

Integrating the Healthcare Enterprise

IHE Tutorial Düsseldorf Nov. 15th, 2006

IHE Overview

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IHE-Germany „vendor“ co-chair



IHE : Integrating the Healthcare Enterprise

Professional Societies Sponsorship
Healthcare Providers & Vendors

Healthcare IT Standards
HL7, DICOM, etc.

General IT Standards
Internet, ISO, etc.

**IHE
Process**

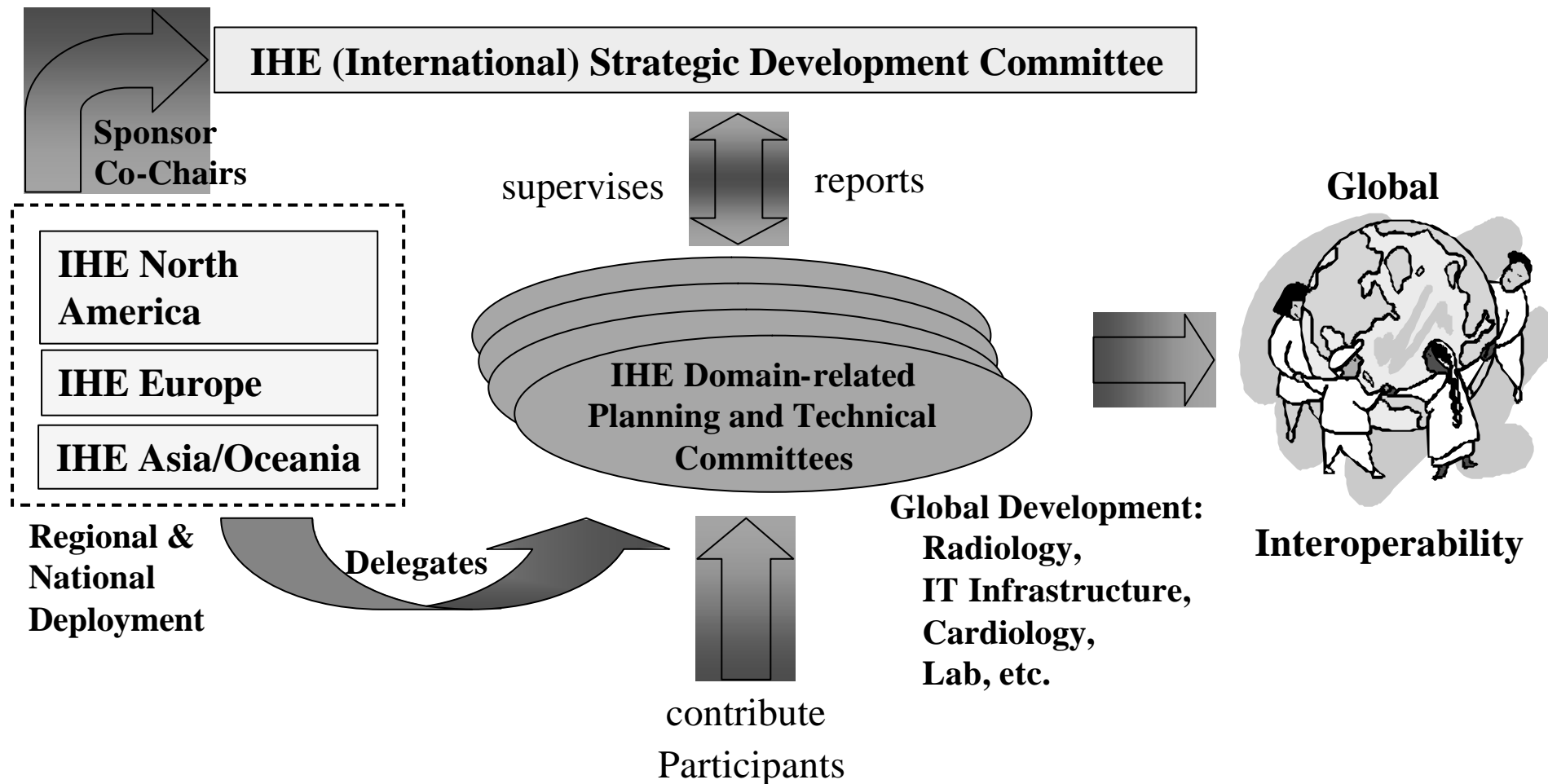
Interoperable Healthcare IT
Solution
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Interoperable Healthcare IT
Solution Specifications
IHE Integration Profile

IHE Organizational Structure Multi-Domain & Multi-National



Who is IHE?

- **IHE is a joint initiative among:**
 - Radiological Society of North America (RSNA)
 - Healthcare Information Management Systems Society (HIMSS)
 - American College of Cardiology (ACC)
 - GMSIH, HL7-France-HPRIM, JAHIS (laboratory)
 - American Society of Ophthalmology
 - Deutsche Krankenhaus Gesellschaft
 - Deutsche Röntgen Gesellschaft
 - And many more....
- **Began in 1997 in Radiology (RSNA) and IT (HIMSS)**
- **International effort: IHE- Europe and IHE-Asia**

What is IHE NOT

- **IHE is *not* a standard**
 - You *conform* to a standard
 - You *comply* with IHE integration profile and actors
- **IHE is *not* a standards development organization**
- **IHE is *not* a certifying authority**
- **IHE is *not* simply a demonstration project**
 - Demos are only one means to the end: *Adoption*
 - Backed up by documentation, tools, testing, and publication of information
- **IHE is *not* just for radiology**

IHE Synergies

- Users are defining their *needs*, sponsoring the common events, controlling the tests and making the *IHE based RFPs*
- Vendors are defining the *specifications*, selecting the standards, participating to the tests, claiming for integration statements and providing the *IHE compliant products*
- A “balanced” organization, IHE, is driving the IHE process

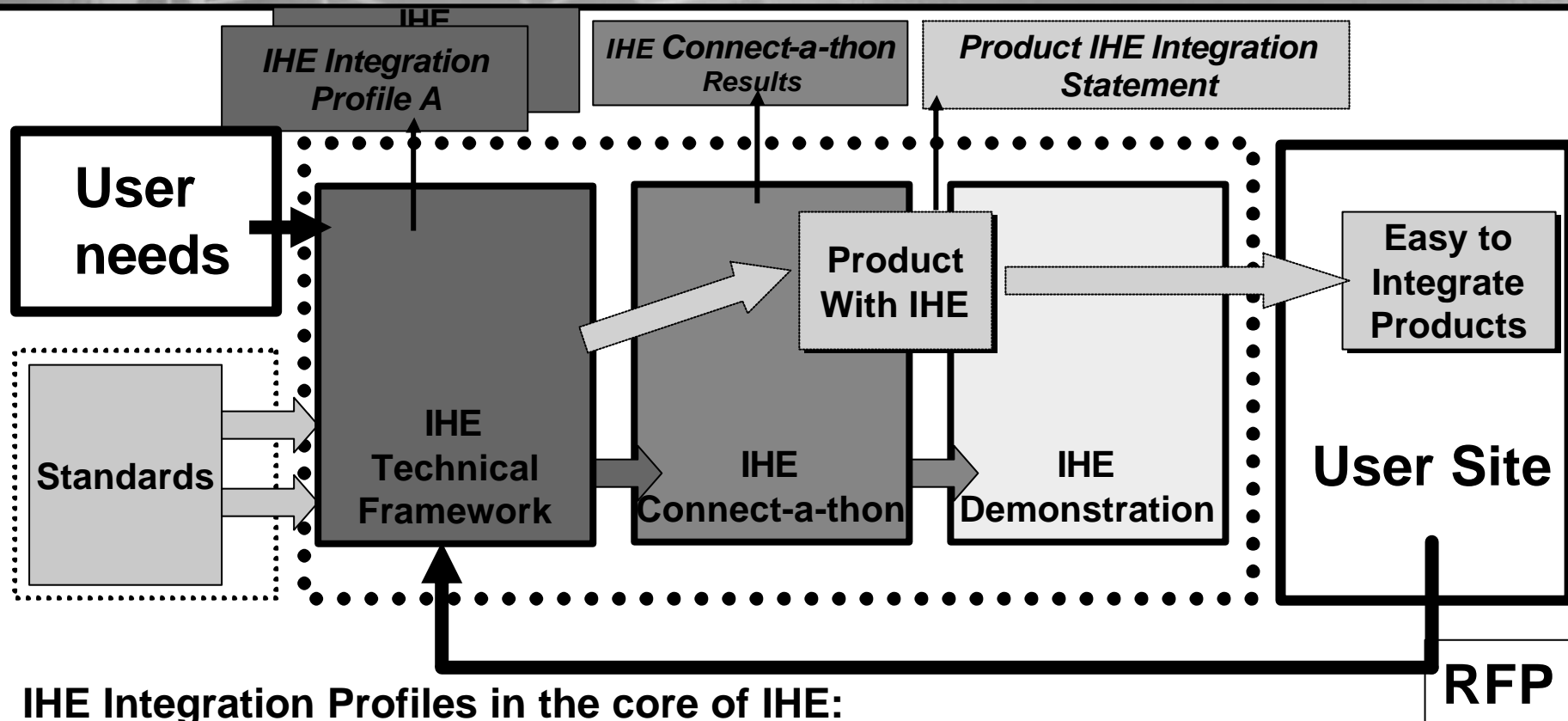
The user's needs

- **Connect to distributed IT in healthcare
(best of breed)**
- **Access complete medical patient information
(medical summary)**
- **Support streamlined medical pathways
(workflow)**
- **Overcome limited budgets
(lack of money)**
- **Follow organizational concentrations
(resources)**

The vendor's needs

- **identify the users needs and, more, minimize local specificities**
- **make the right choice among the multiple standards than apply, form medical, IT or medical IT**
- **test its products with other, in different contexts, and prove to its client the quality of its product interoperability**

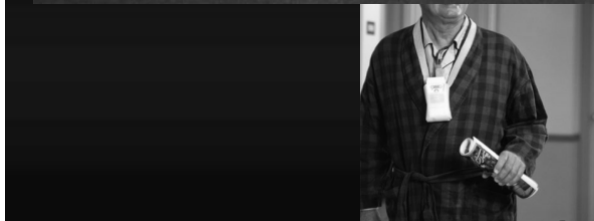
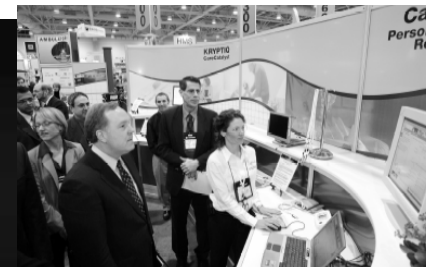
The IHE Process



IHE Integration Profiles in the core of IHE:

- Detailed selection of standards and options each solving a specific integration problem
- A growing set of effective provider/vendor agreed solutions
- Vendors can implement with ROI
- Providers can deploy with stability
- Process started in 1998; continuously improved

The annual IHE Process



Document Use Case in
Requirements



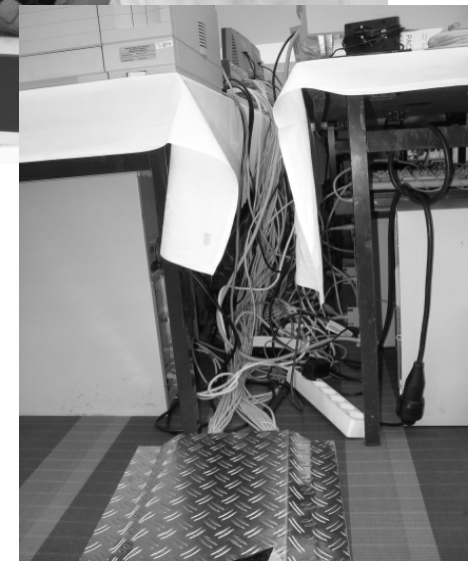
Ti

Easy to integrate
products

ECTS

Assurance for Users: Connect-a-thon

- Annual validation (Connect-a-thon)
Real work validation,



2002

2003

2004

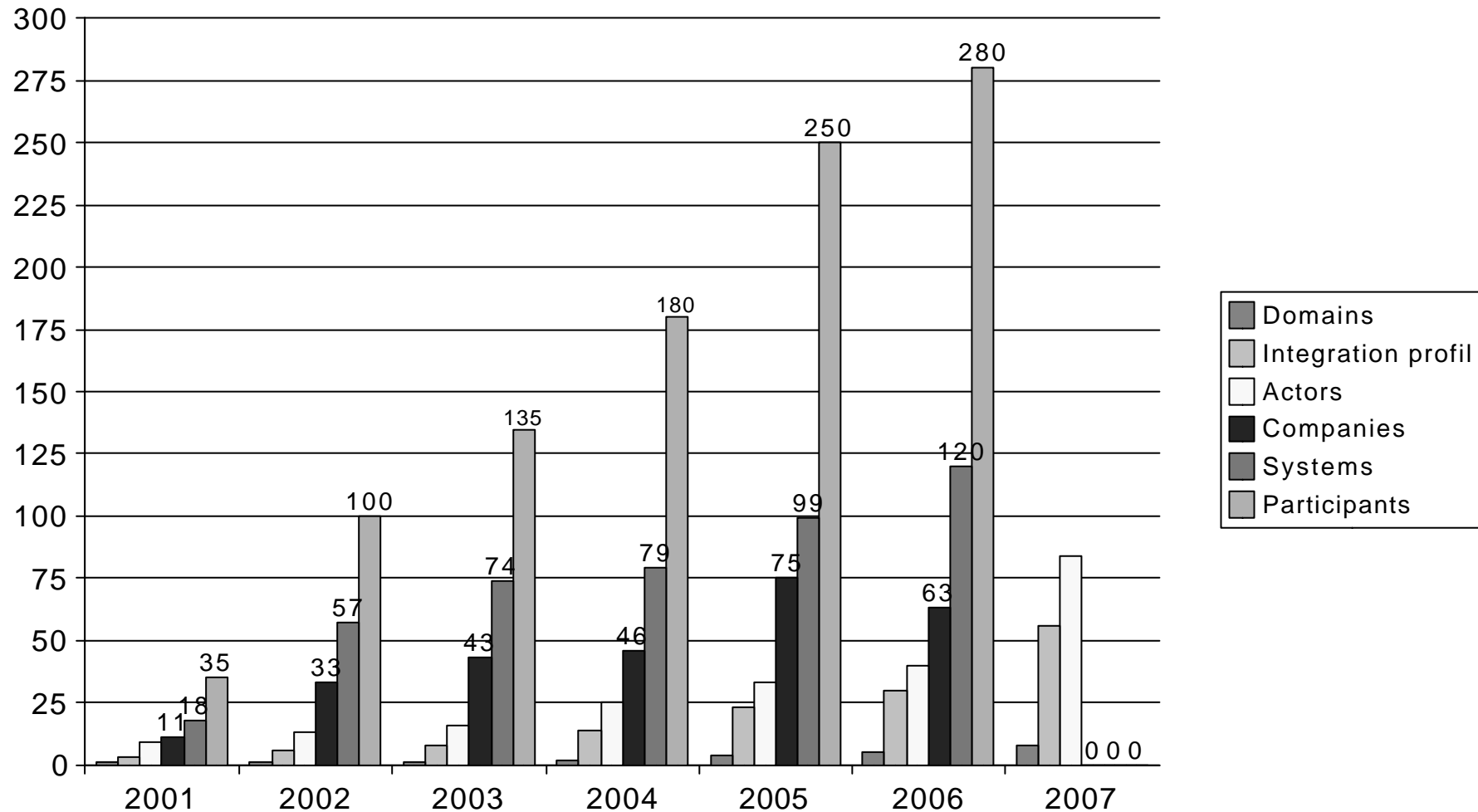
2005

2006

2007

Paris, Aachen, Padua, Nordwijkerhout, Barcelona, Berlin

Connect-a-thon participation In Europe



Some numbers

2007

8

84

56

European IHE Connectathon 2007

Special features:

High level exposure for IHE in Germany

- Overlap with European eHealth Week (Oct.16-20)
- → ITeG (April 17 to 19, 2007), the trade show for healthcare IT in Germany
- → Telemed and KIS Tagung (Oct.16/17&19/20)
- All events will take place at Messe Berlin in neighbouring halls
- Visitors to all events will have the possibility to take a look into the connectathon area
- VIP tours, IHE Logo in paperprint, website etc.

Plan can also be adjusted to new schedule for connectathon

- Requires new budget and planning

ITeG

ITeG

- Exhibition, workshops
- 3.500 visitors
- Organized by VHitG – Association for IT Vendors in Healthcare
- Sponsored IHE infobooth (or on VHitG booth)
- Embedded workshop session

eHealth-Week

German
EU-Presidency



- Exhibition, workshops (1000 visitors)
- Organized by GVG – Association for Social Security and Research
- IHE infobooth
- Embedded into workshop program

'Political Perspective' Statements

- The influence of European integration on eHealth solutions
- Regional, national and cross-border telematics projects
- Legal framework conditions for eHealth services in the European context
- Patient affairs – the advantages of eHealth applications for the EU citizens
- Goals and projects of the health care organisations (sponsors, service providers)



healthcare CONNECTS

11th Telemed and KIS Tagung (GMDS)

- Most important educational events for IT in Healthcare (>500 visitors)
- Focus: Users and 'Academics'
- Telemed: April 16 to 17
organized by associations of medical informatics professionals (BVMI)
- KIS Tagung: April 19 to 20
organized by GMDS



IHE demonstrations



Locations of Success (USA)

- Bethesda Healthcare Systems
- Cleveland Clinic Foundation
- Detroit Medical Center
- Grossman Imaging Centers
- Magic Valley Regional Medical Center
- Mayo Clinic Jacksonville
- McKay-Dee Hospital
- MeritCare Medical System
- Montefiore Medical Center
- Our Lady Of The Lake Regional Medical Center (OLOL)
- US Dept. of Veterans Affairs
- VA Puget Sound Health Care System
- St. Vincent Hospital and Health Services
- Mayo Clinic Clinic Jacksonville
- Sinlau Hospital
- University of Wisconsin
- Warren Hospital

Locations of Success (EUR)

- Hôpitaux Universitaires de Genève
- Johannes Gutenberg University
- Klinikum Nürnberg
- Staedtisches Klinikum Goerlitz
- Steinberg Diagnostic Medical Imaging
- University of Pisa
- Centre Hospitalier Centre Hospitalier
- Centre Hospitalier Centre Hospitalier
- Centre Hospitalier de Centre Hospitalier
- Centre Hospitalier de Centre Hospitalier
- Centre Hospitalier Intercommunal
- Val d'Aoste Hospital

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IHE User Success Story

Johannes Gutenberg University Hospital Mainz, Germany

*Experiences with Clinical Use of IHE Profiles:
Tools for Scheduled Workflow and Patient
Reconciliation Inside Radiology*

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Head of Department

Objective
Goal of the project was to realize interoperability in an existing multi-vendor PACS environment with different vendors for modalities and workstations. How modalities play together.

Implementation has been performed incrementally, with DICOM based PACS starting in 1996, DICOM MWL since 1999, and first MPPS/Storage Commitment in Nov 2000.

The modalities installed perform various levels of IHE-conformant transactions like DICOM MWL or MODALITY IMAGES STORED (2 CR, 3 MR, 1 CT). Also, there are some proprietary connections for workflow (FTP) to 3 CR- and 4 Ultrasound-Systems (all with Modality Images Stored transaction).

Method
The following IHE transactions have been implemented:

IHE Profiles and Transactions



In the table of transactions, those marked with an asterisk (*) are currently in the testing or implementation phase; those with a # are available based on DICOM services, with change to IHE compliant version November/December 2002. All other actors/transactions are completed and in clinical use.

Results
The usage of IHE profiles and transactions allowed us to integrate a variety of different imaging modalities together with the GAP RIS system and the Image Devices PACS-system.
With MWL all imaging requests are scheduled by the RIS system. Typing errors of patient demographics at the modality were thereby reduced to a minimum (<3%).

With the MPPS transaction the image modalities document data of an examination and send them back to the RIS system for further processing. Exposure data for legal aspects, consumption of filmsheets or other used supplies are registered. There is no need anymore to enter this data at the RIS terminal, which saves ~5min per examination.

Both profiles help to omit time consuming manual re-entering of information and to maintain the integrity and consistency of data across all systems.

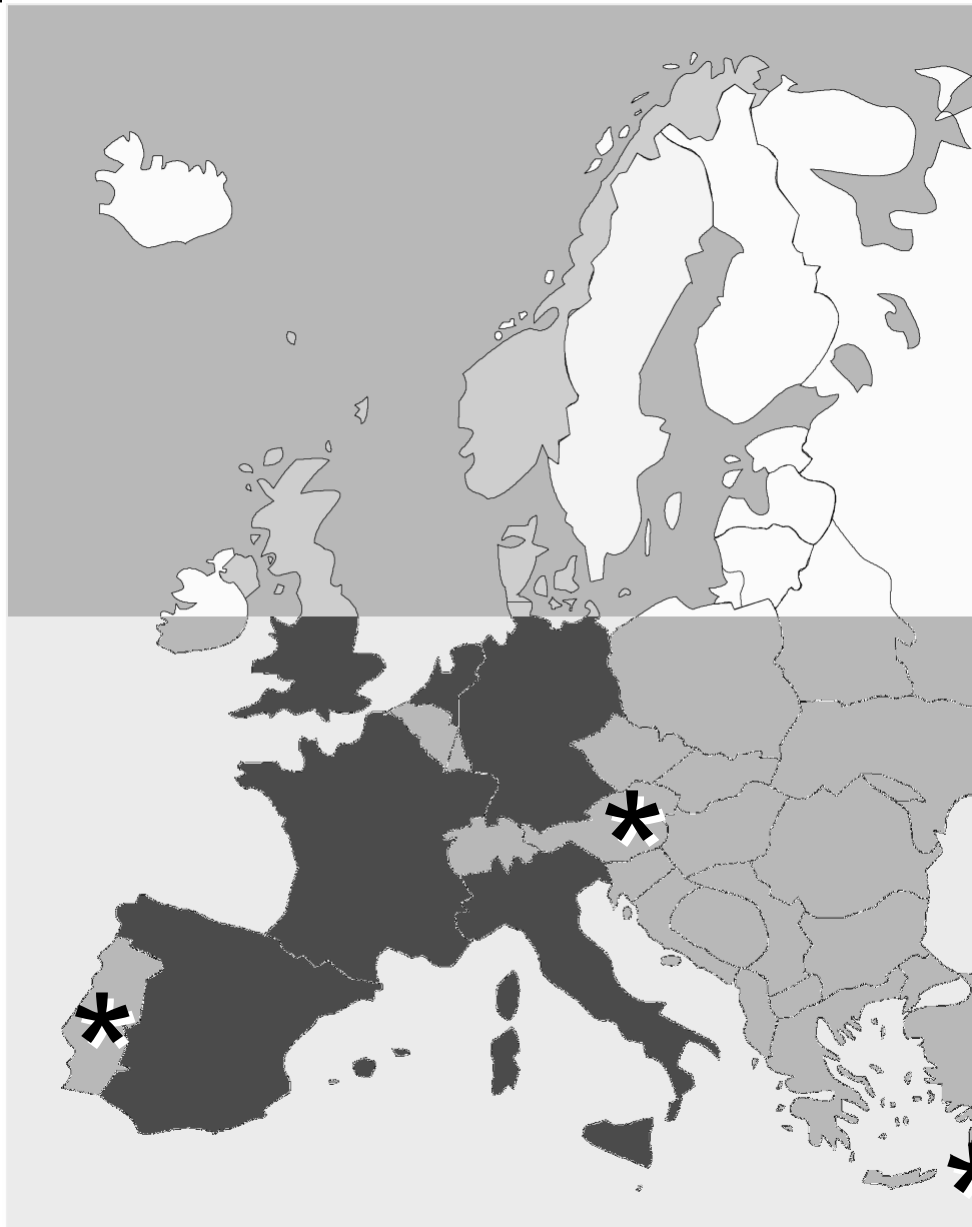
With Storage Commitment all performed examinations are securely stored in the PACS system. This helps the techs tremendously to know which data can be deleted at the modality already.

Conclusion
The integration of RIS-Modality-PACS with MWL and MPPS improves the workflow markedly. Especially in digital radiography, MWL is necessary to shorten examination time. MPPS improves the documentation of examination data and reduces faults of conventional registration.

IHE Integration Profiles, Actors and Transactions Implemented

Integration Profile	System/vendor	IHE Actor(s)	IHE Transactions	New or upgrade?
Scheduled Workflow (Partial)	RIS GAP X, Y, Z	Order Filter Department System Database	Procedure scheduled* Modality Worklist Modality Procedure Step in Progress Modality Procedure Step Completed Images Availability Query	Upgrade
	PACS Image Devices GAPCS Vets. 3.6	Image Manager Image Archive	Procedure scheduled* Modality Images Stored Modality Presentation State Stored Storage Commitment Image Availability Query Query Images Retrieve Images Create Images Stored	Upgrade
	CT Modality/Services SONATON Volume Zoom Vets. 10.41	Acquisition Modality	Modality Worklist Procedure Modality Procedure Step in Progress Modality Procedure Step Completed Modality Images Stored Storage Commitment	New (Installed Dec. 2002)
	CT Modality/Services SONATON Volume Zoom Vets. 10.41	Acquisition Modality	Modality Worklist Procedure Modality Procedure Step in Progress* Modality Procedure Step Completed Modality Images Stored Storage Commitment	Upgrade
	MR Modality/Services Magnetom Sonata Vets. 10.41	Acquisition Modality	Modality Worklist Procedure Modality Procedure Step in Progress* Modality Procedure Step Completed Modality Images Stored Storage Commitment	New (Dec. 2002)
	Angio Modality Philips Integra 3000	Acquisition Modality	Modality Worklist MPPS in Progress MPPS Completed Modality Images Stored Storage Commitment	Upgrade (Dec. 2002)
	Ultrasound Modality Philips HD 3000	Acquisition Modality	Modality Worklist MPPS in Progress MPPS Completed Modality Images Stored Storage Commitment*	New (Dec. 2002)
	CT Modality Philips Modicon21	Acquisition Modality	Modality Worklist MPPS in Progress MPPS Completed Modality Images Stored Storage Commitment	New (Oct. 2002)
	Workstation Centris DICOM Viewer 3.0.8	Diagnostic and Clinical Image Display	Patient query Query Images Retrieve Images	Upgrade (April 2002)
	CT Modality Philips PowerVision	Acquisition Modality	Modality Worklist MPPS in Progress* MPPS Completed Modality Images Stored Storage Commitment	New (Dec. 2002)
Integration Profile	System/vendor	IHE Actor(s)	IHE Transactions	New or upgrade?
Patient Information Reconciliation (Partial)	RIS GAP Vets. 3.6	Order Filter	Patient Update # Procedure Update #	Upgrade
	PACS Image Devices GAPCS Vets. 3.6	Image Manager Image Archive	Patient Update # Procedure Update #	Upgrade
	CT Modality/Services SONATON Volume Zoom	Acquisition Modality	Modality Worklist Modality Procedure Step in Progress Modality Procedure Step Completed Modality Images Stored Storage Commitment	New (Installed Dec. 2002)
	Angio Modality Philips Integra 3000	Acquisition Modality	Modality Worklist MPPS in Progress MPPS Completed Modality Images Stored Storage Commitment	Upgrade (Dec. 2002)
	Ultrasound Modality Philips HD 3000	Acquisition Modality	Modality Worklist MPPS in Progress MPPS Completed Modality Images Stored Storage Commitment	New (Jan. 2002)
Integration Profile	System/vendor	IHE Actor(s)	IHE Transactions	New or upgrade?
Consistent Presentation of Images	CT Modality/ Services SONATON Volume Zoom	Print Composer	Print Request with Presentation List	New (Installed Dec. 2002)

View Beyond



Active Domains

- Radiology
- IT-Integration
- Laboratory
- Cardiology
- Patient Care Coordination
- Patient Care Devices
- Eye Care
- Pathology
- Endoscopy
- Dermatology
- Pharmacology

Evolution of IHE Domains

IHE Global Developments

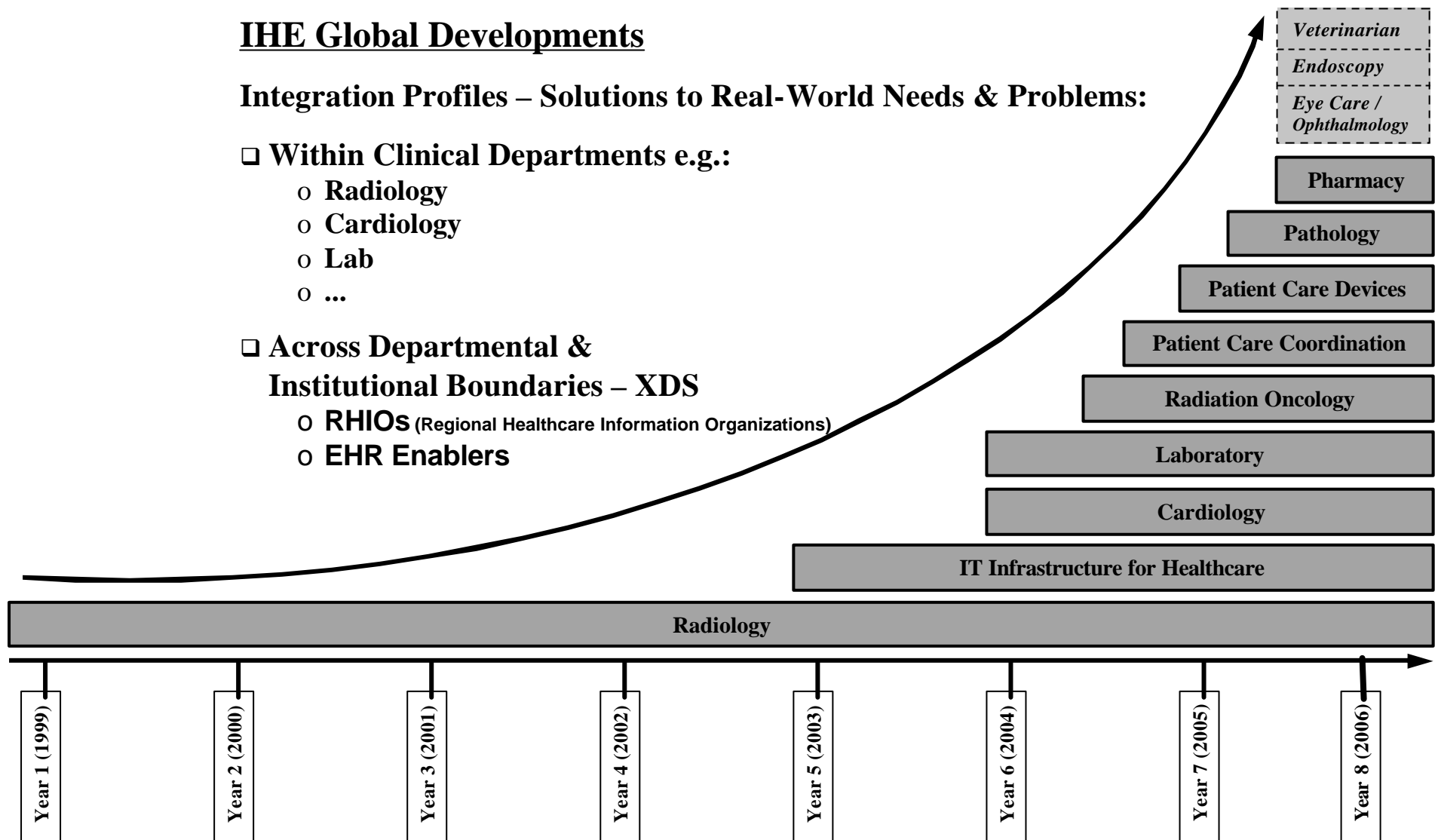
Integration Profiles – Solutions to Real-World Needs & Problems:

❑ Within Clinical Departments e.g.:

- Radiology
- Cardiology
- Lab
- ...

❑ Across Departmental & Institutional Boundaries – XDS

- RHIOs (Regional Healthcare Information Organizations)
- EHR Enablers



Integration Profiles (3)

Solutions exist already
in different domains:

		Number of existing Integration Profiles
RAD	Radiology:	17
ITI	Information Technology Integration:	9
LAB	Laboratory Medicine:	6
CARD	Cardiology:	6
PCC	Patient Care Coordination:	1

... and more are coming

Implementing the Healthcare Interoperability Infrastructure Technical Framework

IHE

ITI Infrastructure Technical Framework

Volume 1
(ITI TF-1)
Integration Profiles

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Implementing the Healthcare Interoperability Infrastructure Technical Framework

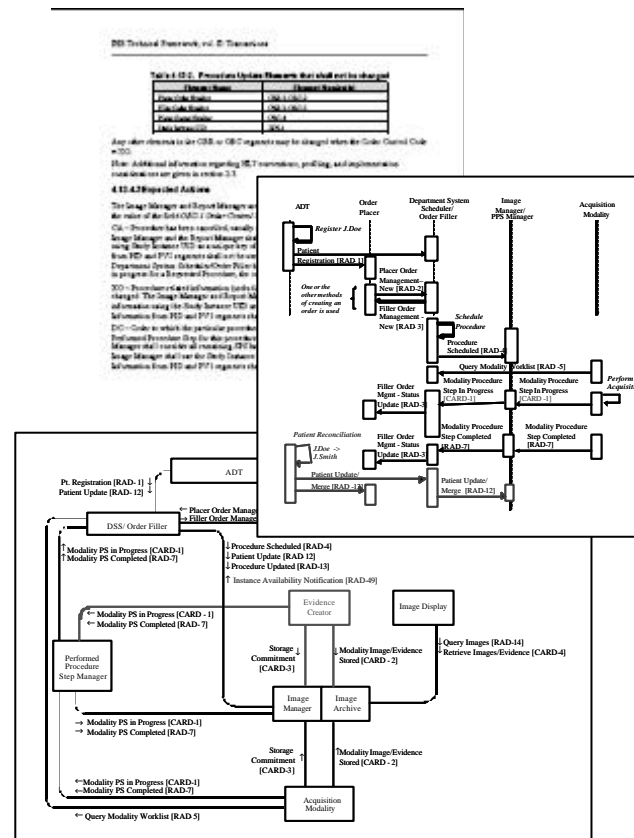
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ITI Infrastructure Technical Framework

Volume 2
(ITI TF-2)
Integration Profiles

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- Cardiology
- IT Infra
- Lab
- Radiology



Organization of TFs

- **Volume 1: Integration Profiles**

- Describes clinical need and use cases
- Identifies the actors and transactions

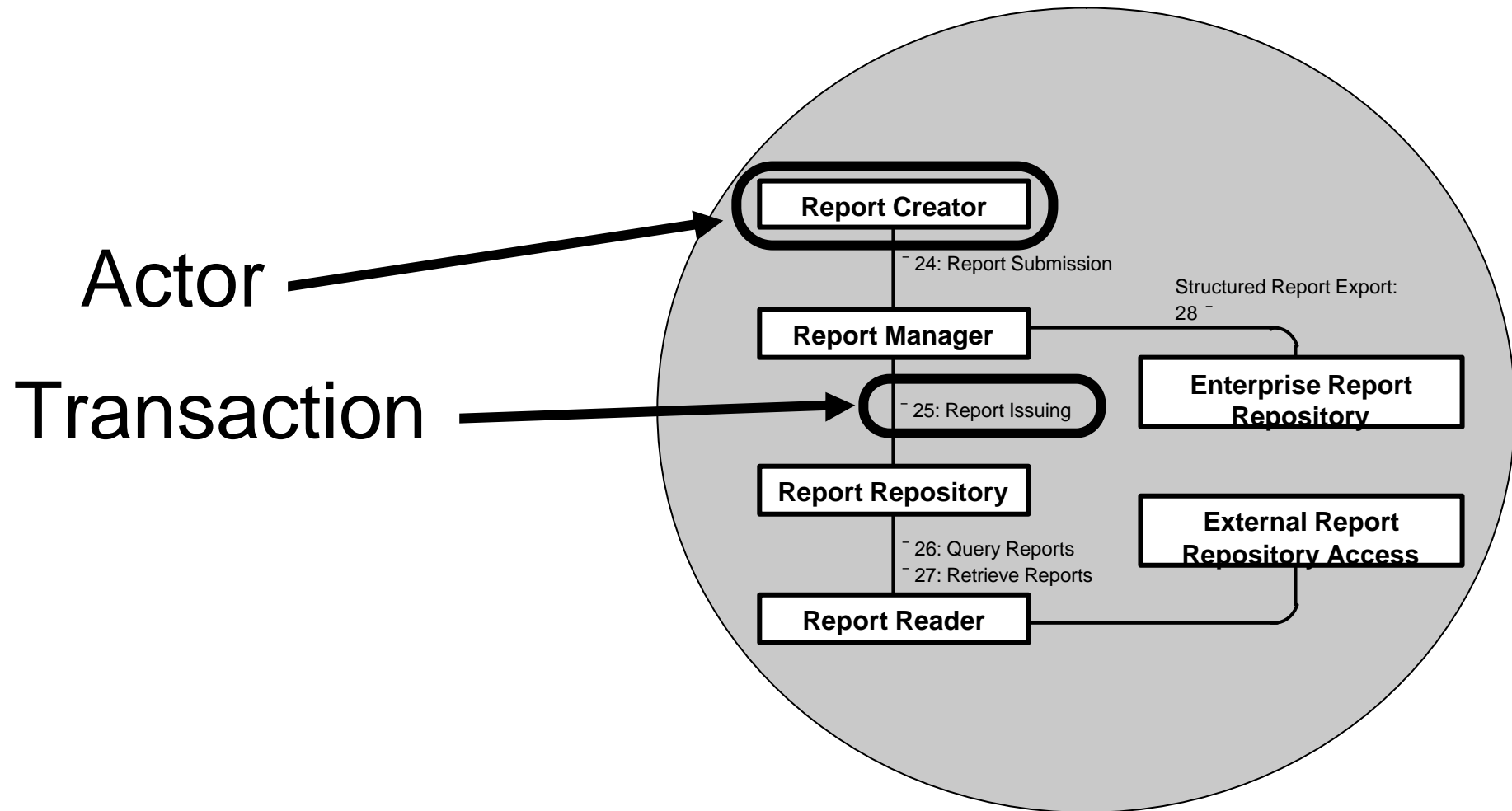
- **Volume 2+ of Technical Framework**

- Provides implementation specification for each transaction by specific reference to Standards

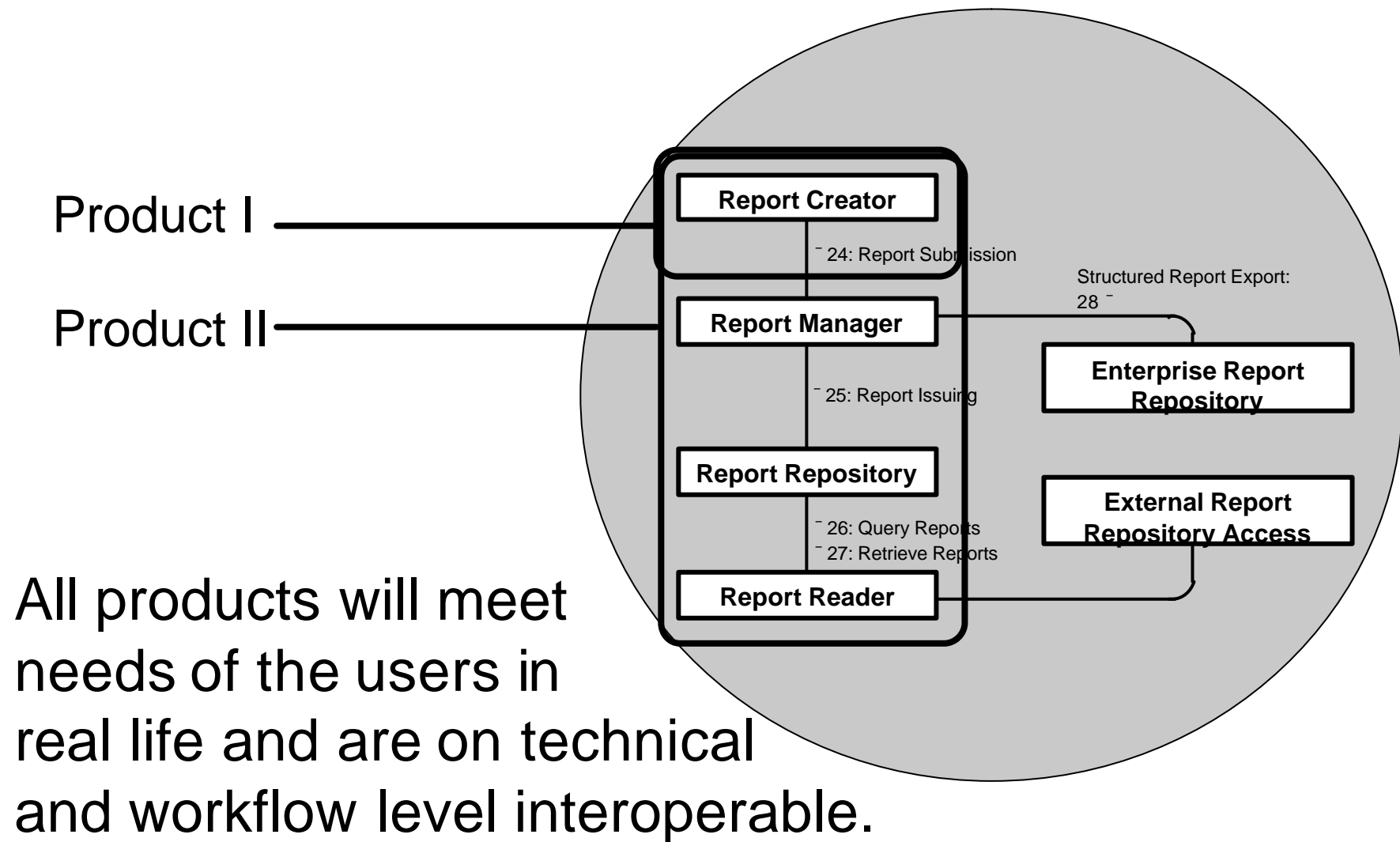
Integration Profiles (1)

- **Based on real use cases of a real users**
- **Easy to understand functional units using and specifying commonly used standards**
- **Describing actor / transaction relations**
- **Giving solutions to interoperability problems**
- **Independant on vendors or providers**

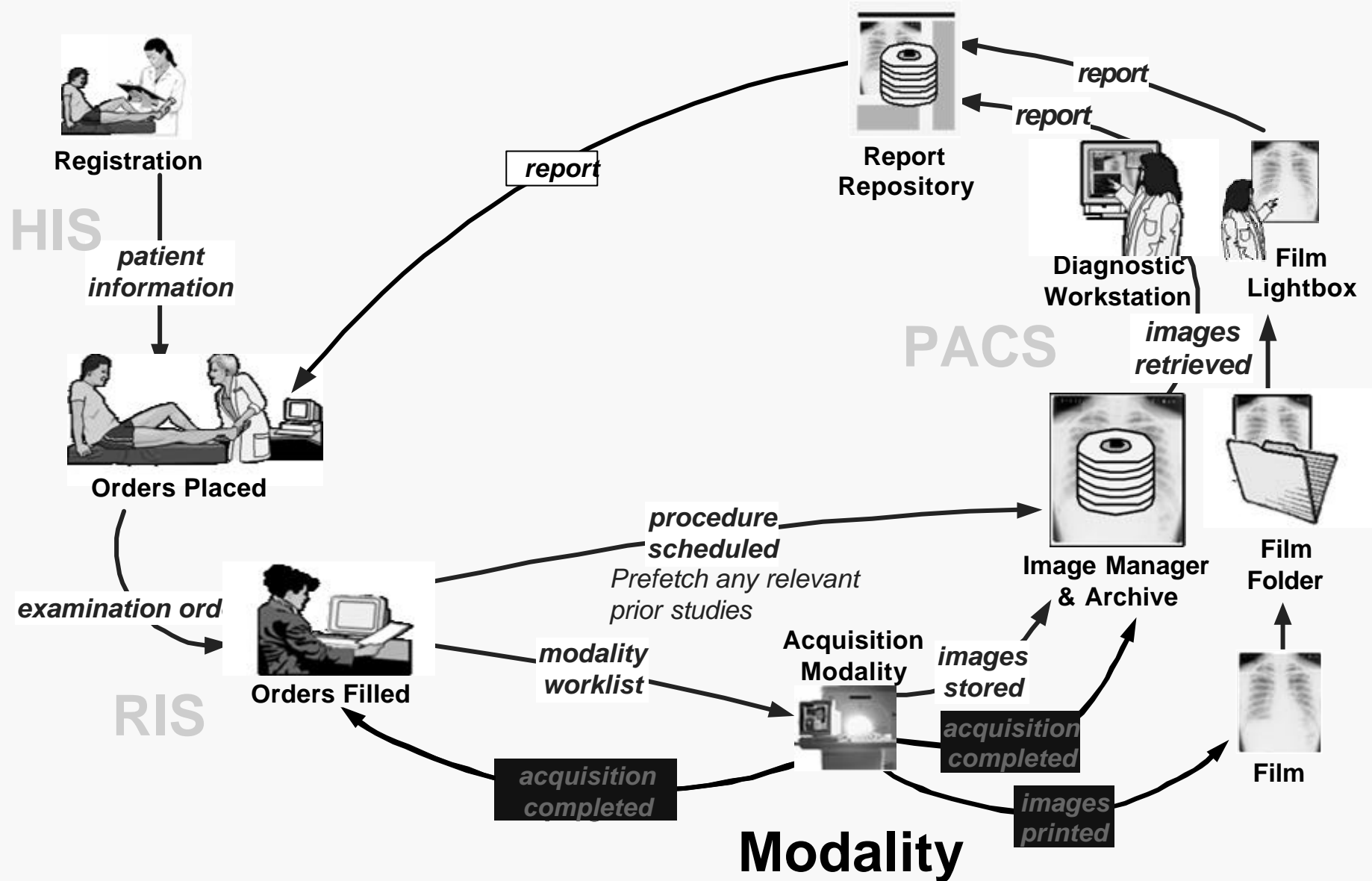
Integration Profile (2)



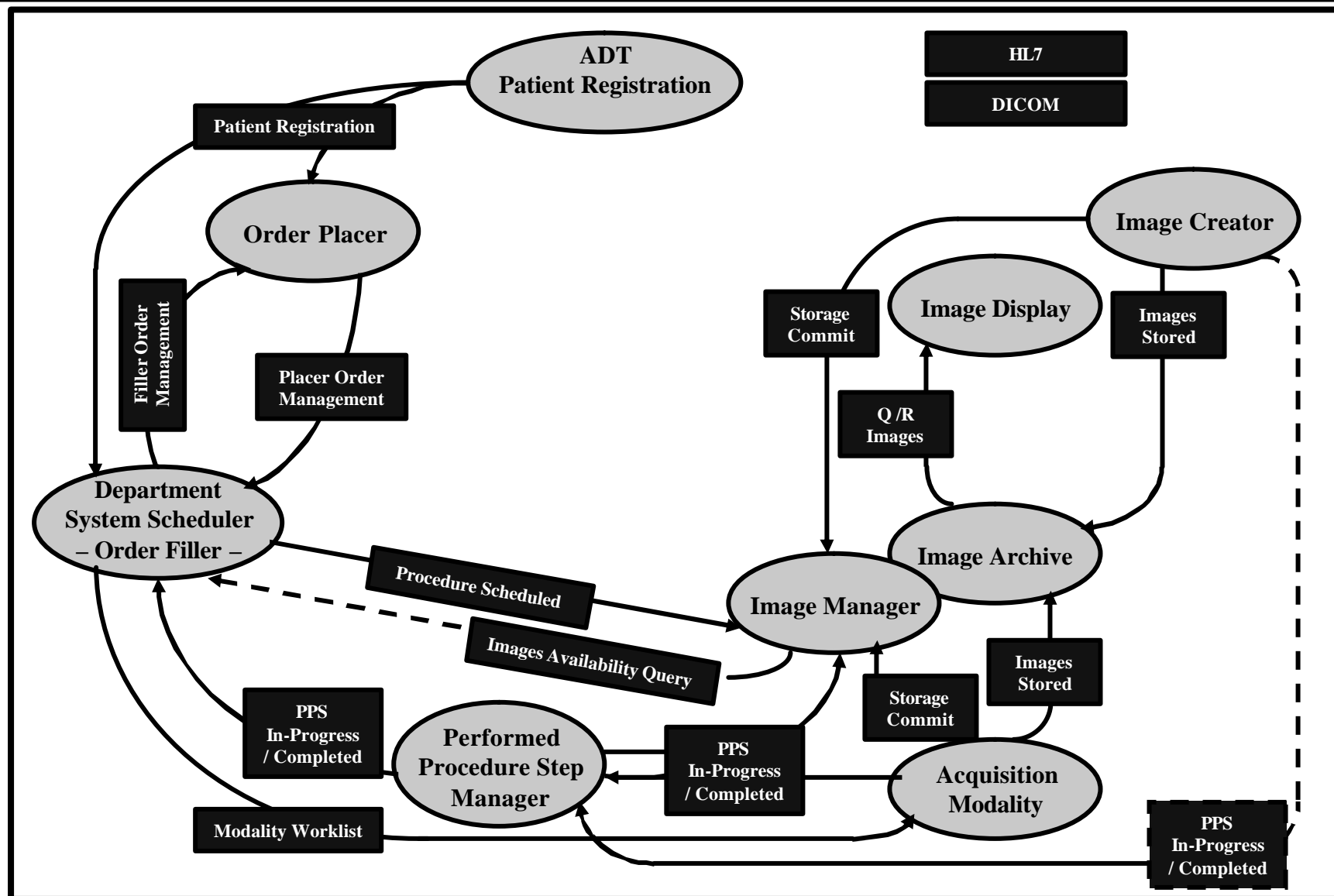
Integration Profile (2)



Example 1: Scheduled Workflow

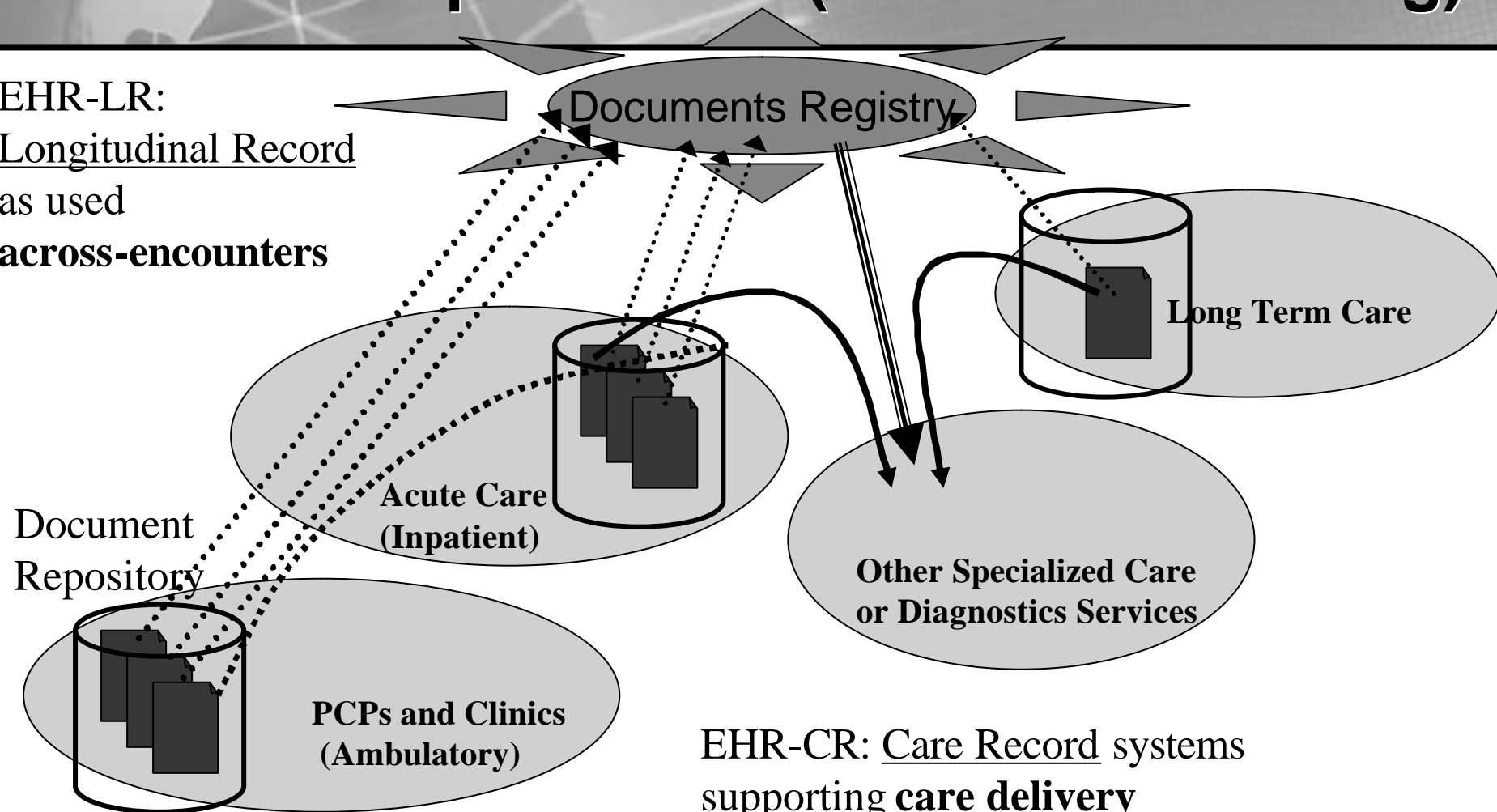


Schedule Workflow Diagram



Profile example 2: XDS (Document Sharing)

EHR-LR:
Longitudinal Record
as used
across-encounters

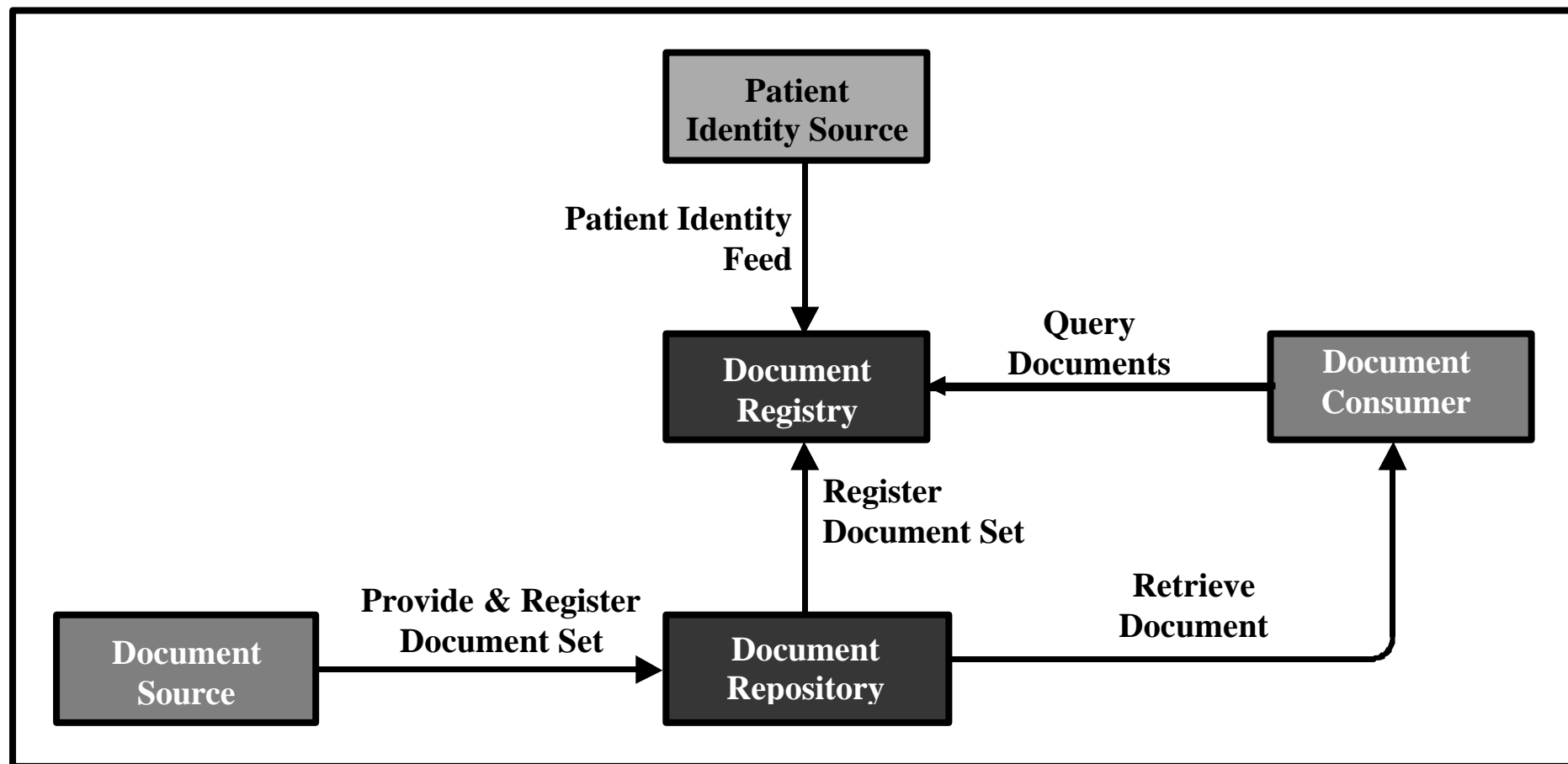


EHR-CR: Care Record systems
supporting **care delivery**

◀ *Submission of Document References*

◀ *Retrieve of selected Documents*

XDS Actors and Transactions



Examples of LPOCT

- **Portable blood gas and chemistry analyzer used by the nurse on patient bedside**
- **Blood gas analyzer permanently installed in a surgery theater**
- **Coagulation analyzer in acute care ward**
- **Glucometer used by the patient in home care**
- **Work station on which the nurse manually enters the results of pregnancy stick tests.**

The IHE actors of LPOCT

Point Of Care Result Generator (POCRG)

Produces the results from a specimen

- By measurement of an analyte on a specimen
- By calculation
- By manual enter



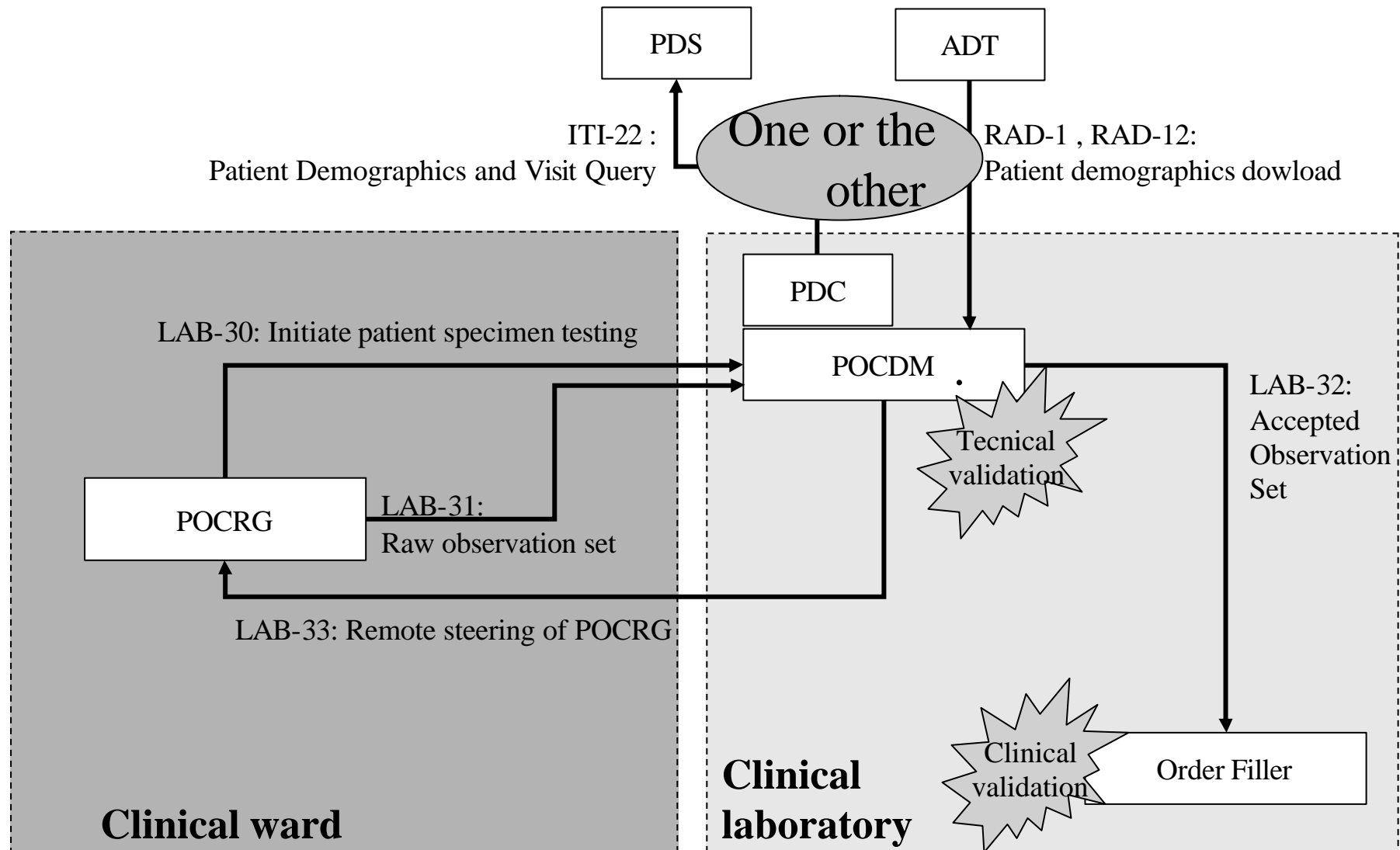
Point Of Care Data Manager (POCDM)

Handles and administers a set of POCRG

- Controls the process,
- checks the patient identity and location
- Collects the patient results
- Collects and manages the QC results
- Forwards the results to the Order Filler



LPOCT Actors and transactions



IHE Integration Statement

IHE Integration Statement			
Vendor	Product Name	Version	Date (dd/mm/yyyy)
Big Medical Buisness	RIS2003	3.4	15/10/2003
Integration Profiles Implemented	Actors Implemented	Options Implemented	
Scheduled Workflow	Department System Scheduler/Order Filler	None	
Scheduled Workflow	Performed Procedure Step Manager	None	
Patient Information Reconciliation	Department System Scheduler/Order Filler	None	
Internet address for vendor's IHE information :			
http://www.big-buisness.com			
Links to Standards Conformance Statements for the implementation			
Health Level 7	http://www.big-buisness.com/HL7		
Dicom	http://www.big-buisness.com/DICOM		
Links to general information on IHE			
In North America: http://www.rsna.org/IHE	In Europe: http://www.ihe-europe.org	In Japan: http://www.jira-net.or.jp/ihe-j	

Challenges for a vendor

- Healthcare is one of the most promising market for IT
- National Markets for Health IT products in Europe are too small to justify required R&D investment
- Interoperability is not only increasingly useful but it becomes now a condition for surviving
- IHE is the best response to these constraints

IHE Cost / Benefits for Vendors

● Costs:

- All Technical Framework, publication of IHE Integration Statement: free
- Participants to the Connect-a-thon: ~2k€ fees + travel + software development (the real expense!)
- Contributors to the Technical framework: time & travel expenditure / t-con participation

● Benefits:

- Conformance to the user demand and proof (all)
- Tests with multiple vendors, (participants, not customers)
- Access to international expertise (contributors)

In Conclusion

- IHE is dedicated to interoperability of IT systems in healthcare
- IHE is a user & vendor driven initiative
- IHE is already working worldwide
- Users and vendors already benefit

www.ihe-europe.org

www.ihe.net

**Thank you
for your attention!**



Changing

Healthcare CONNECTS