IHE EUROPE | Integrating the Healthcare Enterprise

eHealth Plugathon

IHE profiles based on HL7 FHIR®

November 3rd, 2020

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Presentation Objectives

- You should:
  - Understand the role of IHE in interoperability
  - Understand the use of FHIR in IHE profiles
  - Understand IHE collaborations on FHIR

- These slides were initially developed by John Moehrke, IHE IT Infrastructure Committee co-chair and presented at
  - HL7® Workgroup Meeting May 2018 https://www.hl7.org
  - HL7® FHIR® DEVDAYS June 2018

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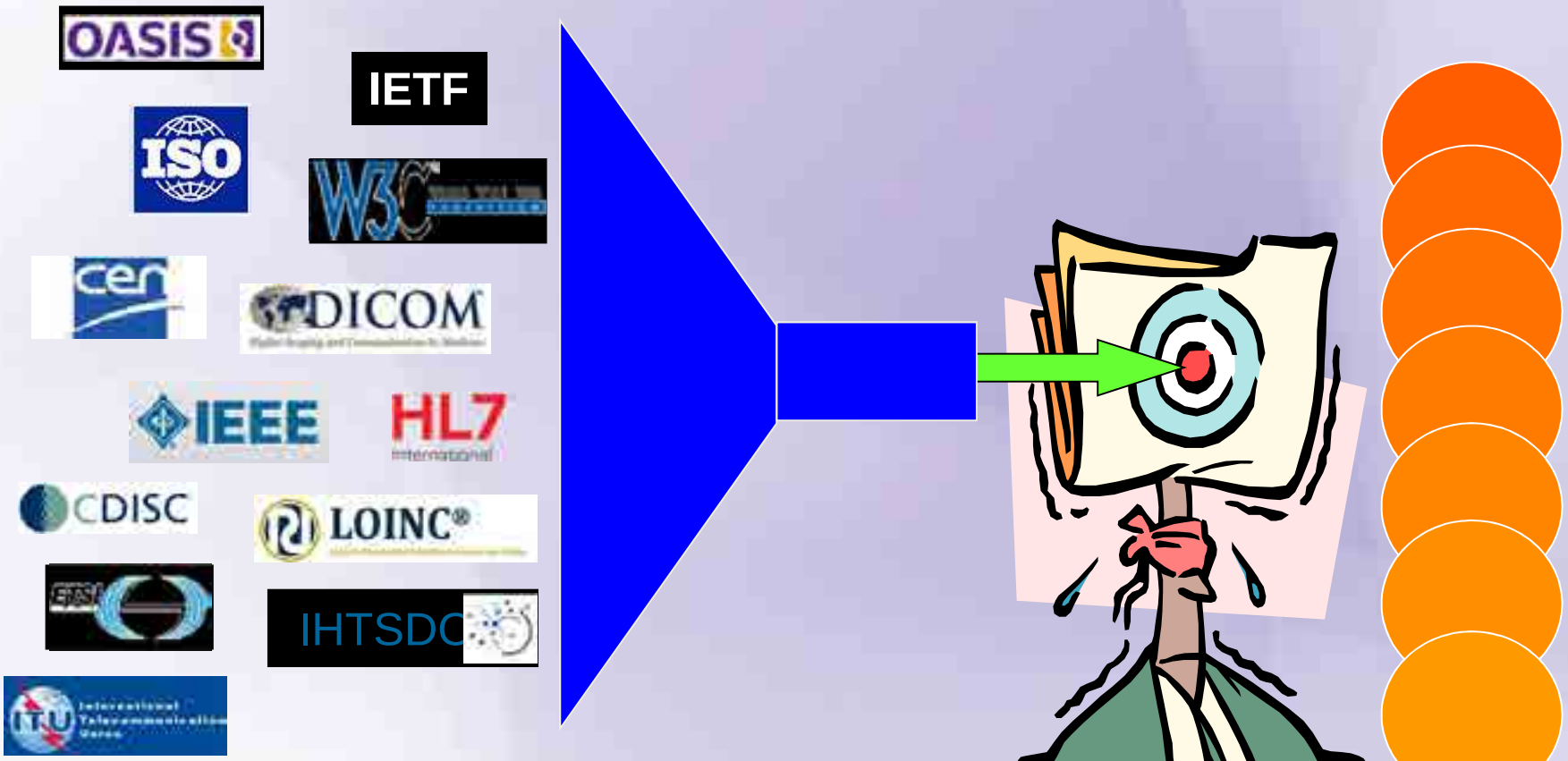
Interoperability:
Highest Cause of Health IT project failures

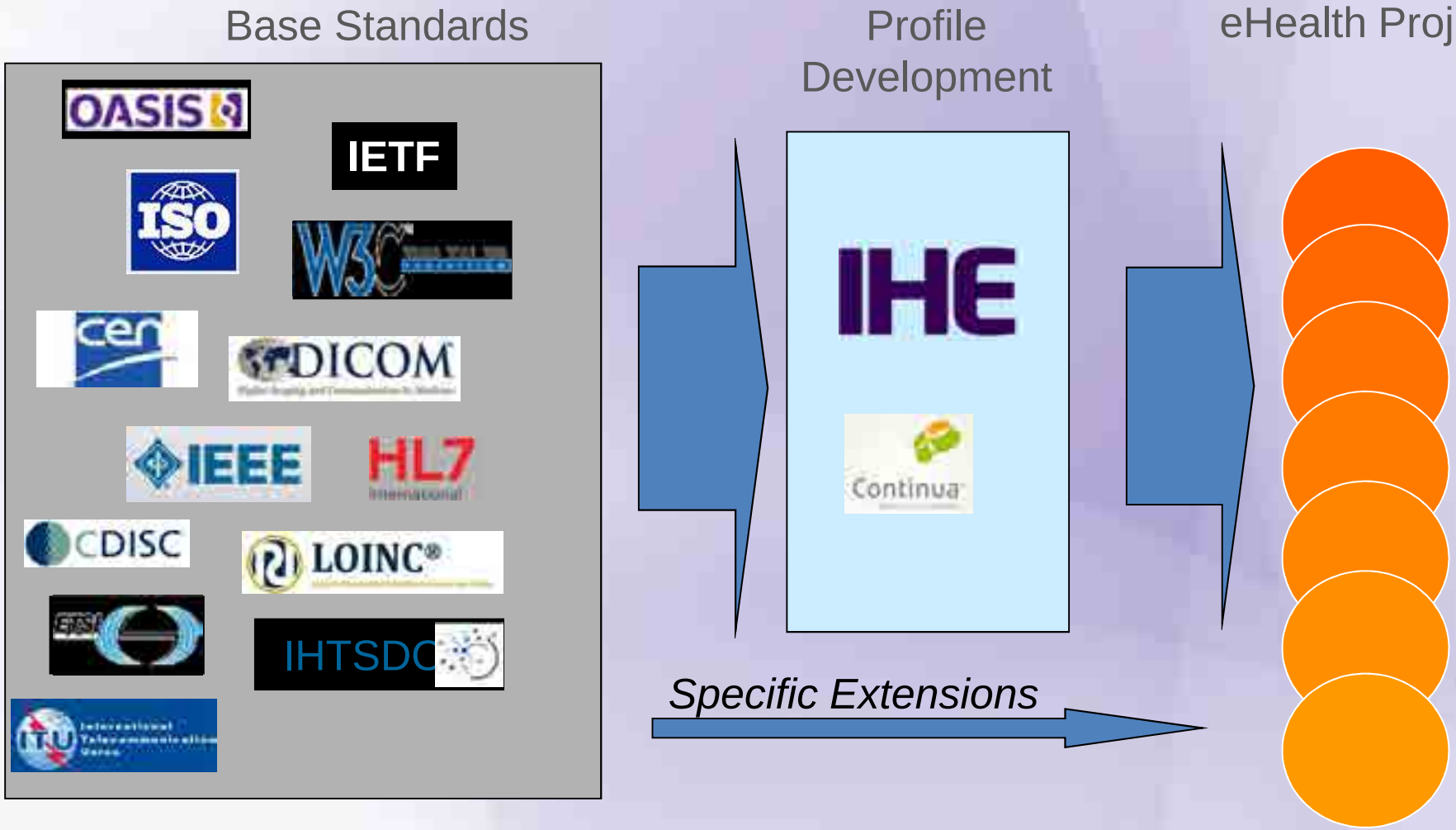
Base Standards

eHealth Projects



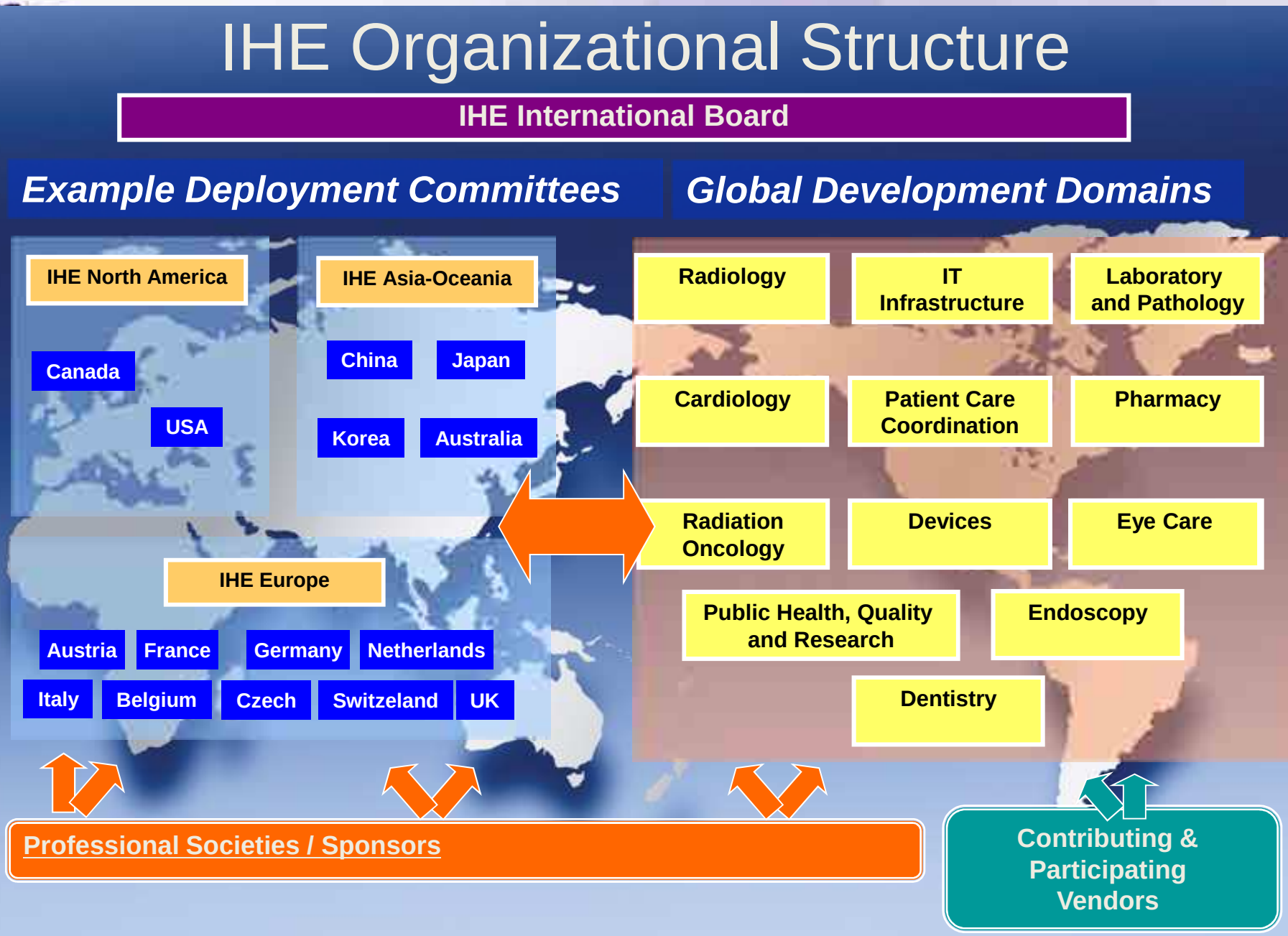
Health Interoperability Standards: how can we realize the promise ?

Interoperability: From a problem to a solution

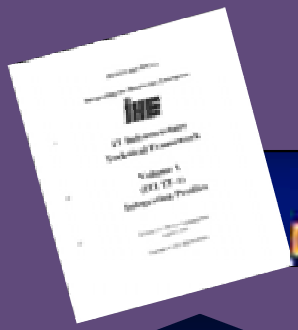


Profiling Organizations are well established

IHE Organizational Structure



IHE methodology (ISO TR 28380-1 to 3)



Profile Development

Identify available standards

Use Case

Products

Testing at Connectathons

ISO17025 accredited
World-wide equivalence

Products declare IHE

Projects

RFPs with IHE reqs

Easy to integrate products

IHE methodology (ISO TR 28380-1 to 3)

Projects

Products

esting at Connectathons

Products declare IHE

RFPs with IHE reqs

standards

Pillar 1:

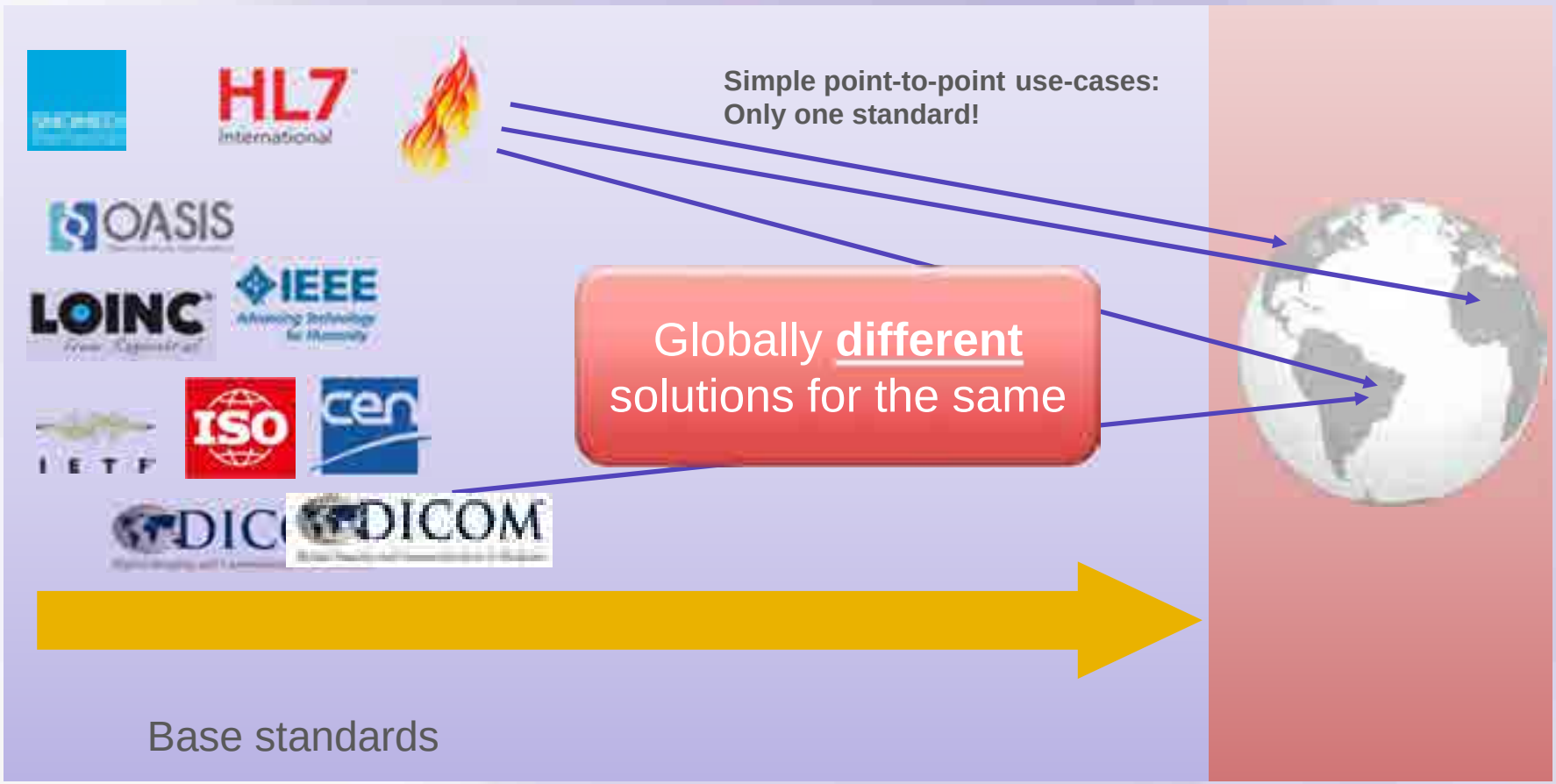
Profile Development

Use Case

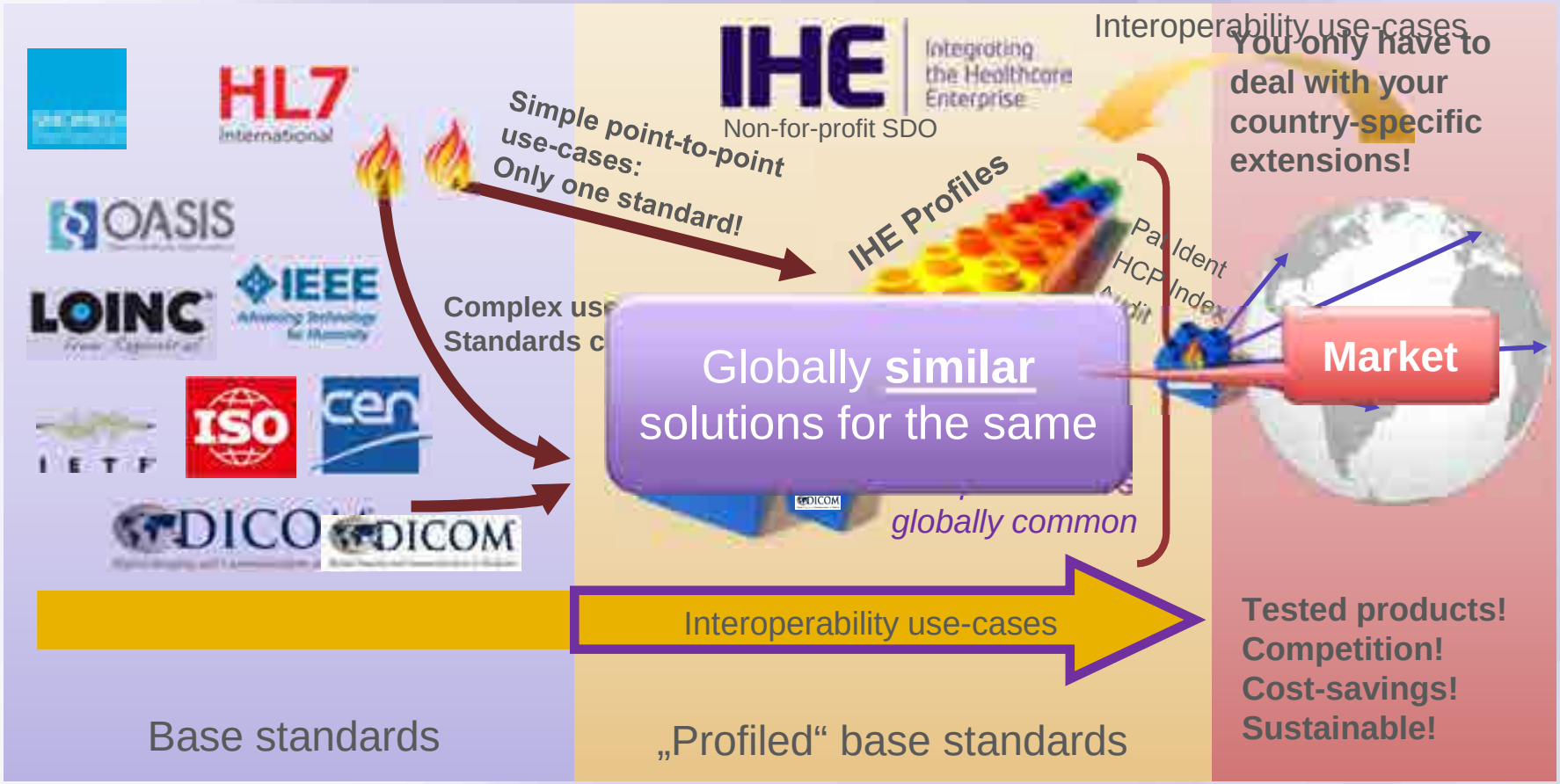
Easy to integrate products

IHE methodology (ISO TR 28380-1 to 3)

How IHE works

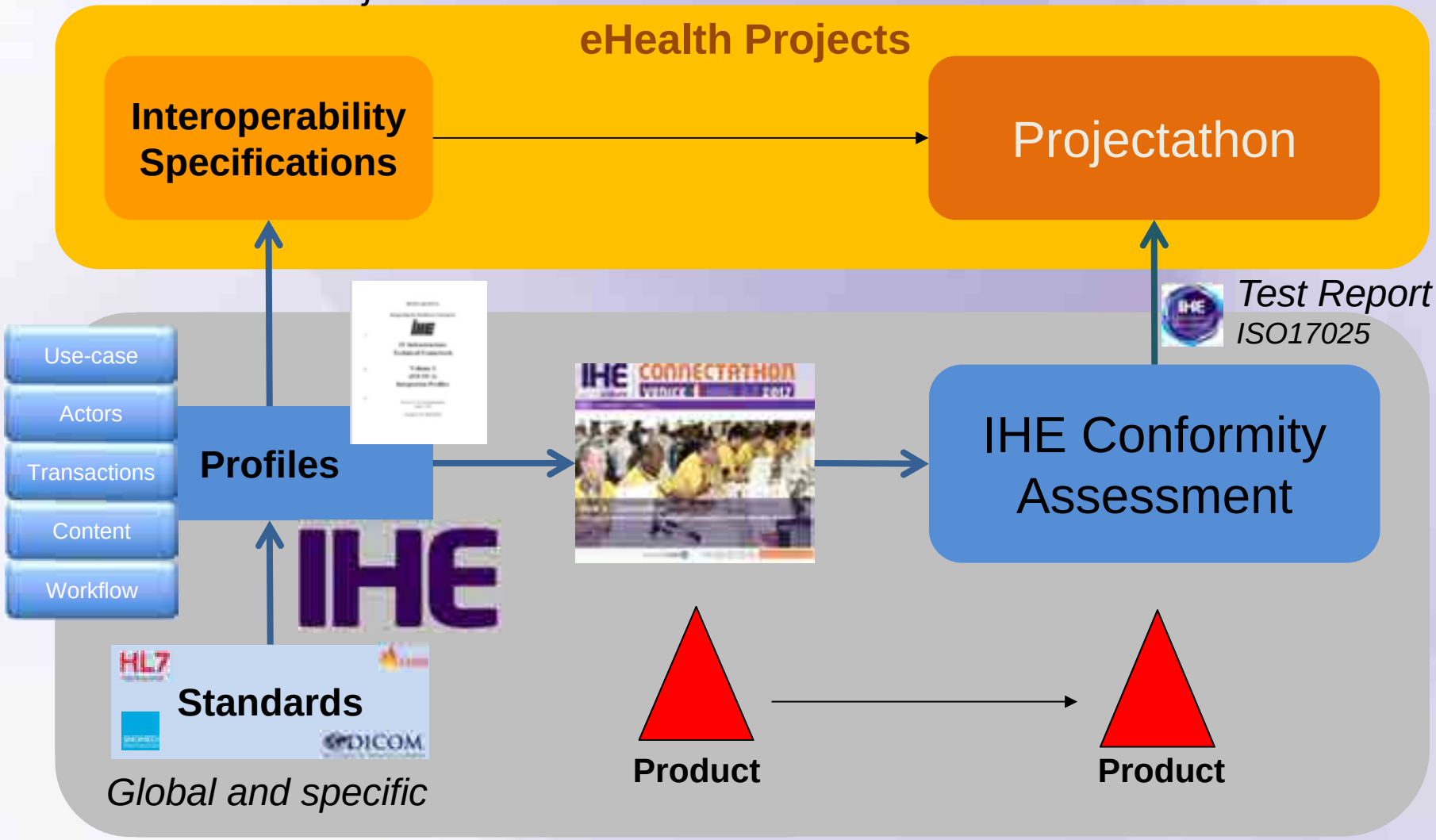


How IHE works



Conformity and eHealth Projects

Focused on the Project



Polling Question 1

To which extent do you agree that IHE acts “standardizing” up to the point of testing and deployment?

- ❑ Crucial important to maximize efficiency and minimize costs
- ❑ See the benefit, but doing it on their own is equally good
- ❑ This is absolutely unnecessary and not relevant

IHE Domains

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

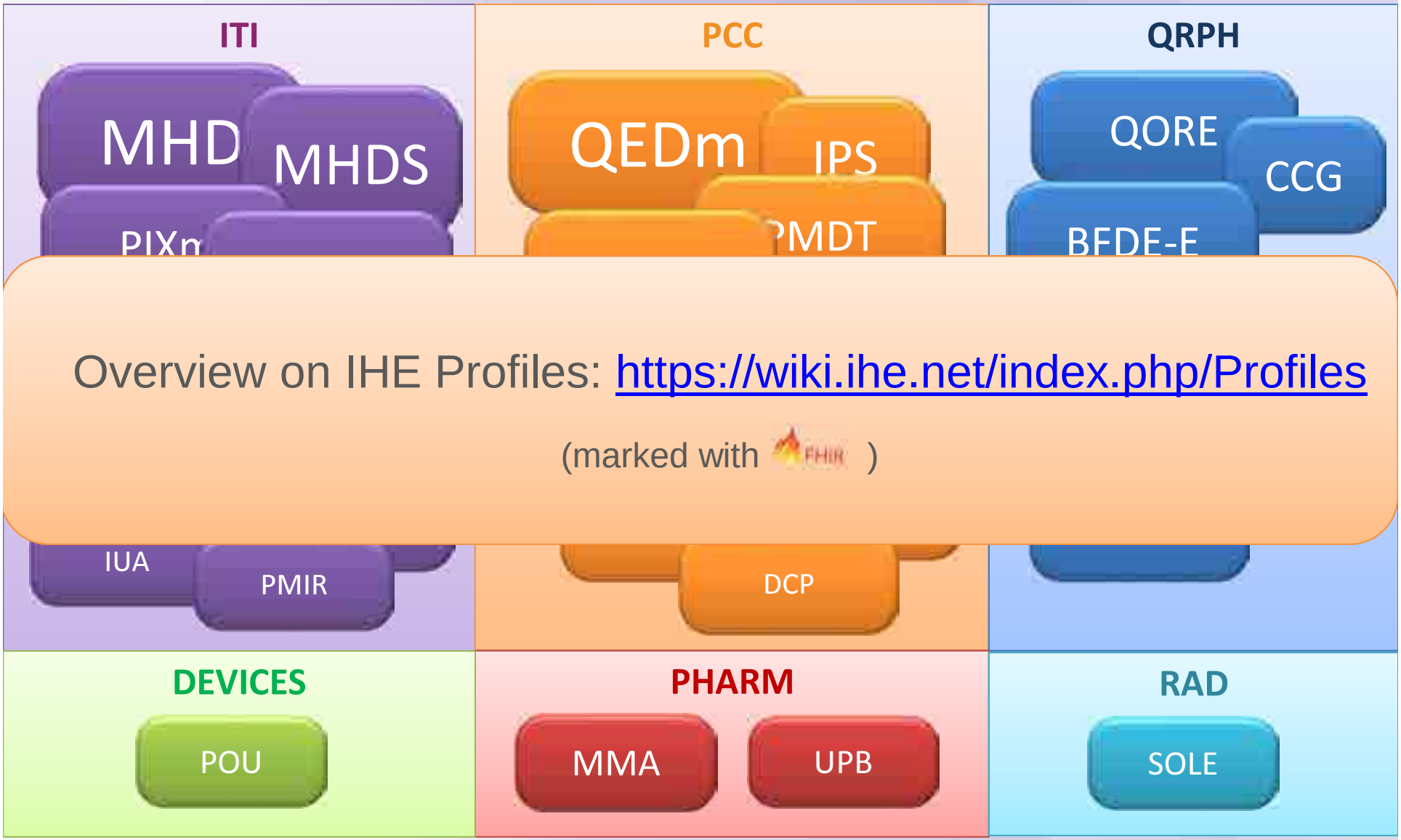
Source: https://www.ihe.net/IHE_Domains/

* Marked in orange are domains using FHIR

Mobile

- Most profiles from IHE that leverage FHIR have the word “Mobile” in their title
- Indicates that FHIR was used
- Does NOT restrict the use to non-Mobile use

FHIR-based IHE profiles



IHE Profiles on FHIR®

IT INFRASTRUCTURE PROFILES

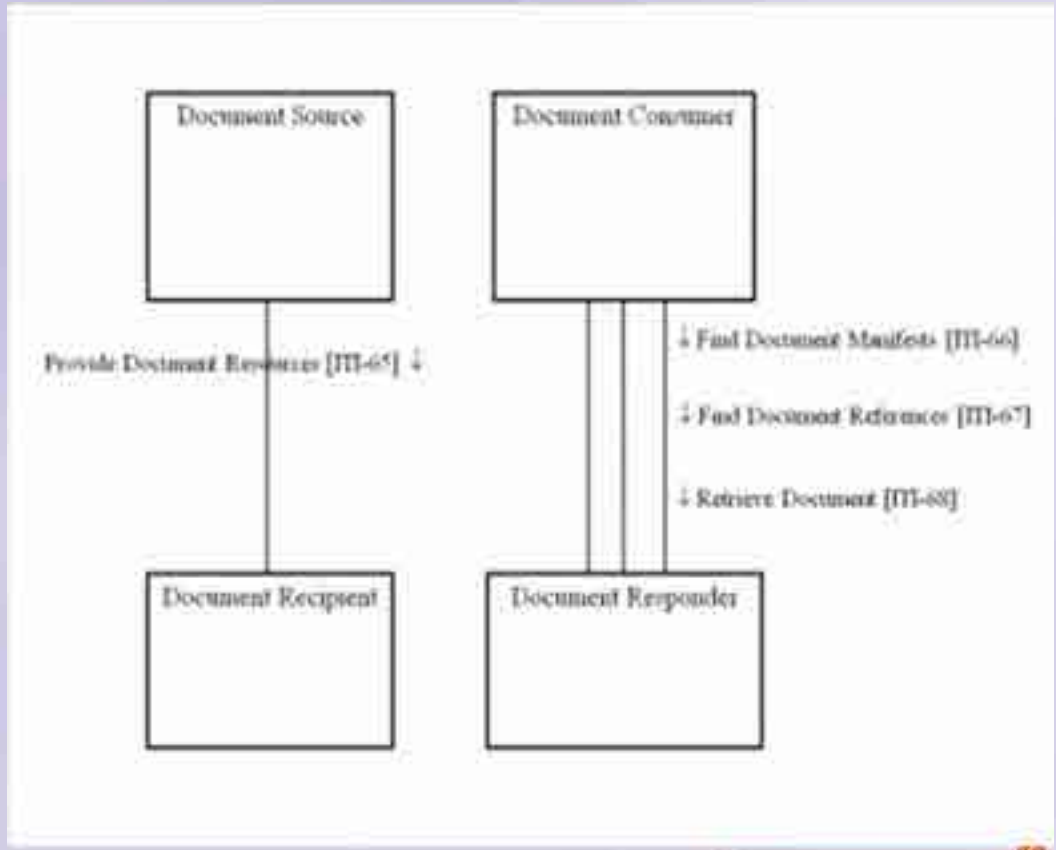
IT Infrastructure Profiles on FHIR

- **Mobile Access to Health Documents (MHD)***
- **Mobile Cross-Enterprise Document Data Element Extraction (mXDE)**
- **Non-patient File Sharing (NPFS)**
- **Patient Identifier Cross-reference for Mobile (PIXm)***
- **Patient Demographic Query for Mobile (PDQm)***
- Mobile Alert Communication Management (mACM)
- Mobile Care Services Discovery (mCSD)
- Audit Trail and Node Authentication (ATNA) - Query
- Internet User Authentication (IUA)
- Plus a few others: PMIR, MHDS, etc.

- Development started, at the same time as HL7 FHIR in 2011. Drove the HL7 work on specific resources as they evolved.
- And more profiles being developed….

Mobile Access to Health Documents (MHD)

- Defines FHIR interface to an XDS environment, and defines:
  - submit a set of documents and metadata from the mobile device to a document receiver,
  - find the document submission set metadata based on query parameters;
  - find document entries containing metadata based on query parameters, and
  - retrieve a copy of a specific document

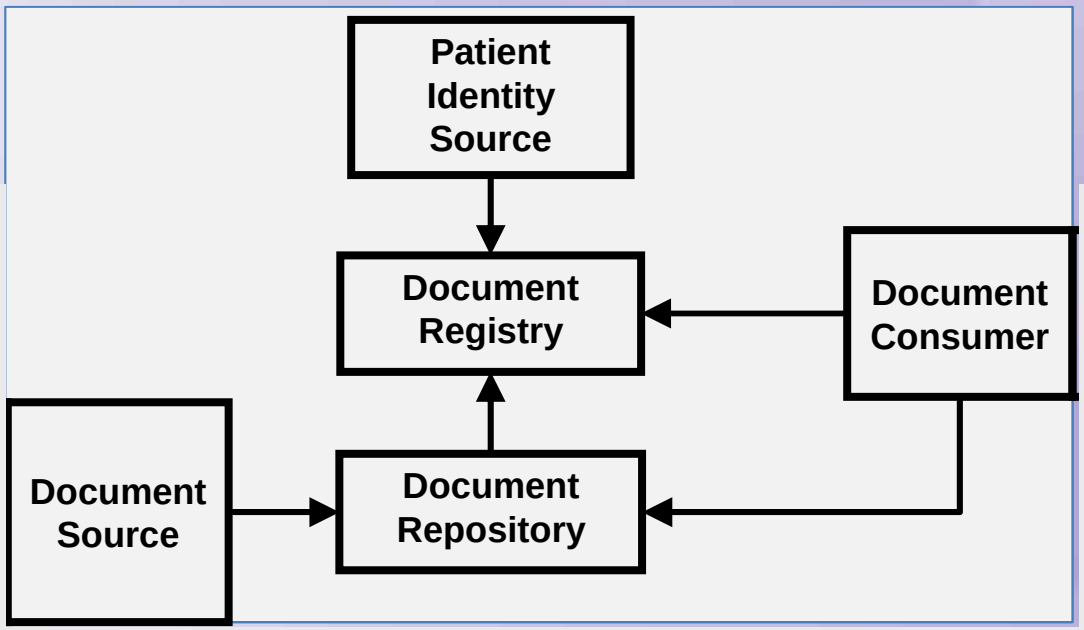


FHIR® Resources:

DocumentReference, DocumentManifest, List, Patient, Practitioner, OperationOutcome, Bundle

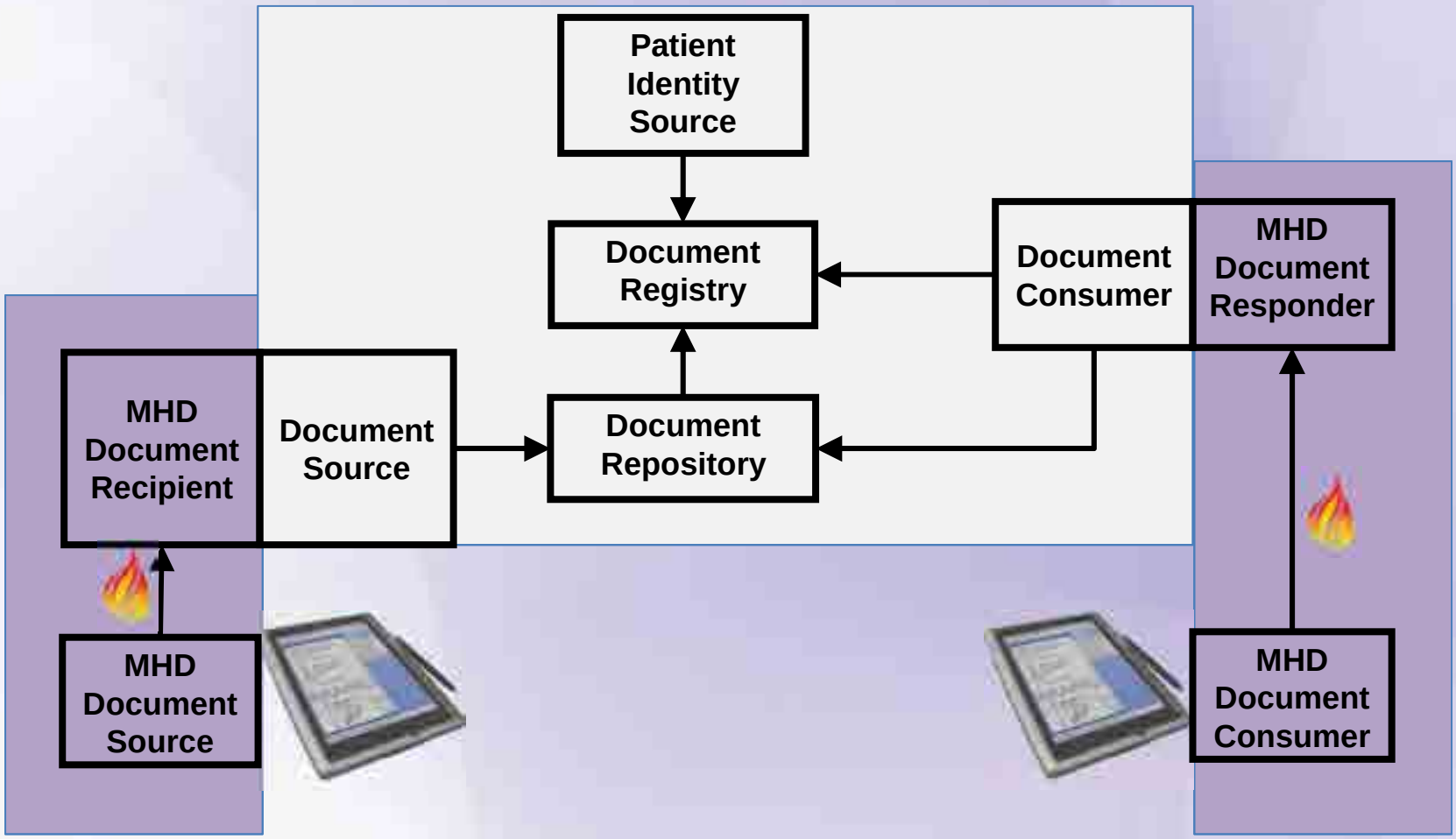
Source: https://wiki.ihe.net/index.php/Mobile_access_to_Health_Documents_(MHD)

XDS – Cross-enterprise Document Sharing



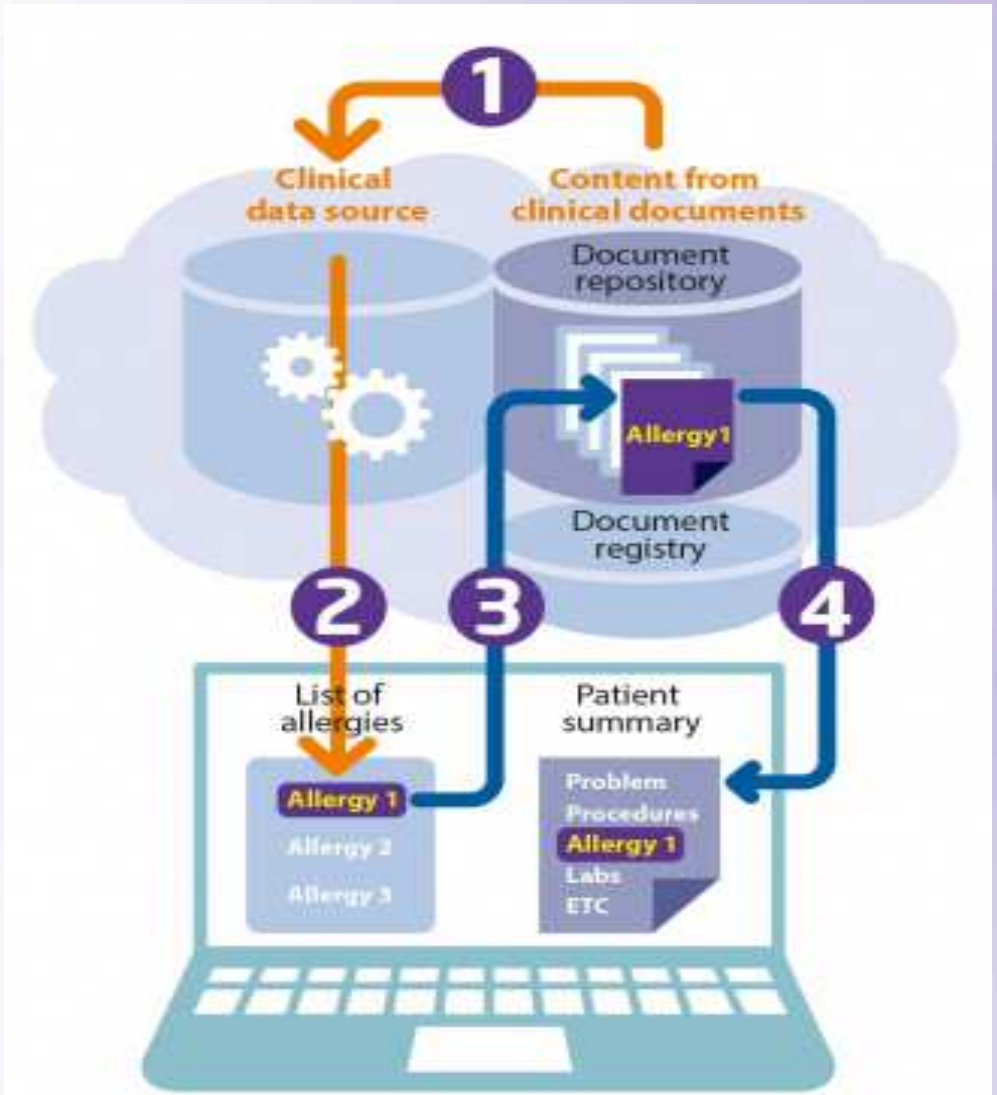
Source: https://wiki.ihe.net/index.php/Cross-Enterprise_Document_Sharing

Mobile Health Documents: MHD: *XDS-on-FHIR*



Source: https://wiki.ihe.net/index.php/Cross-Enterprise_Document_Sharing

Mobile Cross-Enterprise Document Data Element Extraction (mXDE)



- Provides means to access data elements extracted from shared structured documents
- Enables the deployment of health data exchange infrastructures where fine-grained access to health data coexists and complements the sharing of coarse-grained documents and the fine-grained data-elements they contain

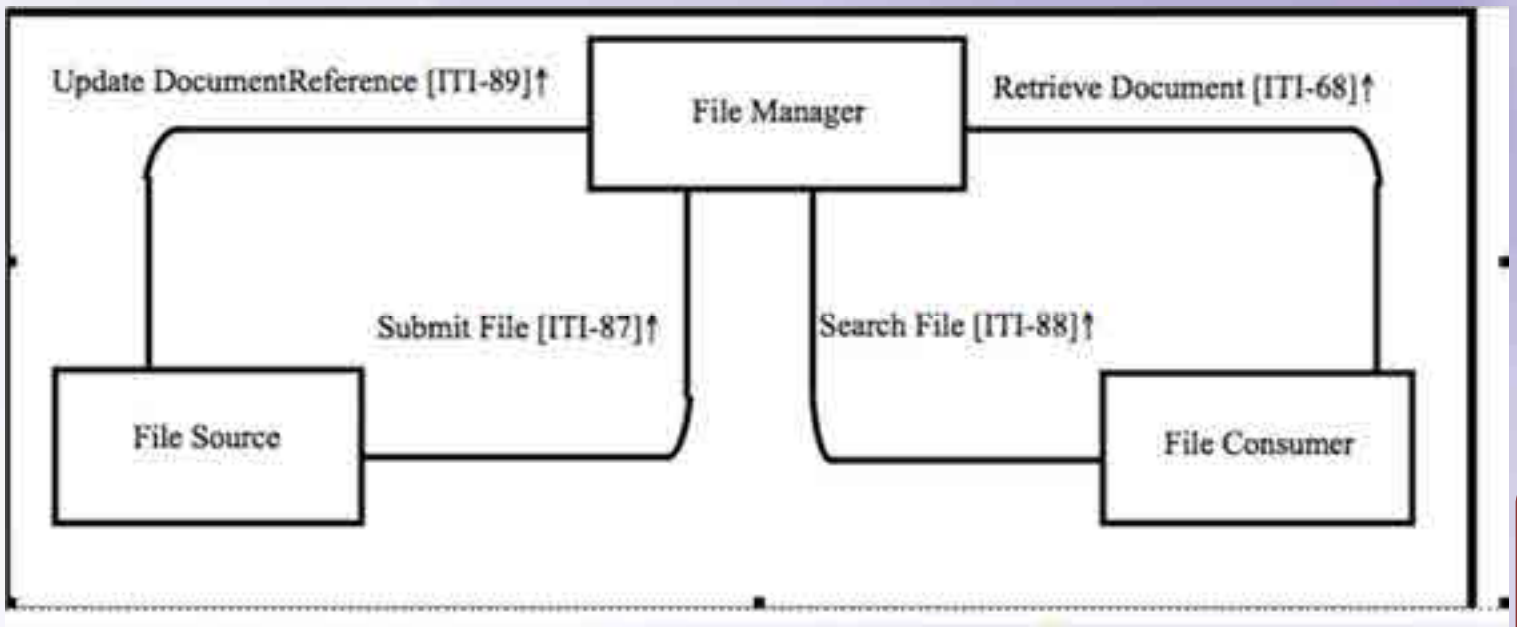
FHIR® Resources:

Observation, AllergyIntolerance, Condition, DiagnosticReport, Medication, MedicationStatement, MedicationRequest, Immunization, Procedure, Encounter, Provenance, OperationOutcome, Bundle

Source: https://wiki.ihe.net/index.php/Mobile_Cross-Enterprise_Document_Data_Element_Extraction

Non-patient File Sharing (NPFSm)

- Defines how to enable the sharing of non-patient files
- Files can be created, consumed and updated by many different systems involved in a wide variety of data sharing workflows



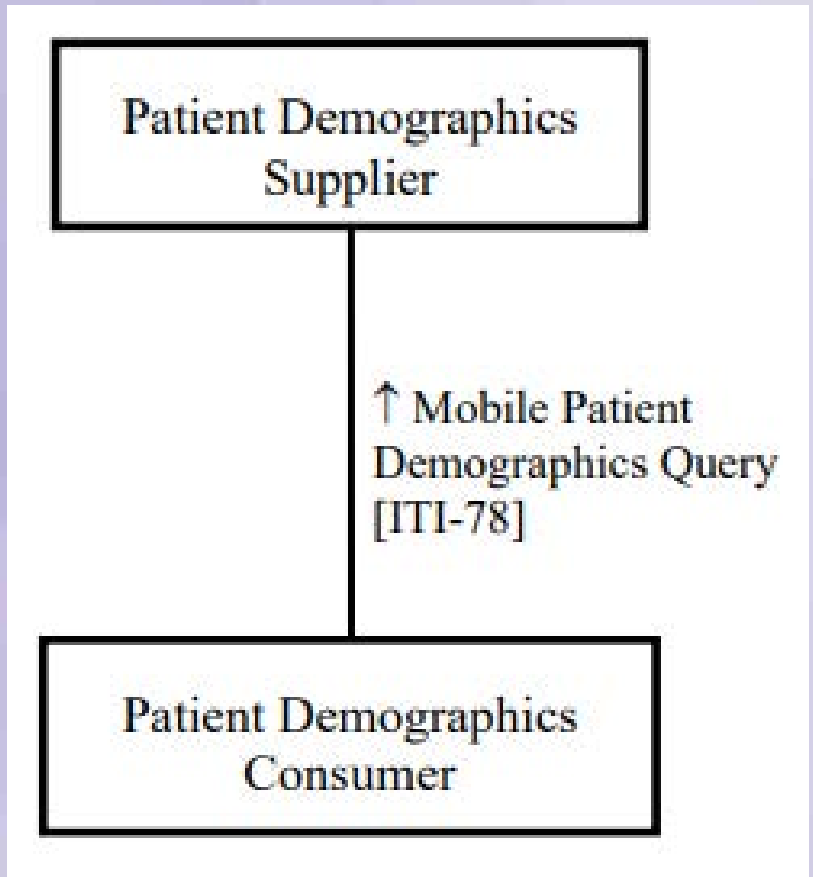
FHIR® Resources:

DocumentReference, OperationOutcome, Bundle

Source: https://wiki.ihe.net/index.php/Non-patient_File_Sharing_(NPFSm)

Patient Demographics Query for Mobile (PDQm)

- Defines interface to patient demographics supplier, to be used in many use cases:
  - A health portal securely exposing demographics data to browser based plugins
  - Medical devices which need to access patient demographic information
  - Mobile devices used by physicians (example bedside eCharts) which need to establish patient context by scanning a bracelet



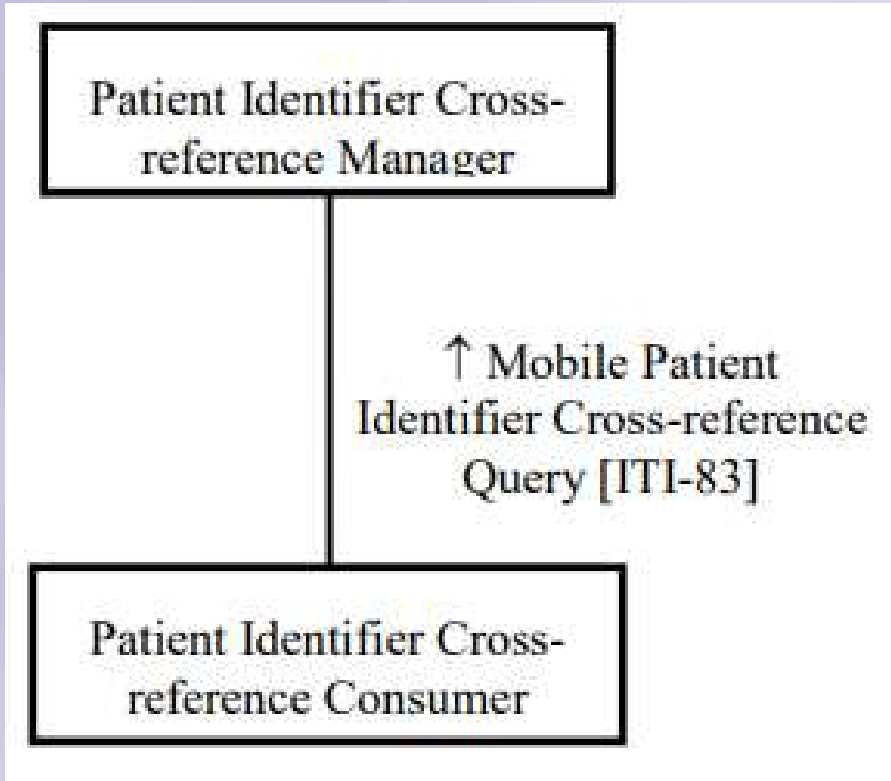
FHIR® Resources:

Patient, OperationOutcome, Bundle

Source: https://wiki.ihe.net/index.php/Patient_Demographics_Query_for_Mobile_(PDQm)

Patient Identifier Cross-Reference for Mobile (PIXm)

- Provides ability to query for list of patient identifiers based on the patient identifier in a different domain and retrieve a patient's cross-domain identifiers information
- Deals only with patient IDs - covers cases where you don't want to disclose/exchange more of the patient resource



FHIR® Resources:

Patient, Operation, Parameter, OperationOutcome, Bundle

Source: https://wiki.ihe.net/index.php/Patient_Identifier_Cross-Reference_for_Mobile_(PIXm)

IHE Profiles on FHIR®

RADIOLOGY PROFILES

Radiology Profiles on FHIR

- Standardized Operational Log of Events (SOLE)
- Special mention as these use complementary DICOM web (RESTful Resources):
  - Web Image Capture (WIC)
  - Web Image Access (WIA) formerly called MHD-I
  - Invoke Image Display (IID) - Special mention

Standardized Operational Log of Events (SOLE)

- Supports business intelligence tools
- Information often resides in several different systems, and there are not standard ways to obtain the information
- SOLE defines a way to exchange information about events that can then be collected and displayed using standard methods

FHIR® Resources:
AuditEvent, Bundle

Source: https://wiki.ihe.net/index.php/Standardized_Operational_Log_of_Events_(SOLE)

IHE Profiles on FHIR®

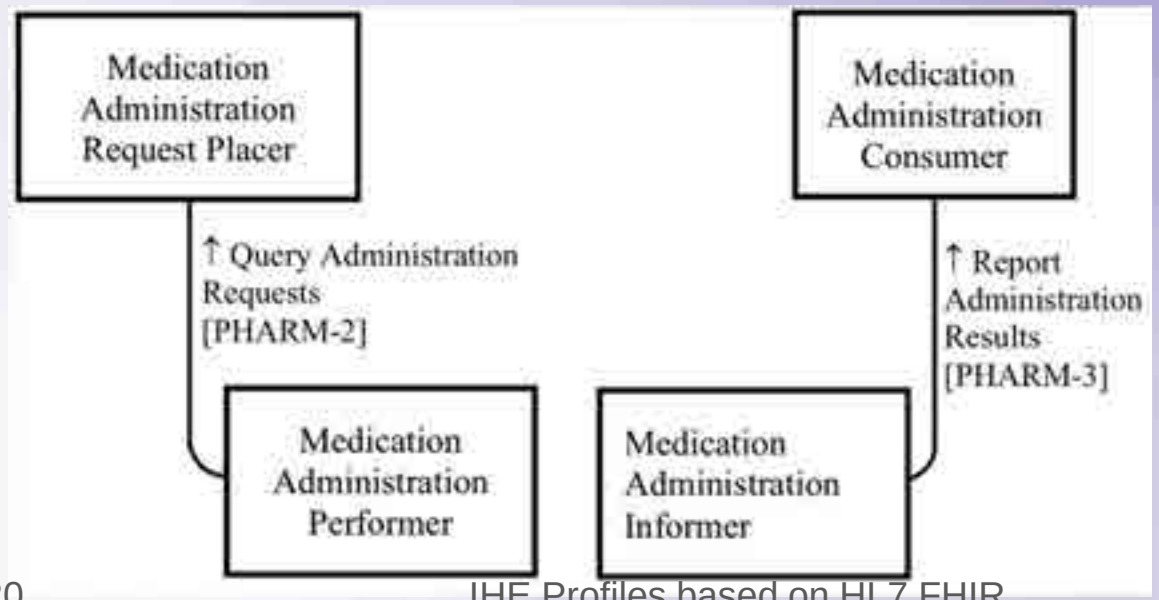
PHARMACY PROFILES

Pharmacy Profiles on FHIR

- Mobile Medication Administration (MMA)
- Uniform Barcode Processing (UBP)

Mobile Medication Administration (MMA)

- Populates the mobile device with a list of scheduled medications from the EHR
- Sends the report of administrations to the EHR or any other system
- Example Use Case
  - Patient app that receives scheduled administrations from the pharmacy system or hospital system, and reminds the patient



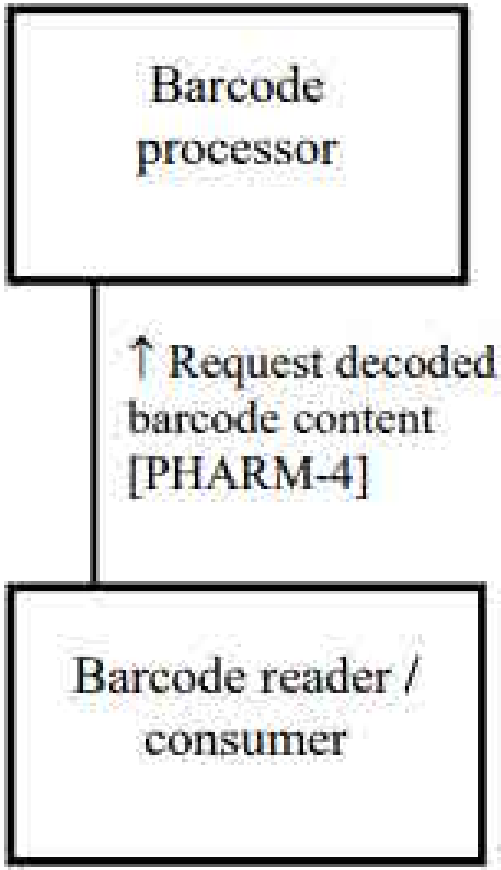
FHIR® Resources:

Patient, Medication, MedicationRequest, MedicationAdministration

Source: https://wiki.ihe.net/index.php/Mobile_Medication_Administration

Uniform Barcode Processing (UBP)

- Use of barcodes and other automatic identification and data capture (AIDC) in healthcare is increasing
- Barcodes contain data that is encoded in a certain way. In order to be able to use that data, software systems need to "understand" the barcode
- Defines a FHIR Operation
  - $decode-barcode(string, …)



FHIR® Resources:
Medication, Device, Patient

Source: http://www.ihe.net/uploadedFiles/Documents/Pharmacy/IHE_Pharm_Suppl_UBP_Rev1.0_PC_2017-10-19.pdf

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IHE Profiles on FHIR®

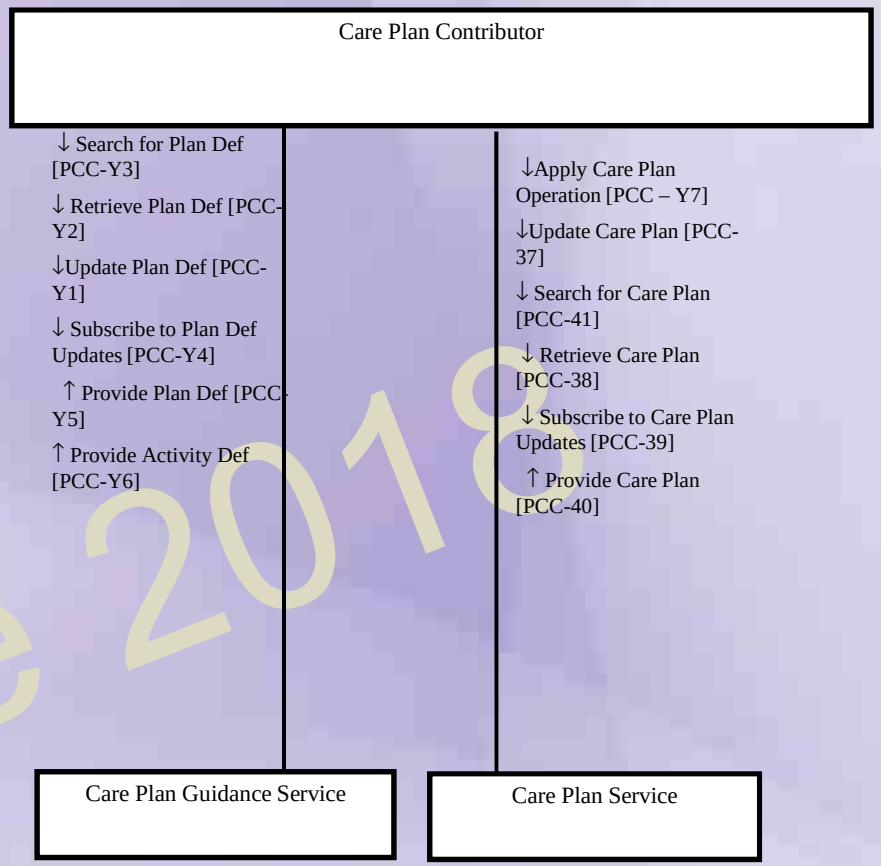
PATIENT CARE COORDINATION PROFILES

Patient Care Coordination Profiles on FHIR

- **Dynamic Care Planning (DCP)**
- **Dynamic Care Team Management (DCTM)**
- **International Patient Summary (IPS)**
- **Routine Interfacility Patient Transport (RIPT)**
- **Emergency Transport to Facility (ETF)**
- Query for Existing Data for Mobile (QEDm)
- Guideline Appropriate Ordering (GAO)
- Point of Care Medical Device Tracking (PMDT)
- Clinical Mapping (CMAP)
- A few others…

Dynamic Care Planning (DCP) - Update

- *Care Plans can be dynamically created from tools used to support evidence-base practice*
- Care Plans can be dynamically updated as the patient interacts with the healthcare system
- Provides structures and transactions for care planning
- Promotes sharing Care Plans that meet the needs of many, such as providers, patients and payers

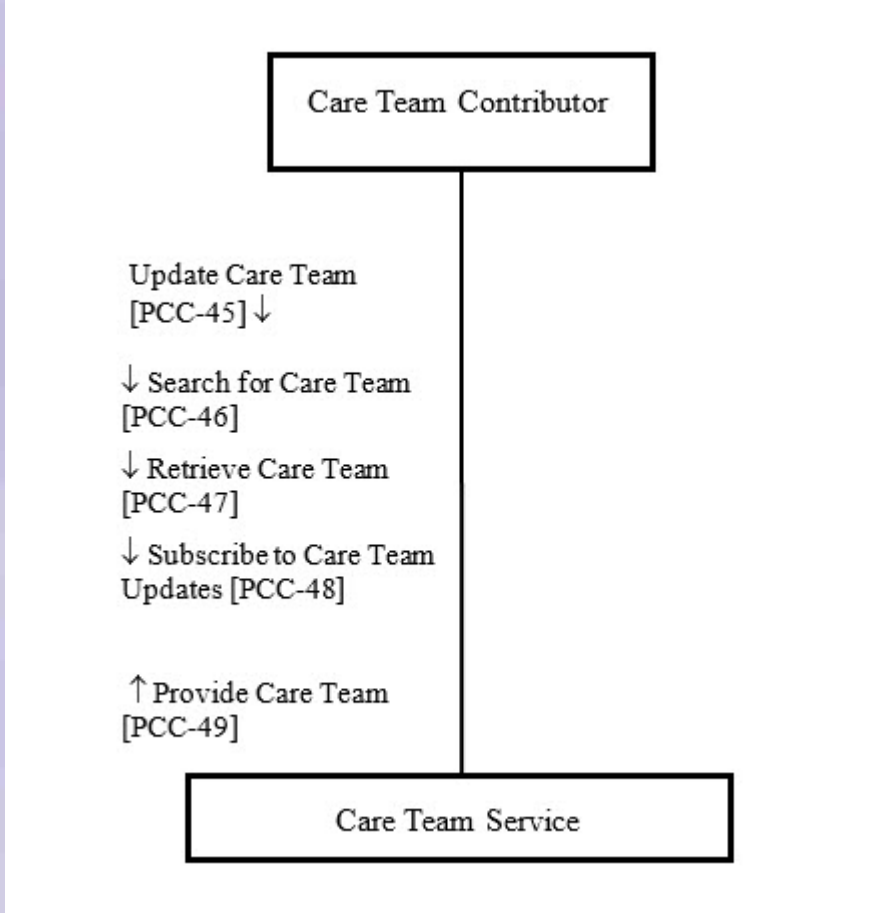


FHIR® Resources:

CarePlan, Subscription, PlanDefintion, ActivityDefinition

Dynamic Care Team Management (DCTM)

- Provide a mechanism to facilitate system interactions to support care team membership such as:
  - Discovering Care Teams
  - Creating/updating Care Teams
  - Listing Care Teams



FHIR® Resources:
CareTeam, Subscription

Source: https://wiki.ihe.net/index.php/Dynamic_Care_Team_Management

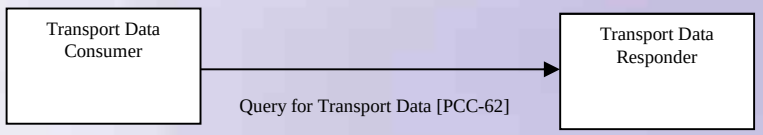
IHE International Patient Summary Profile

- Establishes a minimal yet non-exhaustive data set for a patient summary
- Supports Planned and Unplanned care both within and across borders
- Data set described is intended for global use
- This IHE IPS profile uses the HL7's IPS Implementation Guides that realize the CEN EN 17269 IPS dataset for both CDA and FHIR documents .
- It adds constrains applicable globally:
  - A complete IPS with no optional sections
  - Includes specification considerations for testing with options that support occupational data

FHIR® Resources:
Composition, Patient, Practitioner, MedicationStatement, Medication, AllergyIntolerance, Condition, Immunization, Procedure, Organization, DeviceUseStatement, Device, Observation, Specimen, Imaging Study, DiagnosticReport, CarePlan

Routine Interfacility Patient Transport (RIPT)

- Provides means of updating a Transport team with critical and necessary medical information on a patient to be transported
  - FHIR RESTful query
  - Document Sharing with
    - CDA template for RIPT



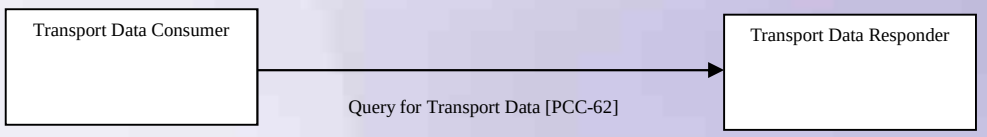
FHIR® Resources:

Patient, RelatedPerson, Coverage, Practitioner, Claim, AllergyIntolerance, Procedure, Immunization, MedicationStatement, ClinicalImpresion, DiagnosticOrder, DiagnosticReport, ImagingStudy, Observation, Condition, Location

Source: http://wiki.ihe.net/index.php/Routine_Interfacility_Patient_Transport

Emergency Transport to Facility (ETF)

- Provides means for Emergency Transport to inform destination Hospital with critical and necessary medical information on a patient to be transported
  - FHIR RESTful query
  - Document Sharing with
    - CDA template for RIPT



FHIR® Resources:

Patient, RelatedPerson, Coverage, Practitioner, Claim, AllergyIntolerance, Procedure, Immunization, MedicationStatement, ClinicalImpresion, DiagnosticOrder, DiagnosticReport, ImagingStudy, Observation, Condition, Location

IHE Profiles on FHIR®

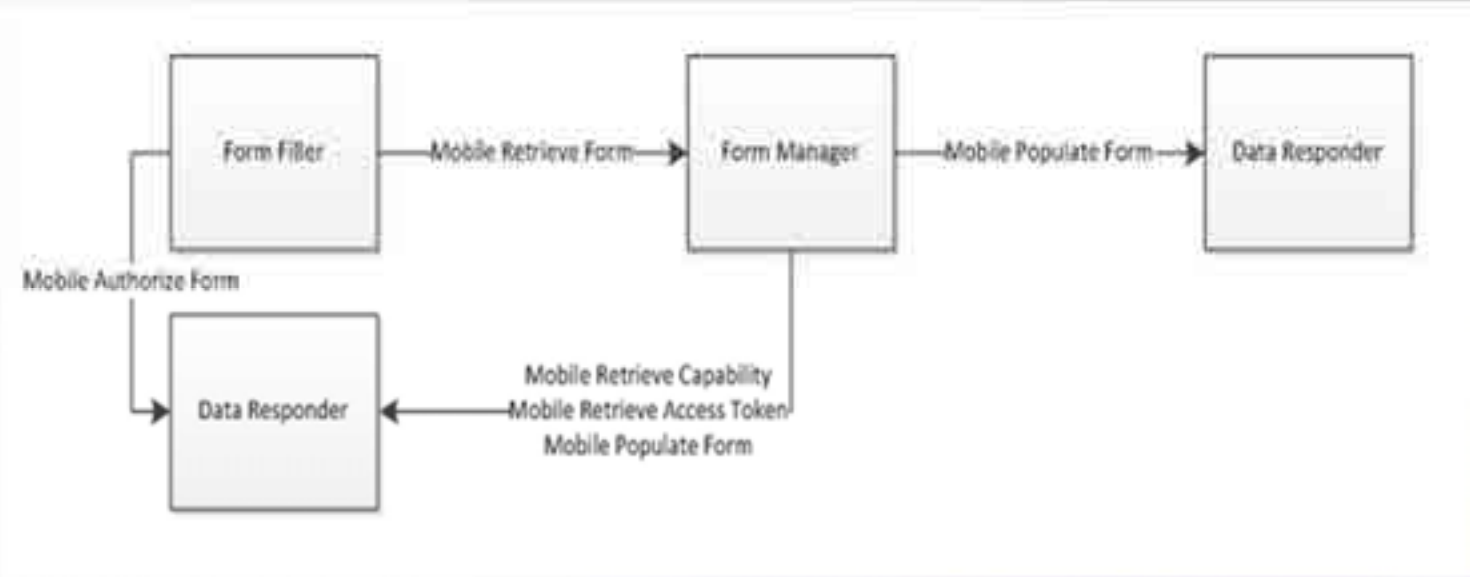
QUALITY, RESEARCH AND PUBLIC HEALTH PROFILES

QRPH Profiles on FHIR

- Mobile Retrieve Form for Data Capture (mRFD)
- Vital Records Death Reporting (VRDR)
- Birth and Fetal Death Reporting – Enhanced (BFDE)
- Quality Outcome Reporting for EMS (QORE)

Mobile Retrieve Form for Data Capture (mRFD)

- Provides a method for gathering data within a user's current application to meet the requirements of an external system
- Supports retrieval of forms from a form source, display and completion of a form, and return of instance data from the display application to the source application



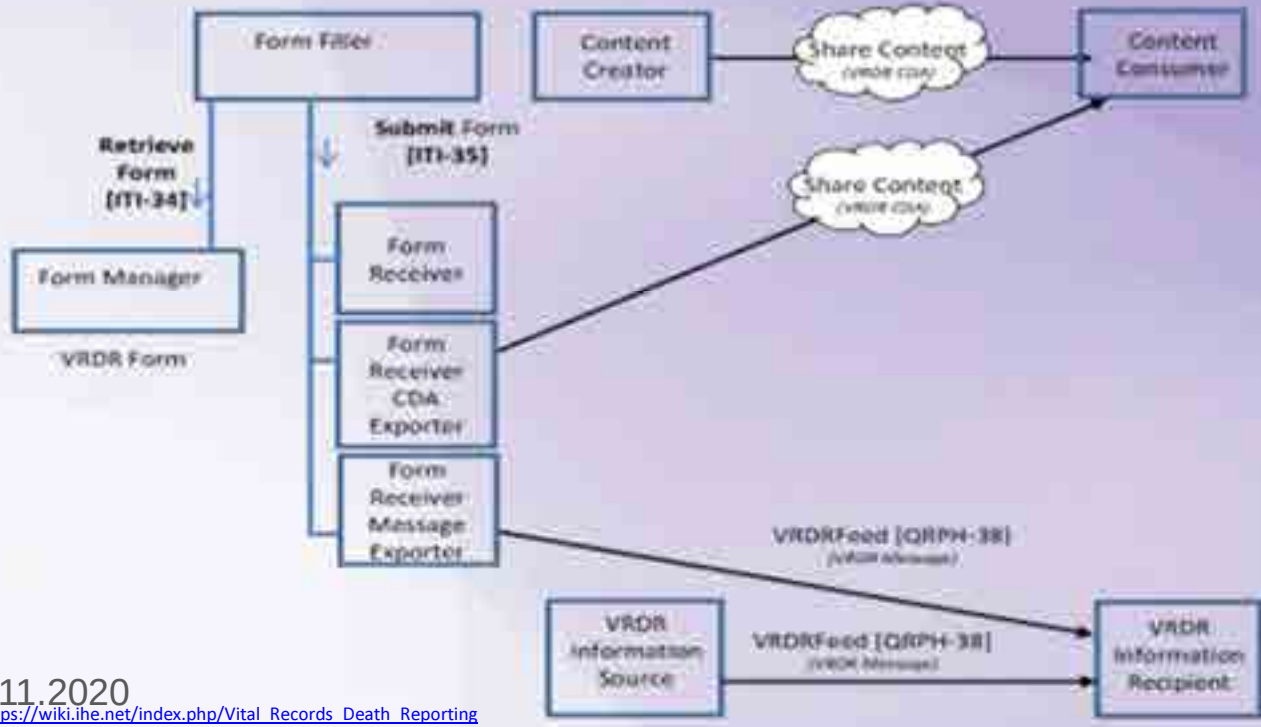
FHIR® Resources:

Bundle, ANY resource
* Also uses SMART on FHIR

Source: https://wiki.ihe.net/index.php/Mobile_Retrieve_Form_for_Data_Capture

Vital Records Death Reporting (VRDR)

- Supports pre-population of data from electronic health record systems to electronic vital records systems for death reporting
- Establishes interoperable electronic exchange of VR data between EHR and VR Systems
- Higher quality data for demographic and epidemiologic surveillance and research



FHIR® Resources:

Patient, Composition, Condition, Observation, Practitioner, Patient, Procedure, RelatedPerson, Location

Source: https://wiki.ihe.net/index.php/Vital_Records_Death_Reporting

Birth and Fetal Death Reporting – Enhanced (BFDE)

- Supports pre-population of data from electronic health record systems to electronic vital records systems for birth and fetal death reporting
- Establishes interoperable electronic exchange of VR data between EHR and VR Systems
- Higher quality data for demographic and epidemiologic surveillance and research
- …

FHIR® Resources:

TBA

Quality Outcome Reporting for EMS (QORE)

- Supports transmission of clinical data for use in calculating Emergency Medical Services Quality measures
- Establishes interoperable exchange between EMS and EHR systems

FHIR® Resources:
TBAComposition, Patient, AllergieIntolerance, Procedure, Medication Statement, Medications Administration, Clinical Impression, Diagnostic report, Encounter, Observation, Condition, Location, Document Reference, Device

Polling Question 2

Which of the FHIR-based IHE Profiles would you deem most relevant in the next years?

(Check all that apply)

- ❑ Patient related profiles: PIXm, PDQm,
- ❑ FHIR based access to XDS by MHD
- ❑ Fine grain access to health information with mXDE
- ❑ Radiology related around DICOMweb: WIC, WIA, IID
- ❑ The “public health” related profiles (QRPH)
- ❑ International Patient Summary (IPS)

Gemini

A Joint Initiative of IHE and HL7 to Advance Use of FHIR for Interoperability

Mandate, Mission, Parity

- **Mandate**
  - Project GEMINI operates under the Statement of Understanding between IHE and HL7
- **Mission**
  - Tighten collaboration between IHE and HL7 in the context of FHIR
- **Parity**
  - **GEMINI is a „Joint“ IHE / HL7 project**
  - Joint ownership and steering under equal parity
- **Main work**
  - Coordinate! Establish connections!

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Global Consortium for eHealth Interoperability

HIMSS | IHE International | HL7 International

Global Consortium for eHealth Interoperability (GCeHI)

- **GCeHI is a joint initiative by HIMSS, IHE and HL7.**
- Launched at ONC Annual Meeting in Washington, D.C, January 27, 2020
  - https://www.himss.org/resource-news/announcing-global-consortium-ehealth-interoperability
- Rapidly advance global digital health efficiency through next generation API-based interoperability
- Founded to become a global community
  - Collaborate to succeed!

GCeHI

- Future work (emerging ideas)
  - GCeHI Portal
  - More listening sessions
  - Interoperability dashboard (Info on projects)
  - Global master standards list (info on established standards)
  - Interoperability measurement/maturity models
  - Shared use cases, best practices around implementation/deployment

- Plus: Work-items brought by participants, e.g.
  - Coordinated work on new standards / blueprints

Everything which is too big/complex for one of the organizations alone

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IHE Profiles on FHIR®

CONCLUSIONS

IHE on FHIR and DICOMweb

- http RESTful standards by HL7 and DICOM
- 33 IHE Profiles and growing:
  - IT Infrastructure (ITI) - 11
  - Patient Care Coordination - 11
  - Pharmacy - 2
  - Quality, Research and Public Health - 7
  - Radiology – 1
  - Devices – 1

Get Involved

Join IHE by visiting: https://www.ihe.net/
IHE Deployment Committees Worldwide

- North America
  - Canada
  - USA
- South America
  - Brazil
- Asia Pacific
  - Australia
  - China
  - Japan
  - Korea
  - Taiwan
- Middle East
  - Saudi Arabia

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

Links

- **FHIR @ IHE**
  - https://wiki.ihe.net/index.php/Category:FHIR
  - http://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_Appx-Z.pdf
- **Gemini**
  - https://confluence.hl7.org/display/GP/Project+Gemini
- **Global Consortium for eHealth Interoperability (GCeHI)**
  - http://globalhealthinterop.org

Links

- IHE Homepage
  - http://www.ihe.net/
  - http://www.ihe-europe.net/
- IHE Wiki
  - http://wiki.ihe.net/

- IHE International Social Media
  - YouTube channel: https://www.youtube.com/user/IHEIntl
  - IHE Webinars: http://www.ihe.net/Webinars/
  - Twitter: https://twitter.com/IHEIntl
- Google groups
  - https://groups.google.com/forum/#!search/ihe

Questions?

IHE EUROPE

Integrating the Healthcare Enterprise

Making Healthcare Interoperable

http://www.ihe.net