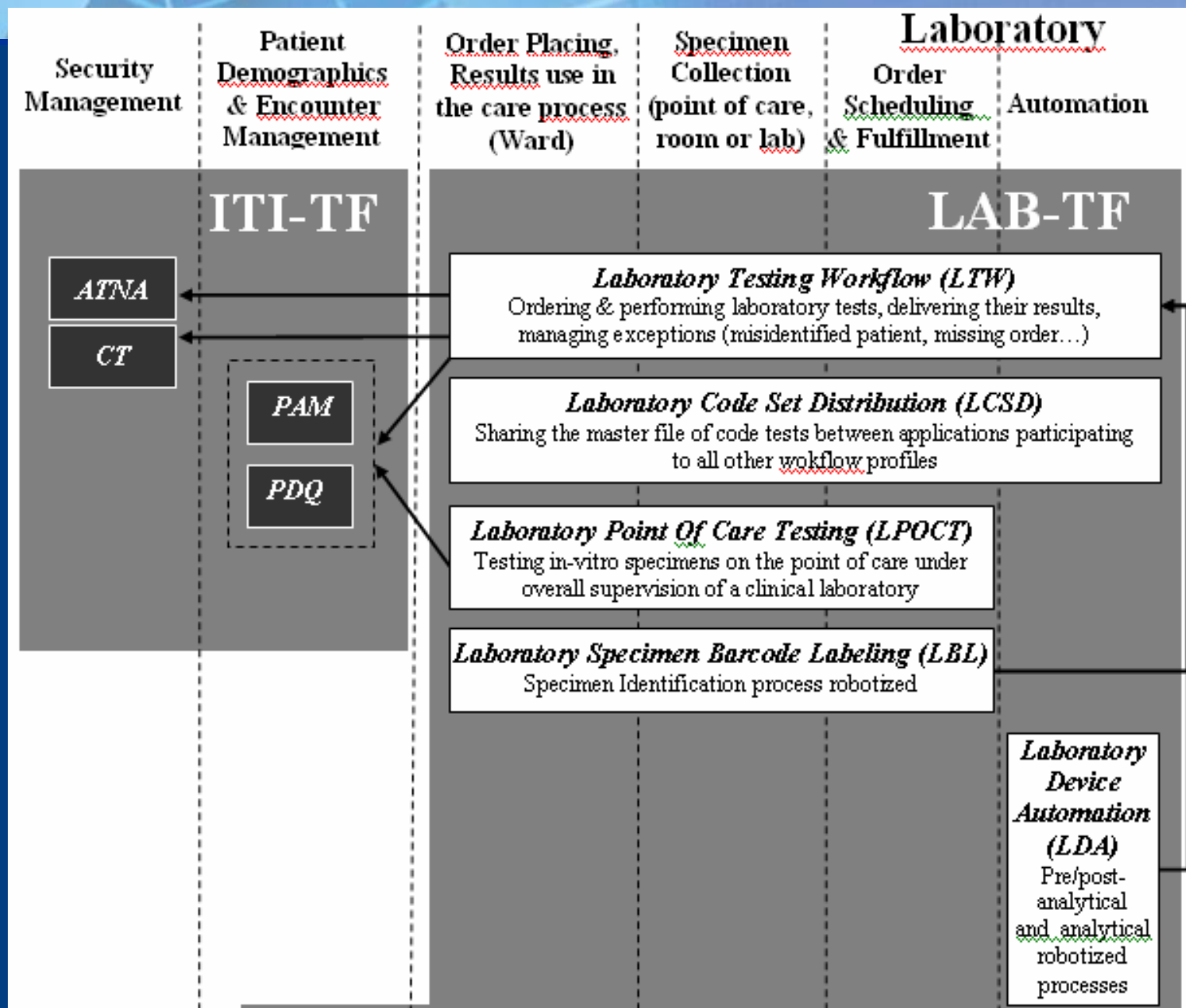
V3:

CDA

Sharing Laboratory Reports (XD-LAB)

Content

Dependencies toward IHE IT Infrastructure



Lab TF Rel 2: Integration Profiles

HL7

V2.5

Laboratory Testing Workflow (LTW)
Laboratory Device Automation (LDA)
Laboratory Point Of Care Testing (LPOCT)
Laboratory Code Sets Distribution (LCSD)
Laboratory Barcode Labeling (LBL)

Workflow

Subset of LOINC test codes

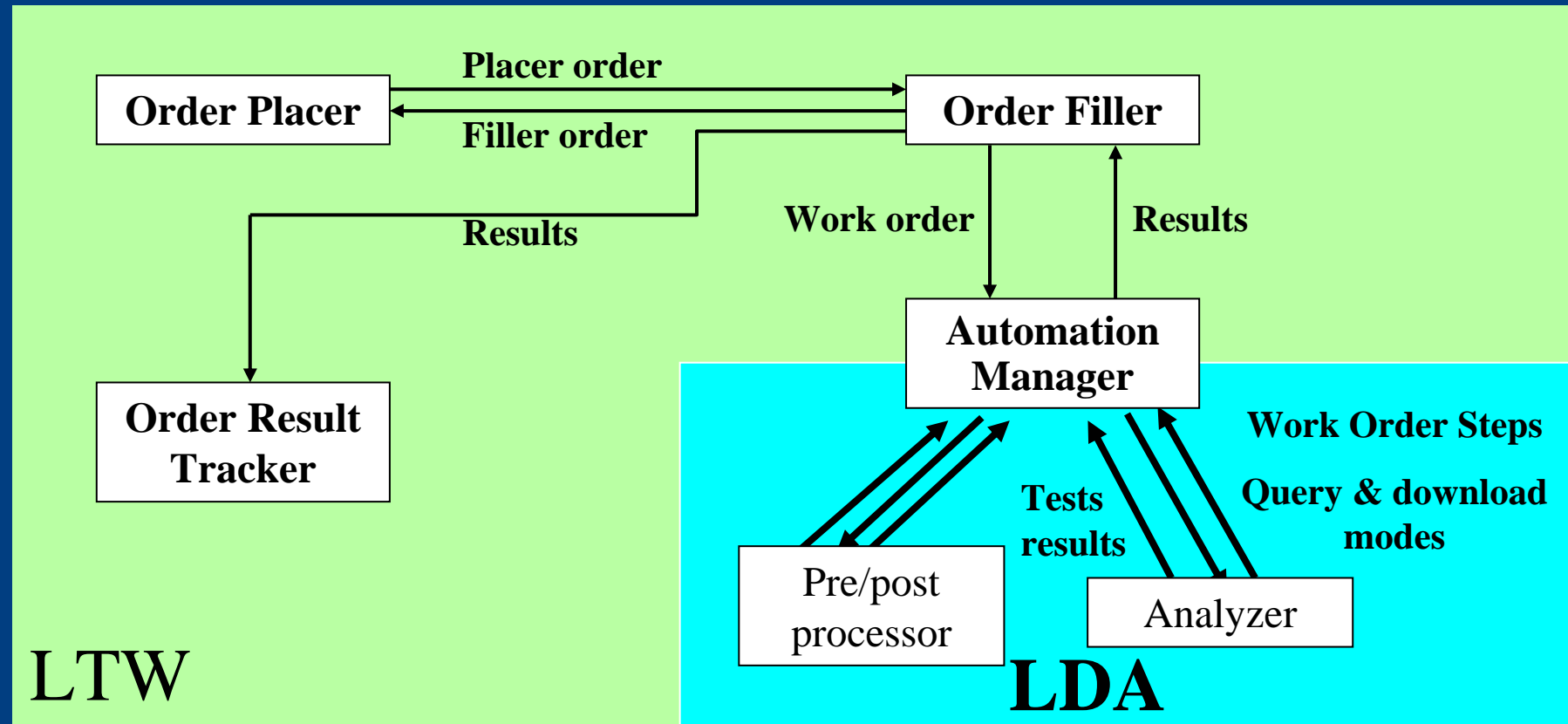
V3:

CDA

Sharing Laboratory Reports (XD-LAB)

Content

Laboratory Testing Workflow (LTW) & Laboratory Device Automation (LDA)



The Automation Manager Actor

- A system that manages a set of automated devices (IVD) in the laboratory
- Used by the lab technical staff
- Involved in the two integration profiles LTW and LDA.
- Intermediate between the LIS and the IVDs.
- Communications on both ends rely on HL7 v2.5 based on IP socket

Close to the target of the current « middleware » project of CIC

Laboratory Point Of Care Testing

Scope:

- In vitro tests performed on point of care or patient bedside
 - specimen collected, tested at once and eliminated
 - No pre or post-processing
 - Results used immediately by the care provider
- Supervision by a clinical laboratory of the hospital
 - Training provided to the ward staff
 - Provision of reagent
 - Supervision of quality control
 - Clinical validation a posteriori

The Actors of LPOCT

Point Of Care Result Generator (POCRG)

Produces the results from a specimen by testing on a specimen, or calculation or manual entry



Point Of Care Data Manager (POCDM)

Administers a set of POCRG, controls their process. Collects the patient and QC results. Forwards the patient results to the Order Filler

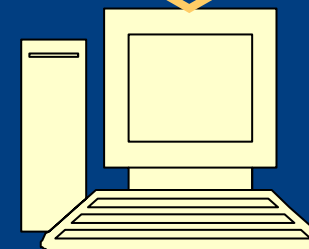
Point of
care results



Order Filler

Recipient of POCT results. Stores the results within orders. Performs a posteriori clinical validation

Point of care
patient results



Benefits of LPOCT

- Results obtained at once → increases the efficiency of clinical decisions
- Minimizes the blood quantity drawn from the patient, because of the immediate use of the specimen. E.g. Two drops are enough to test blood gas, electrolyte and hematocrit of a new-born baby.
- Preserving a high level of quality of the POCT process through its supervision by a clinical laboratory.

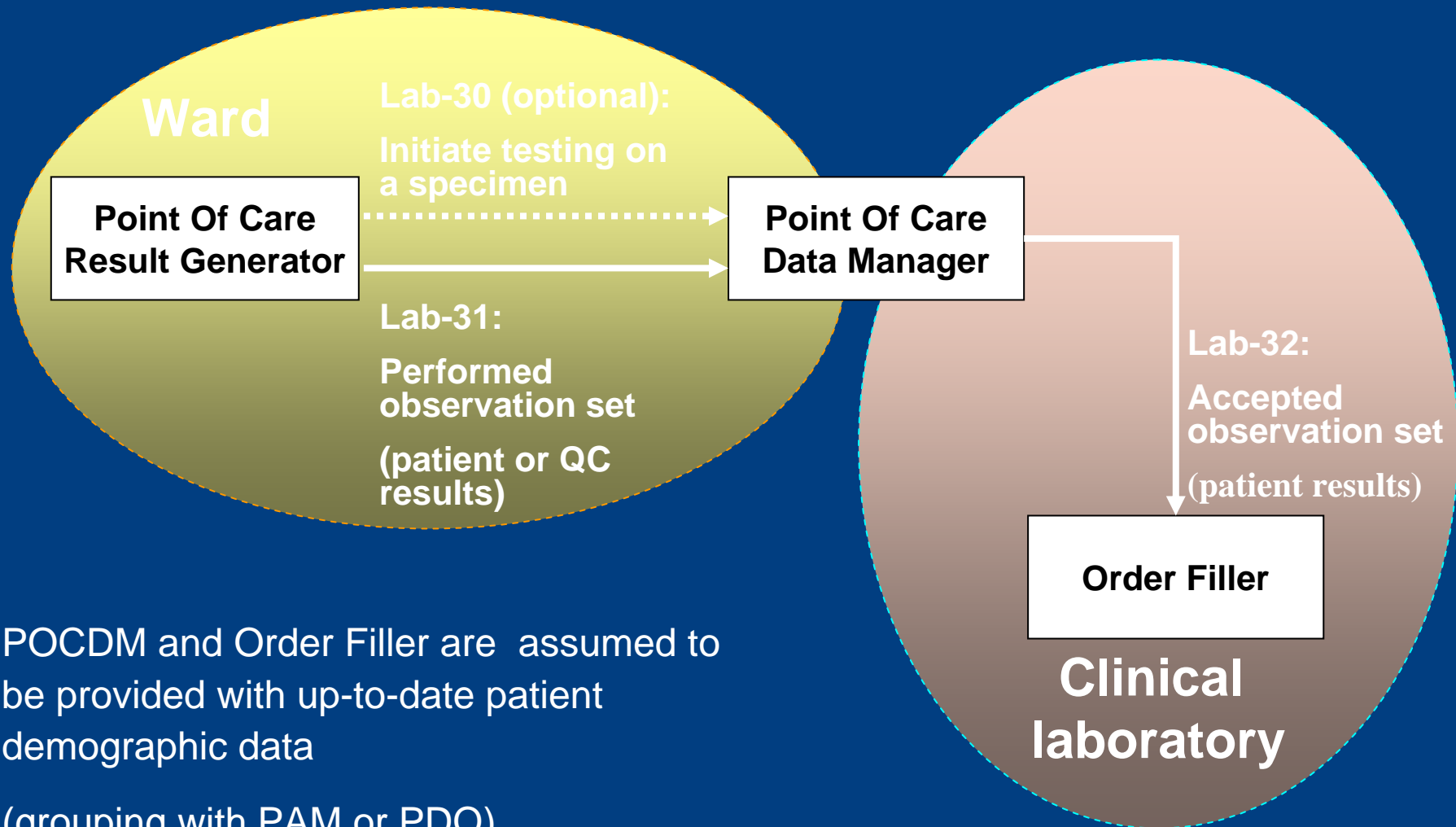
Examples of LPOCT devices

- Portable blood gas and chemistry analyzer used by the nurse in a neonatology ward
- Blood gas analyzer permanently installed in the surgery theater
- Workstation on which the nurse manually enters the results of pregnancy stick tests.

Five major use cases

1. Observations to match with an existing order, real-time patient identity checking
2. Unordered observations, real-time patient identity checking
3. Unordered observations on a POCRG with an intermittent link (no patient identity check)
4. Manual entry of unordered observations
5. QC results

LPOCT: Actors and Transactions



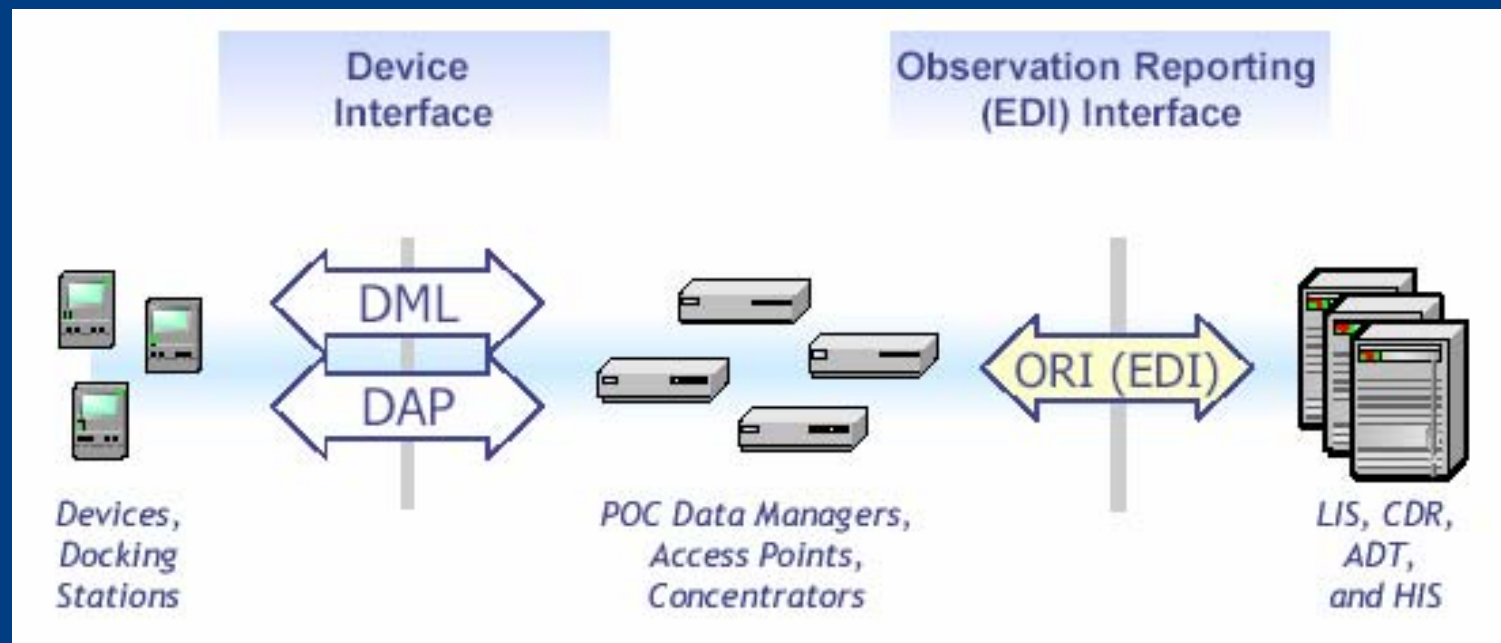
POCDM and Order Filler are assumed to be provided with up-to-date patient demographic data

(grouping with PAM or PDQ)

One single option: Patient identity checking

- **Transaction LAB-30 enables the operator to get a real time checking on the patient identity:**
 - When initiating the test on the point of care device, the patient ID is scanned or keyed in. The device, then sends the patient ID, device ID, operator ID to the POCDM, which checks the patient identity and sends back the patient name, displayed on the device.

Selected standard: POCT1-A



POCT1-A Component name	Point of care device	Observation Reviewer	Observation Recipient
IHE Actor name	POCRG	POCDM	Order Filler

Correspondence IHE/POCT1-A

- IHE is neutral towards the « Device Access Point » (DAP) interface.
- IHE is an implementation guide of:
 - The Device Message Layer (DML) interface, based on a proto-v3 HL7 XML message format
 - The Observation Reporting Interface (ORI), which is a pure subset of HL7 v2.5 (ORU message structures)
- Added value : The « patient identity checking » option.

Lab TF Rel 2: Integration Profiles

HL7

V2.5

Laboratory Testing Workflow (LTW)
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Laboratory Point Of Care Testing (LPOCT)
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Workflow

V3:

CDA

Sharing Laboratory Reports (XD-LAB)

Content

Subset of LOINC test codes

Laboratory Code Set Distribution

- The goal of this profile is to simplify the configuration of the systems involved in the Laboratory Scheduled Workflow.
- The *Laboratory Code Set Distribution Profile* offers the means to share the same set of test/observation codes between different actors.
- Other information can be also exchanged like presentation of results, laboratory codes (in which lab a test is performed), units ...

LCSD: Use Case 1



Replaces Observation/Test/Battery Code Sets

All Observation, Test and Battery code sets of the Consumer are replaced by the code sets sent by the Master. This Use Case is used both for initialization as well as periodic (weekly, monthly) update.

LCSD - Standard used

- HL7 V2.5: Master Files
- Messages rich enough to transport other information than just observation/test/battery codes :
 - presentation of the results
 - Units of measure
 - Laboratories fulfilling this test

Sharing Laboratory Reports: XD-LAB



Purpose

● Sharing laboratory reports

- Access to lab results in a patient-centric manner
- Retrieval of historical lab results by providers of care
- To improve coordination of care

● A content profile. A lab report:

- Presents a set of **releasable** laboratory results to be shared as “historical information”.
- Is **human-readable**, shared between care providers of various specialties and the patient (e.g. through a PHR)
- Contains **machine readable coded entries** (decision support, bio-surveillance)

Value Proposition

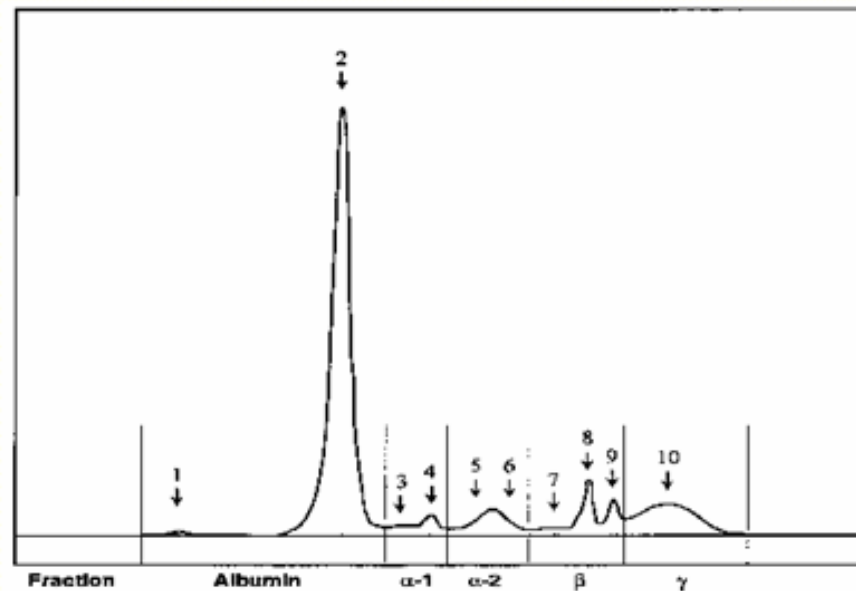
- **Use case 1: Hospital lab report [CIS → RHIO → EHRs]**
 - Most significant lab reports shared at discharge time.
- **Use case 2: Private lab report [LIS → RHIO / PHR]**
 - Final report shared by a private laboratory
- **Use case 3: Lab report shared by physician [EHR → PHR]**
 - Results received from a reference laboratory. Report shared by physician.
- **Use case 4: Lab report automatically shared [LIS → RHIO]**
 - A laboratory, systematically and automatically shares its final reports with a regional healthcare network.
- **Use case 5: Hospital's cumulative report [CIS → RHIO]**
 - At discharge time a hospital physician selects the most significant lab results and builds a cumulative report shared in a health info exchange .

Rendering of a single specimen battery (2)

text
block
of the
leaf
section

Protein electrophoresis

Electrophoretic fraction	Mar 21, 2006 07:10	Reference range
Total protein (g/L)	72	64 - 80
Albumine (g/L)	40	38 - 50
Alpha 1 (g/L)	4	3 - 5
Alpha 2 (g/L)	5	3 - 7
Beta (g/L)	8	6 - 10
Gamma (g/L)	11	7 - 14



1. pre-albumin
2. Albumin
3. alpha 1-Acid-Glycoprotein
4. alpha 1-Antitrypsin
5. Haptoglobin
6. alpha2 macroglobulin
7. Hemopexin
8. Transferrin
9. Complement
10. Gamma

<renderMultimedia>

<entry>
<observationMedia>
...
</observationMedia>
</entry>

A possible rendering for microbiology

Microbiology on Urine

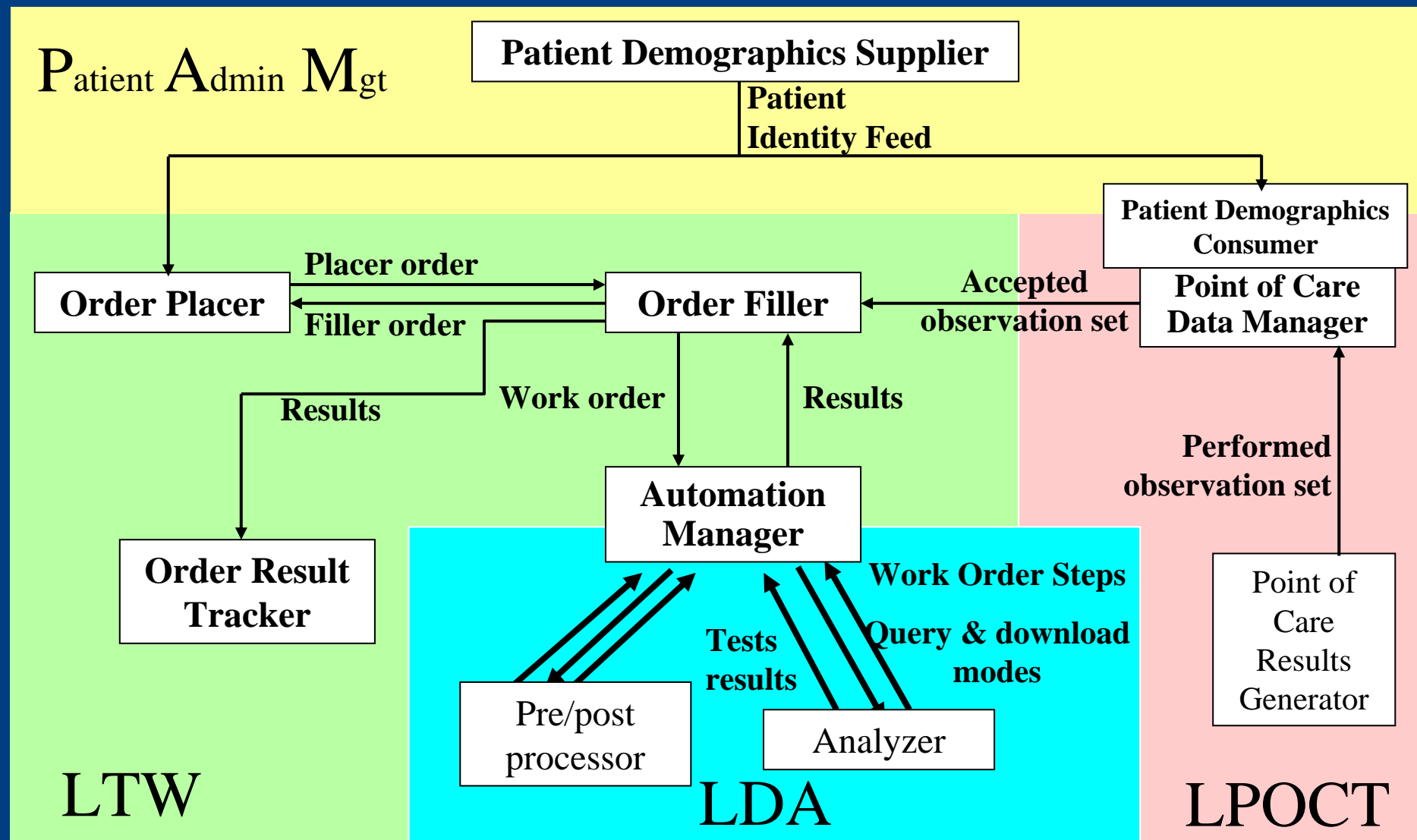
Action	Observation on urine specimen collected 03/21/06 07:25			
Specimen site & localization	Urine mid stream			
Direct examination:				
	color: straw			
	appearance: clear			
Microscopy:				
Leukocytes	500 /mL			
Erythrocytes	200 /mL			
Epithelial cells	absence			
Gram stain	numerous gram - ; some gram +			
Aerobic culture:	Positive			
Isolate:	Escherichia coli		Streptococcus D.	
Microorganism count	100,000 /mL		200,000 /mL	
Microbial susceptibility:	MIC (mg/L)	clinical	MIC (mg/L)	clinical
Amoxicillin	12	R		
Ampicillin			6	I
Fosfomycin	1.3	S	2.5	S
...				

Future work of IHE Lab

- Improve microbiology result messaging
- Add the « lab to public health » report use case to XD-LAB
- Workflow outside of hospital: Lab to lab, lab to GP,
- Linking images to lab results

Next face to face meeting of IHE Lab:
Tokyo, December 10-12, 2007

Imagine the cross-vendor testing potential in Oxford – April 7-11, 2008



IHE-Europe Connectathon

● Open to all implementers

- Pick one or more IHE profiles and Actors
- Apply before December 15th
- Small fee per system
- Announcement & Fact Sheet on www.ihe-Europe.org
- http://ihe.univ-rennes1.fr/data/download/Announcement_Connectathon_2008.pdf
- <http://ihe.univ-rennes1.fr/data/download/EU-2008-Connectathon-Fact-Sheet-1.pdf>

● Efficient

- Need to pass pre-connectathon tests against lab test tools
- During Connectathon, tests orchestrated by Kudu Tool.
- To pass required to pass tests against at least three others. May test more.

● Result Attested

- User Experts form jury under Technical project Mgr
- Results (only passing) formally published on web



iHE Changing the Way Healthcare CONNECTS

Thank you for attention...

WWW.IHE.NET



**Providers and Vendors
Working Together to Deliver
Interoperable Health Information Systems
in the Enterprise
and Across Care Settings**

<http://www.ihe.net>