Introduction to IHE

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Introduction

**Interoperability** is one of the key challenges in **eHealth**

- How to improve citizens’ health by making medical information available in a safe and trusted environment?
- How to increase quality and access to the medical information
- How to make eHealth more effective, user friendly and widely accepted

From the goals of the EU *(reviewed)*:

Europe

First eHealth large scale deployment: European Patient Smart Open Services
2008 – 2014
36,5 Mio € spent
25 European countries

The building blocks represent a massive investment since their creation by the Large Scale Pilots. As their user base grows, the Commission is already working on their sustainability beyond CEF.

Piloting  Consolidation  Roll-Out  Ecosystem

DSI
Digital Service Infrastructure

Source: Gerald Cultot, European Commission, Keynote speech at IHE World Summit 2016
The many dimensions of Interoperability

- **Legal & Regulatory**: Legal and regulatory constraints
- **Policy**: Information Exchange
- **Care Process**: Collaboration agreements
- **Information**: Collaborative care and workflow processes
- **Applications & Services**: Defining structure and coding of information
- **IT Infrastructure**: Transport and Exchange services
- **Generic Communication protocols**: Integration in healthcare systems

**From Refined eHealth European Interoperability Framework**
**EU eHealth Network, 23/10/2015**
Interoperability means also involvement of Stakeholders

- Legal
- Organisational
- Semantic
- Technical

- Legal and regulatory
- Policy
- Care Process
- Information
- Applications
- IT Infrastructure

- Regulators and advisors
- Policy makers
- Information architects, business analysts
- Information analysts, coders
- System architects
- System engineers

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How does IHE operates?
Help is out there: Mission of IHE

• IHE improves healthcare by providing specifications, tools and services for interoperability

• IHE engages clinicians, health authorities, industry, and users to develop, test, and implement standards-based solutions to vital health information needs

• IHE is both international (join forces and reuse) and local (autonomous, learn, adopt, deploy and feedback)
Help is out there: What is IHE

• IHE: Integrating the Healthcare Enterprise
• IHE uses an open, consensus-based process to engage users, providers and suppliers of health IT solutions to identify and solve interoperability problems
• IHE is:
  – an international SDO of authorities, users and vendors
  – Profiles formally recognized by ISO though being Liaison A
  – Sponsoring and fostering a robust interoperability testing ecosystem (cross-standards, open source tooling, process rigor across entire lifecycle)
  – Directly supportive of ehealth projects (use cases, interoperability specifications, conformity assessment, projectathon, national certification) via IHE services and National Initiatives
How does IHE work:
Connecting Standards to Care

• Healthcare professionals work with industry
• Coordinate implementation of standards to meet clinical and administrative needs
  – Clinicians and HIT professionals identify the key interoperability problems they face
  – Providers and industry work together to develop and make available standards-based and tested specifications
  – Implementers follow common guidelines in purchasing and integrating effective systems

IHE: A forum for agreeing on how to implement standards and processes for making it happen

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What is IHE?

IHE: Making Healthcare Interoperable
IHE: Framework for Interoperability

• A common framework for harmonizing and implementing multiple standards
  – “Meta-Standards”—Standardize the use of standards
  – Profiling existing standards to address specific use cases in healthcare
    – Addressing the procurement and testing challenge
• Promotes unbiased selection and coordinated use of established healthcare and IT standards to address specific clinical needs
• In collaboration with other SDOs, users and vendors develop profiles that enable seamless health information movement within and between hospitals, regions, nations
Interoperability: From a problem to a solution

Base Standards

- OASIS
- IETF
- ISO
- W3C
- DICOM
- IEEE
- H7
- CDISC
- LOINC
- IHTSDO
- ITU

Profile Development

IHE

Continua

eHealth Projects

Project Specific Extensions

Profiling Organizations Are Well Established

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IHE Terminology

• Profiles
  – Describe workflow use cases, standards and the overall relationships to achieve transparent interoperability

• Technical Frameworks
  – The documents for each “domain” that specify the Profiles and the associated systems (actors) and transactions. Each Profiles is specified in details and leaves “specific customization points.

• Connectathons
  – Neutral testing events with multiple vendors in one room, consisting of developers and testers (no marketing or sales / no customers), promoting rapid and robust interoperability testing

• Integration Statements
  – Vendor tells customers the IHE Profiles supported by a specific release of a specific product

• Conformity Assessment
  – An accredited test laboratory issues a test reports that states the IHE Profiles supported by a specific release of a specific product
IHE Process

Identify Interoperability Problems to Solve

Integration Statements
- Vendors list tested profiles

Conformity Assessment Reports: test lab issued

Develop Profiles
- Actors and Transactions
- Workflow
- Precisely reference relevant standards

Connectathon Testing
Conformity Assessment

Supports procurement and acceptance

Profile Proposal
Public Comment
Trial Implementation
Final Text
Today over 223 for Interop. within the Enterprise & National-Regional Health Info Exchange 30+ profiles Using HL7 FHIR At Home.
IHE Profile Base Standards
Development Process

Base Standards Development Process

ISO/TR 28380-1/2/3 : 2014
Health informatics -- IHE global standards adoption

www.ihe.net

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Organization of the IHE Technical Framework

IHE TF concepts support different types of standards: HL7 V2, DICOM, HL7 FHIR, WebServices, IEEE
IHE Domains and Standards Portfolio

- Cardiology
- Dental
- Eye Care
- IT Infrastructure (ITI)
- Pathology and Laboratory Medicine
- Patient Care Coordination
- Patient Care Devices
- Pharmacy
- Quality, Research and Public Health
- Radiation Oncology
- Radiology
  - Mammography
  - Nuclear Medicine

- Marked in red are domains using FHIR. All profiles are in Trial Implementation, most based on STU 4 and waiting for stable FHIR Resources Standard
- Marked in blue are domains using HL7 V2 and CDA/V3
- Marked in orange are domains using DICOM
- Marked in green are domains using WebServices
- Marked in brown are domains using other standards (SNOMED, IEEE, LOINC, etc.)

Source: https://www.ihe.net/IHE_Domains/
IHE offers a broad collection of Profiles

• A Technical/Semantical Use Cases is addressed by a profile.
• They are specified based on robust, accepted and evolutionary standards in a series of Technical Frameworks (Volume 1 for the TF of each Domain)
• Different classes of profiles:
  – Integration (how to move the data)
  – Content (what the data conveys) and Terminology (when global)
  – Security/privacy
  – Workflow
• Complete list on: [www.ihe.net/technical_framework](http://www.ihe.net/technical_framework)
IHE is international: Governance

- Unique governance with > 500 Users and Vendors Members covers:
  - International committees (needs and specifications)
  - International testing tools platform: Gazelle
  - Regional testing process: Connectathons
  - Deployment: Projects

Global Interoperability market based on operational standards promoting collaboration by sharing Users and Vendors expectations
Connectathons: « Marathons of connectivity »

In different countries & regions of the world: US, Japan, Europe, Korea, China Australia...
Stakeholder Benefits

• Healthcare providers and health authorities
  – Improved workflows
  – Information whenever and wherever needed
  – Reduced implementation costs

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

• SDOs
  – Rapid feedback to adjust standards to real-world
  – Establishment of critical mass and widespread adoption
IHE Organizational Structure

IHE International Board

Regional Profile Deployment

IHE North America
- Canada
- USA

IHE Asia-Oceania
- China
- Japan
- Korea
- Taiwan

IHE Europe
- Austria
- France
- Germany
- Netherlands
- Italy
- Switzerland
- Spain
- Turkey
- UK
- Belgium
- Luxembourg
- Finland

Professional Societies / Sponsors / Health Authorities
- ACC
- ACCE
- ACEP
- ACP
- ASIP
- SFR
- SFIL
- COCIR
- EAR-ECR
- DRG
- SIRM
- BIR
- NICTIZ
- ESC
- EuroRec
- ELGA
- JAHIS
- JIRA
- JRS
- METI-MLHW
- MEDIS-DC
- JAMI

Global Profile Development

Radiology

IT Infrastructure

Laboratory

Cardiology

Patient Care Coordination

Pathology

Radiation Oncology

Patient Care Devices

Eye Care

Public Health, Quality and Research

Pharmacy

Contributing & Participating Vendors

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IHE- Where to Engage?

Regional Deployment

IHE Europe

Belgium
Luxembourg
Finland
Austria
France
Germany
Netherlands
Italy
Switzerland
Spain
Turkey
UK

Global Development

Radiology
Cardiology
IT Infrastructure
Patient Care Coordination
Patient Care Devices
Eye Care
Laboratory
Pathology
Pharmacy
Public Health, Quality and Research
Radiation Oncology

National Initiative

MoH
National Project
National Stakeholders
(Clinicians, Hospitals, industry, etc.)
Next Stop in a future not that far: interconnected healthcare services networks for the benefit of the patient

mHealth, eHealth and Health/Medical Devices as components of the connected health system

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HL7 FHIR based profiles of IHE (ITI): the future ahead

- **Mobile access to Health Documents (MHD)** a profile on Document Reference and Document Manifest to provide a HTTP REST and Mobile application friendly API for the use cases profiled in XDS, XDR, and XCA.
- **Patient Demographics Query for Mobile (PDQm)** a profile of the FHIR Patient resource for simple lookup and reference. Following the functionality requirements profiled in PDQ (HL7 v2), and PDQv3 (HL7 v3)
- **Patient Identifier Cross-reference for Mobile (PIXm)** an operation profile for retrieving just cross-referenced identifiers for a given patient
- **RESTful Query to ATNA** a profile on Audit Event for query and reporting
- **Mobile Cross-Enterprise Document Data Element Extraction (mXDE)** accesses data elements extracted from shared structured documents
- **Mobile Alert Communication Management (mACM)** a profile on Communication for alert notifications
- **Mobile Care Services Discovery (mCSD)** provides a RESTful interface to discover Care Services: Organization, Location, Practitioner, and Health Services
- **Mobile Cross-Enterprise Document Data Element Extraction (mXDE)** accesses data elements extracted from shared structured documents
- **Non-patient File Sharing (NPFSm)** provides a RESTful interface enable sharing of non-patient files such as clinical workflow definitions, domain policies, and stylesheets
- **Internet User Authorization (IUA)** a profile of OAuth for use with HTTP REST access
- **Query for Existing Data for Mobile (mQED)** queries for clinical data elements, including observations, allergy and intolerances, conditions, diagnostic results, medications, immunizations, procedures, encounters and provenance
- **Mobile Retrieve Form for Data Capture (mRFD)** describes the exchange of context data to allow a seamless form launch with supporting clinical context
- **Dynamic Care Planning (DCP)** Profile provides the structures and transactions for care planning, sharing Care Plans that meet the needs of many, such as providers, patients and payers
- **Mobile Medication Administration (MMA)** describes the requesting and registering of administration of medication in a mobile setting (under development)
IHE based “Interoperability” experience has demonstrated significant benefits to national programs:

- Reduce specification consensus time
- Simplify implementation efforts
- Reuse of testing tools and processes
- Shared implementation experience
27 IHE Profiles identified by EU Commission for public procurement

- This is part of Europe 2020 strategy for “Smart, sustainable and inclusive growth”.

- The European Commission stated that the 27 IHE Profiles have the potential to increase interoperability of eHealth services and applications to the benefit of patients and the medical community leading to their recognition in referencing in public procurement throughout the European Union.

- Details of the 28 July 2015 announcement in the Official Journal of the European Union can be found at:
  
27 IHE Profiles recognized under EU regulation 1025/2012

Regional, National, Cross-border:
- Share documents/records
  - XDS.b
- Patient Identification
  - XDR
- Imaging, Scanned Docs
  - XDS-I.b
- Summaries
  - XDS-MS
- Pharmacy prescription/dispensation
  - XPHR
- Laboratory reports, Privacy
  - XD LAB

Regional, National, Hospital:
- Patient Id
  - PIX
- Security
  - PDQ

Hospital:
- Patient Administration, Terminology
  - PAM
- Radiology
  - SWF.b
- Laboratory
  - LCSD

Overview of overall testing continuum

- **Project A**
  - Virtual Projectathon (Pre-production)
  - eHealth Projectathon

- **Project B**
  - Virtual Projectathon (Pre-production)
  - eHealth Projectathon

**Products**
- IHE Conformity Assessment
- IHE Connectathon
- Vendors Product Internal Lab testing

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The central role of the Gazelle Platform
IHE-Services

• Formally created in 2012
• Built upon a long experience in interoperability testing management and experience with epSOS.
• IHE-Services has the goal to offer professional services to support IHE Members as well as national/regional authorities, local projects or any other organisations deploying IHE profiles for their eHealth projects
IHE Services Catalogue

1. Connectathons and Projectathons
2. Gazelle Test Bed and Tools
3. Training
4. Virtual Connectathons
5. Consulting / IoP Specifications
6. Tailored Test Tools
7. Tailored Test Plans
8. Interoperability Showcases
9. Conformity Assessment/Report
Links

• IHE-International:
  – www.ihe.net

• IHE-Europe:
  – www.ihe-europe.net

• Link to Product Registry:

• Documentation:
  – http://gazelle.ihe.net/content/product-registry

• Conformity Assessment Program:
  – http://ihe.net/Conformity_Assessment.aspx

• Connectathon web site:
  – https://connectathon.ihe-europe.net/

• Gazelle web site:
  – http://gazelle.ihe.net
Questions?

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Thank you!

IHE-Europe's mission: IHE-Europe engages clinicians, health authorities, industry, and users to improve healthcare interoperability by... read more >>>