

INTEROPERABILITY & HL7 FHIR MASTER CLASS + IPS HIE PLUGATHON

📅 7-8 November 2025 📍 Jumeirah Emirates Towers, Dubai, UAE

Interoperability testing approaches

Dr Alexander Berler

Strategic Business Development Director, IHE Catalyst, Belgium

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Alexander Berler

Alexander, Strategic Business Development Director, IHE Catalyst AISBL, has an MSc in Biomedical Engineering and a PhD in Medical Informatics. He was affiliated with the Electrical Engineering Department, National Technical University of Athens, Greece, as a Postgraduate Student and Research Associate in the areas of healthcare information systems interoperability, medical informatics and telemedicine until 1999.

He has worked at Information Society SA, the Greek official governmental information technology project office, as a Project Director responsible for large healthcare informatics projects of the Greek government until 2006. He has participated in multiple eHealth consulting projects in Greece, Cyprus, Luxembourg, Belgium, Ireland, Czech Republic, Slovakia, Canada, USA, Latin America, DG Santé EU Commission, eHealth Network – JAseHN- EU Commission and many more. He is an active member of the eHealth DSI community on the creation of tools for cross border healthcare across Europe and beyond. He is also acting as the Strategic business development Director on behalf of IHE Catalyst, promoting the use of international standards via the IHE Technical frameworks and Integration profiles. He is a member of several societies, institutes and organisations (IEEE, ACM, etc.), a member of several IHE Europe Committees and the Vice Chair of HL7 Hellas, the Greek HL7 International Affiliate



- IHE Methodology
- Use-case driven approach and how this leads into an eHealth Interoperability Framework
- Interoperability Testing
- Successful large-scale testing happening globally



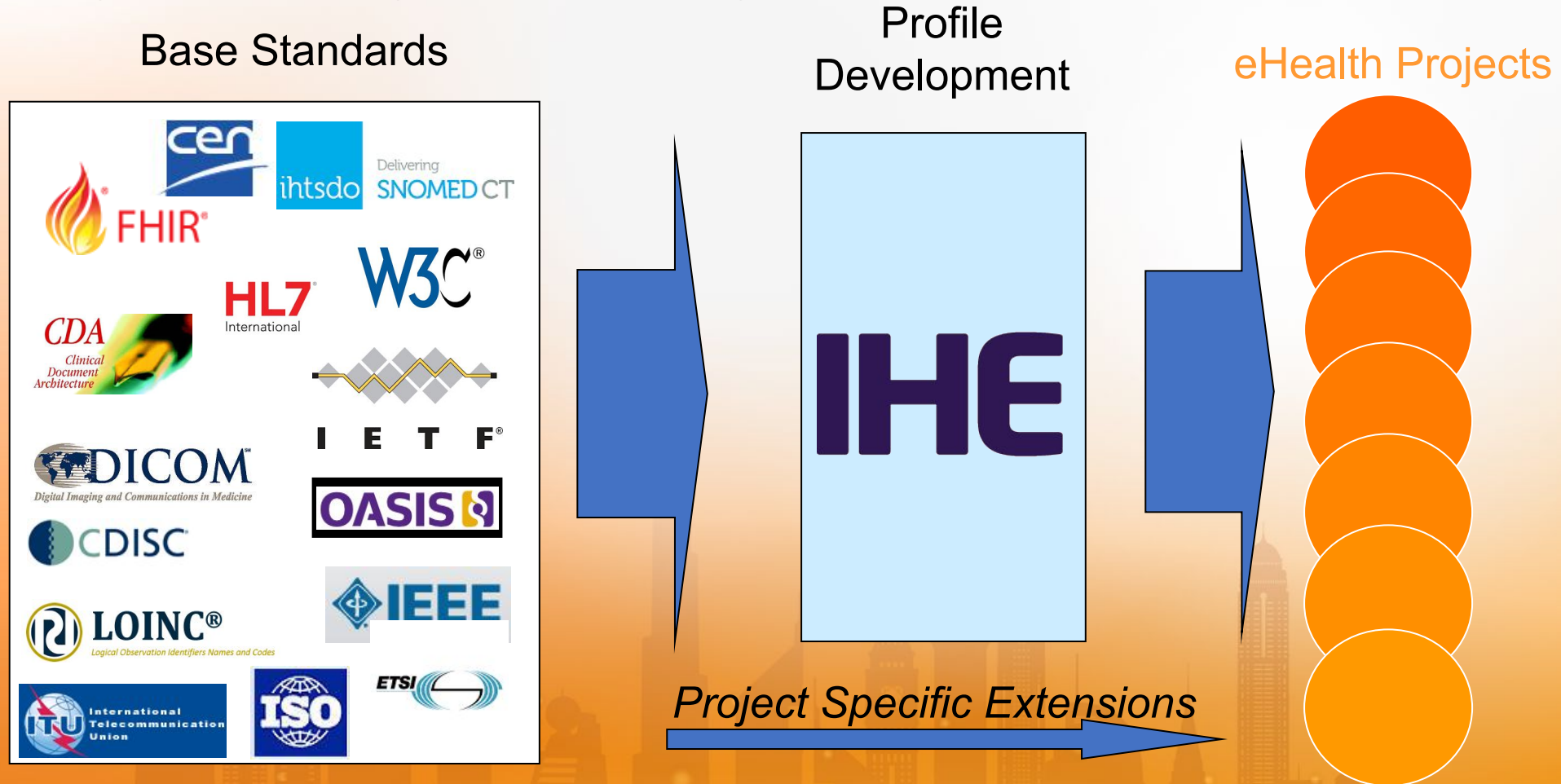
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How does IHE work: Connecting Standards to Care

- 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

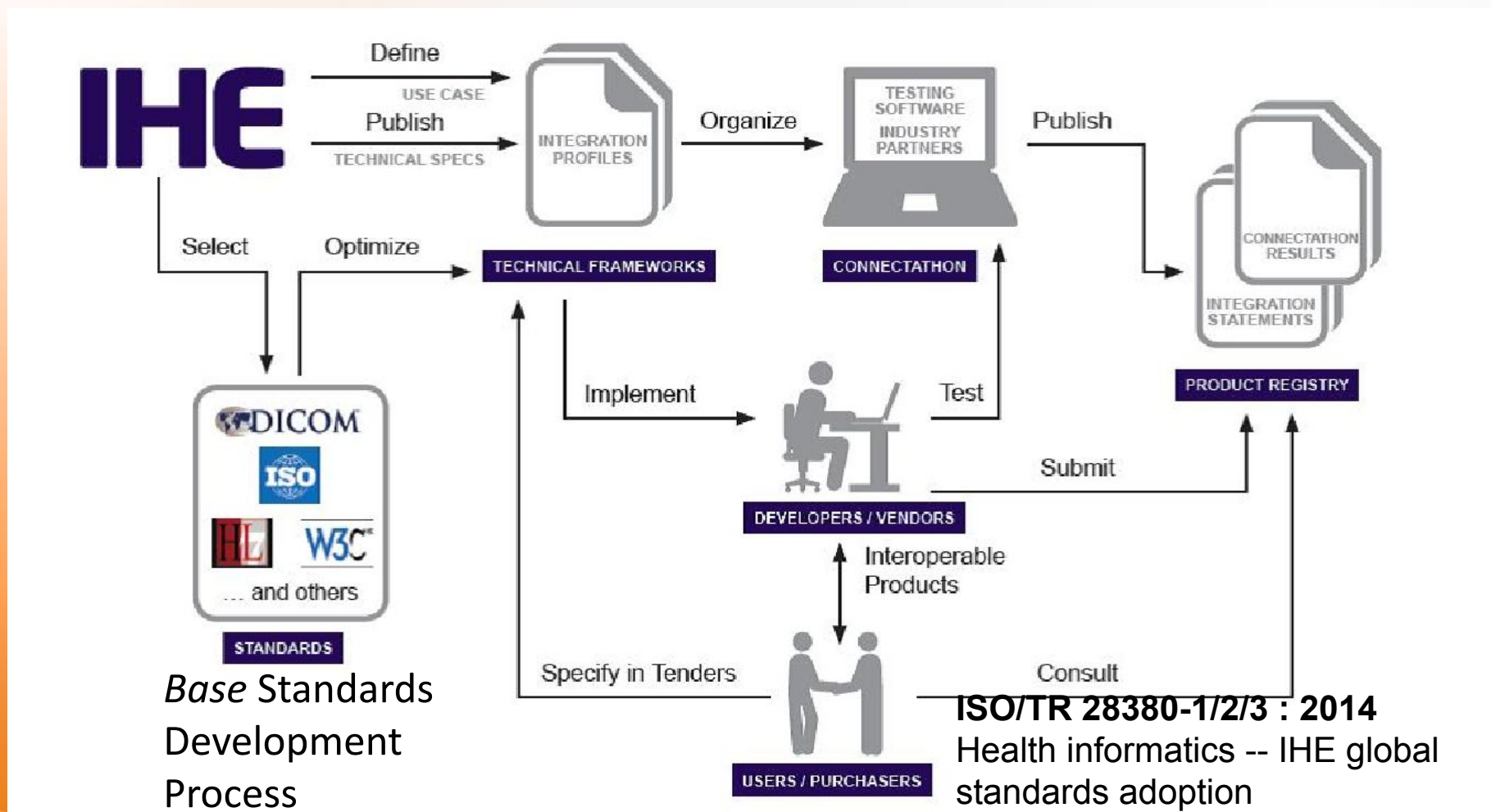
IHE: A forum for agreeing on how to implement standards and processes for making it happen

Interoperability: From a problem to a solution



Profiling Organizations Are Well Established

IHE Profile Base Standards Development Process



Use of International Standards for EHRs and HIEs is mostly based on IHE profiles



HIMSS Europe Event
June 2024 Rome

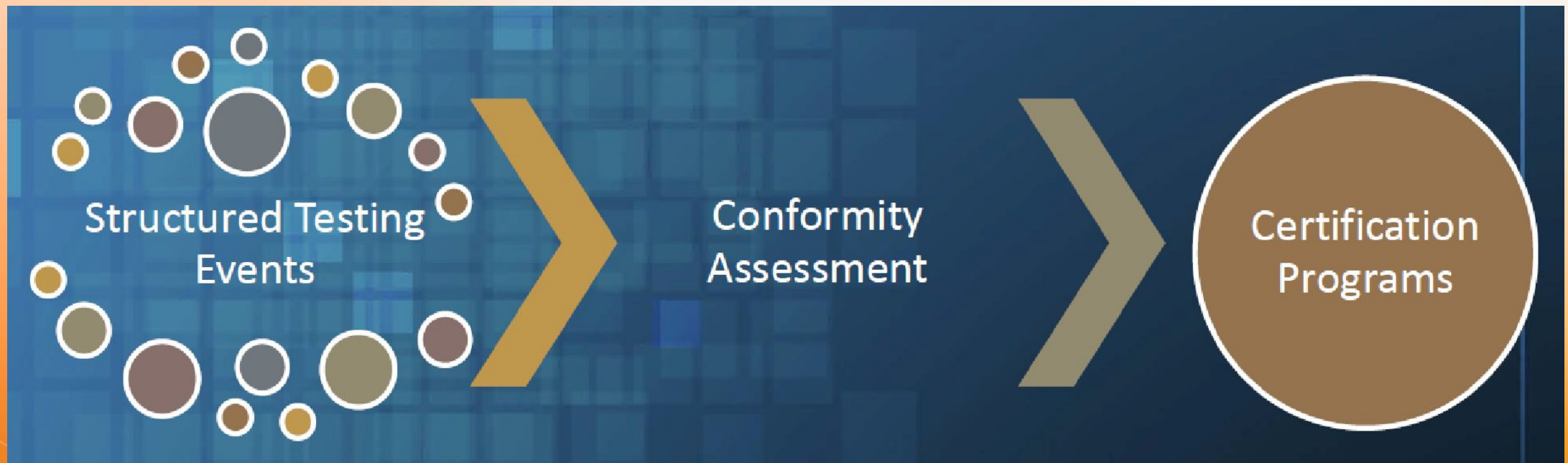


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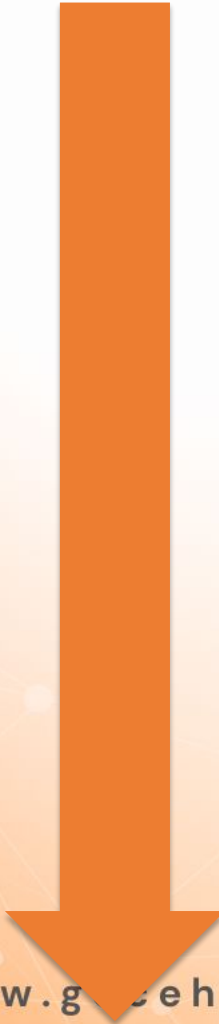
What reasons ehealth programs/projects for controlling interoperability?

- ***Solution choice***: Enables procurement of the IT systems from different organizations, vendors or open source, initially and over time (replacement, future proofing)
- ***Consistent security and privacy***: Policies are simpler to deploy when relying on same interoperability technical measures
- ***Quality in exchange and information***: Reduces finger pointing between:
 - care providers and health policy makers
 - systems buyers and vendors
- ***Reduce costs and project risks***: Building gateways is complex and needs constant investments to implement proprietary/ad-hoc interoperability specifications and maintain competences.

The Vision: operate in a certified environment



Roadmap towards a National eHealth Interoperability Framework



Phase 1: NeHIF Design Principles

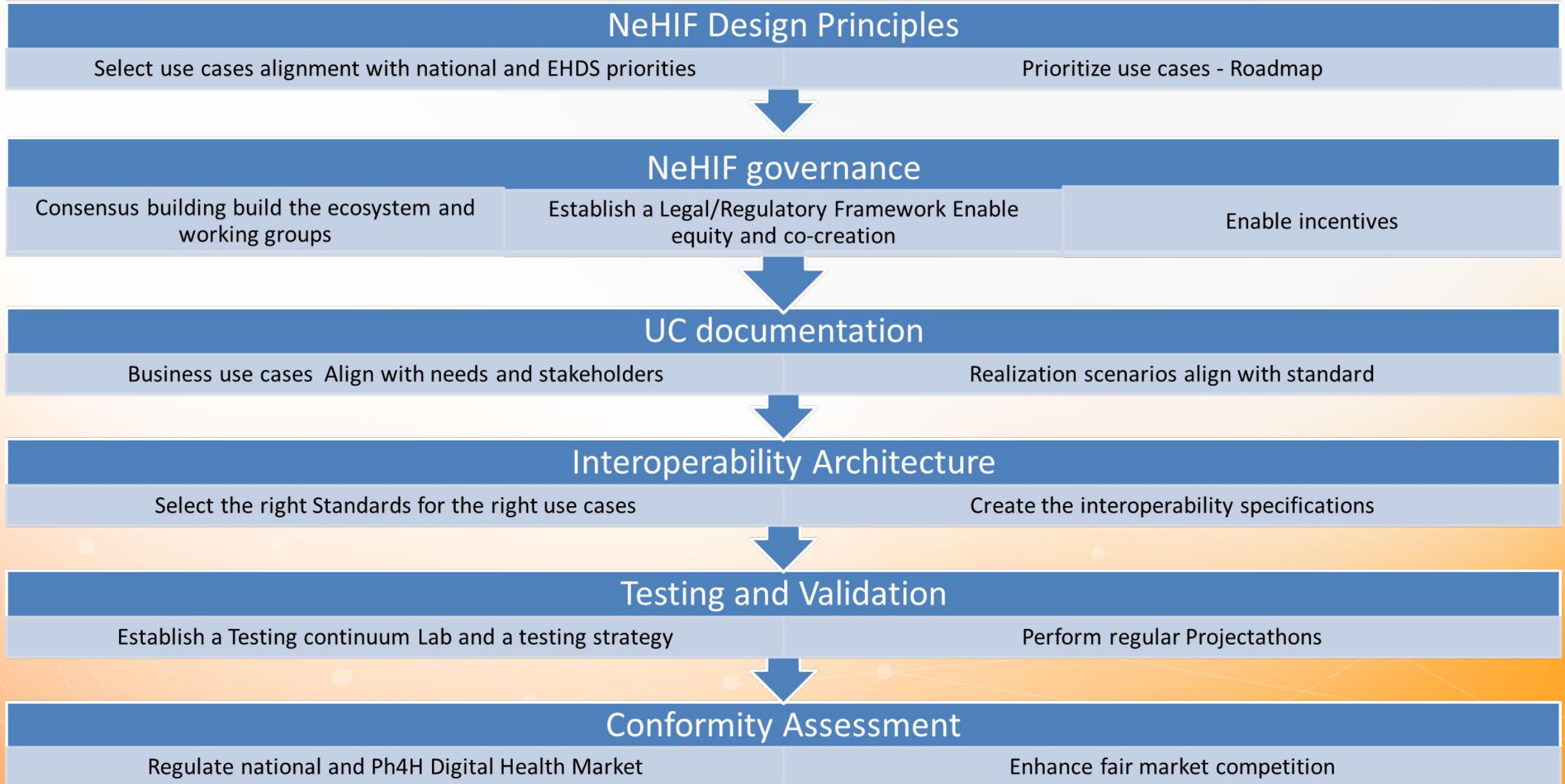
Phase 2: NeHIF governance

Phase 3: UC documentation

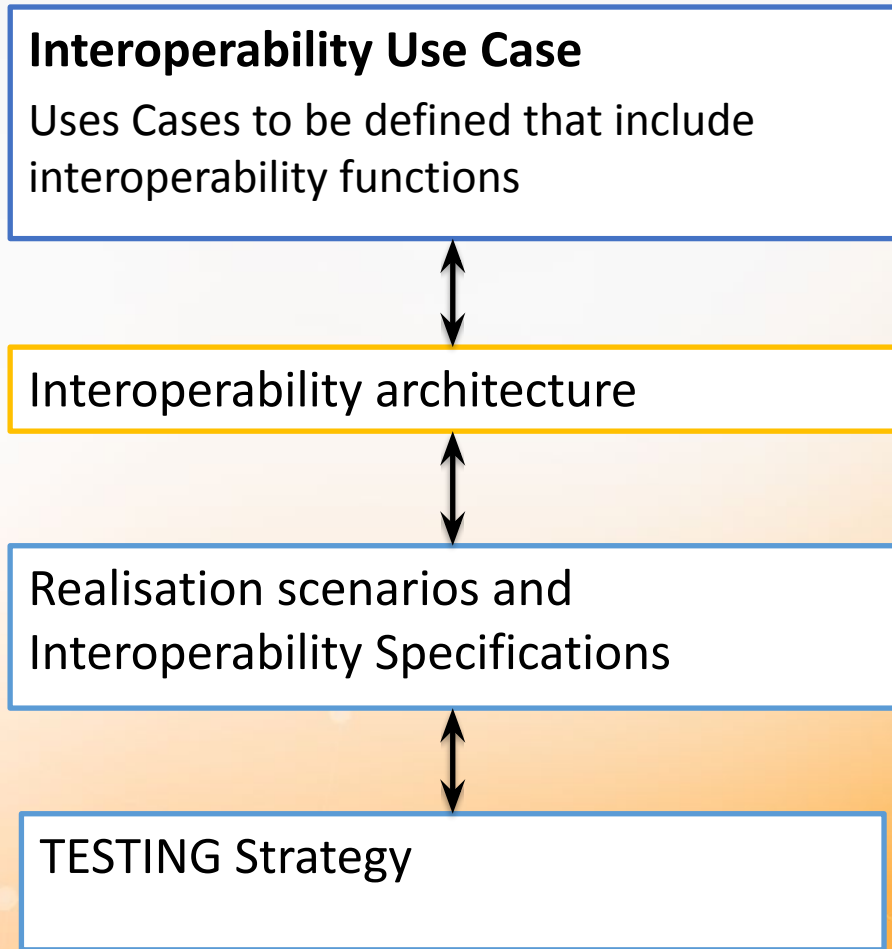
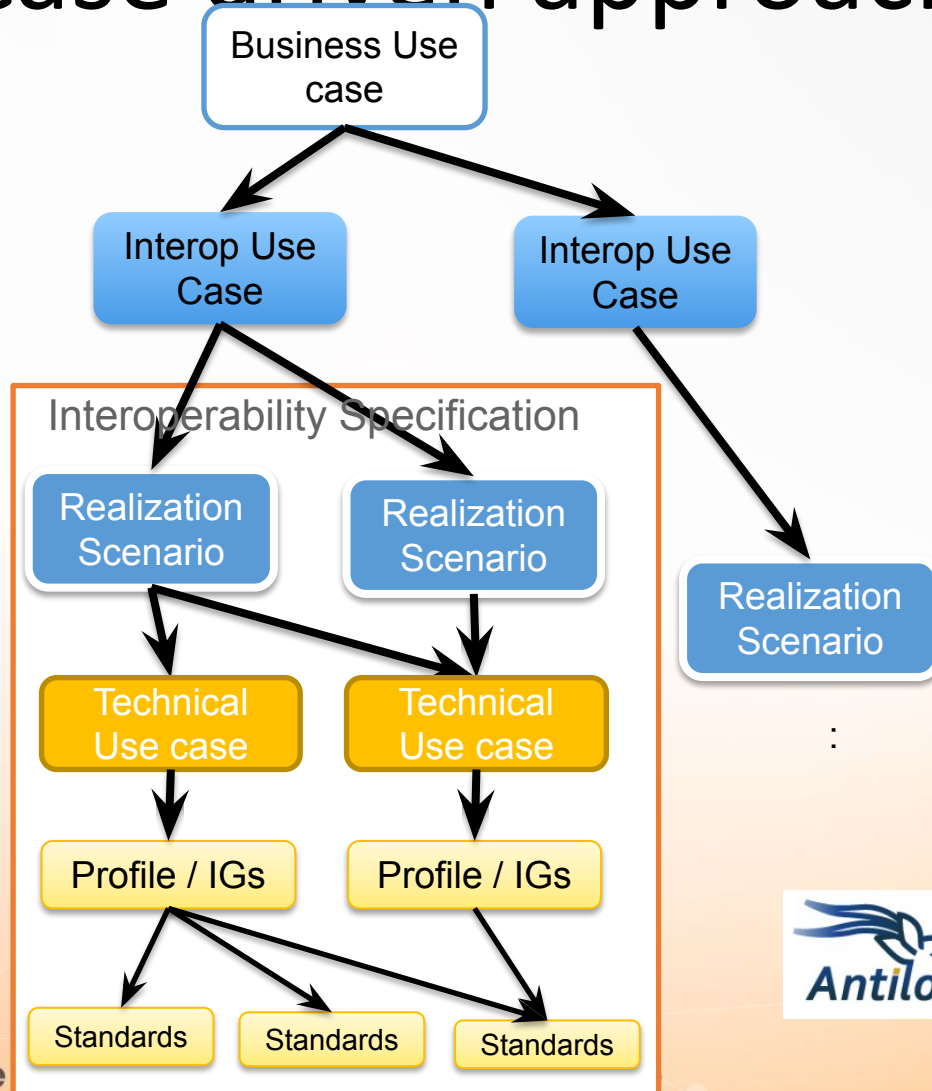
Phase 4: Interoperability Architecture

Phase 5: Testing and Validation

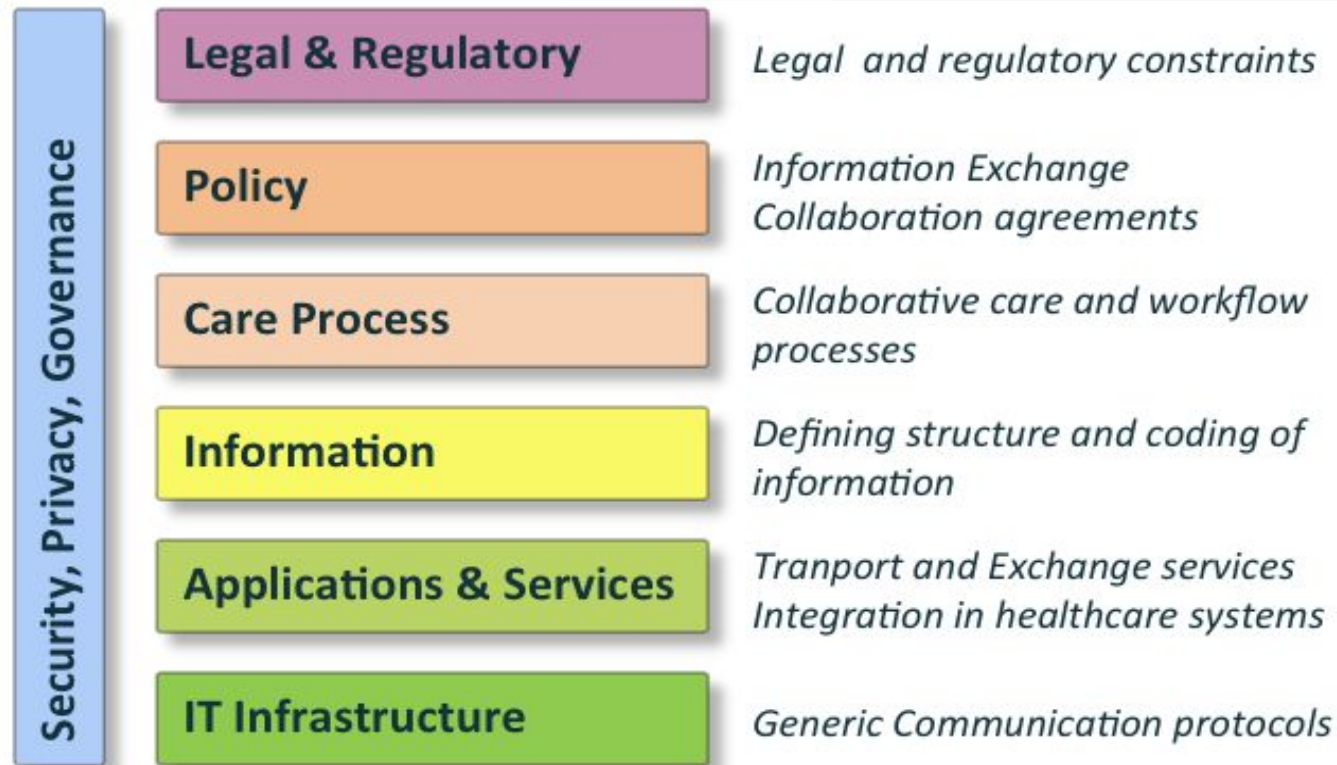
Phase 6: Conformity Assessment



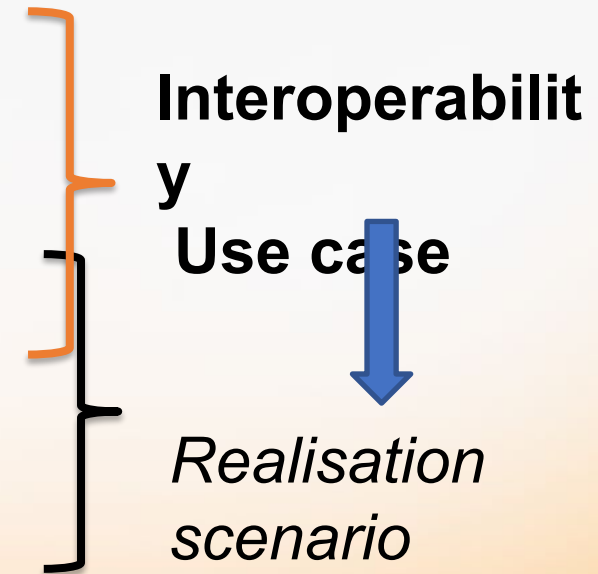
Use-case driven approach



Interoperability is not a simple concept ...



From Refined ehealth European Interoperability Framework
EU eHealth Network, 23/10/2015



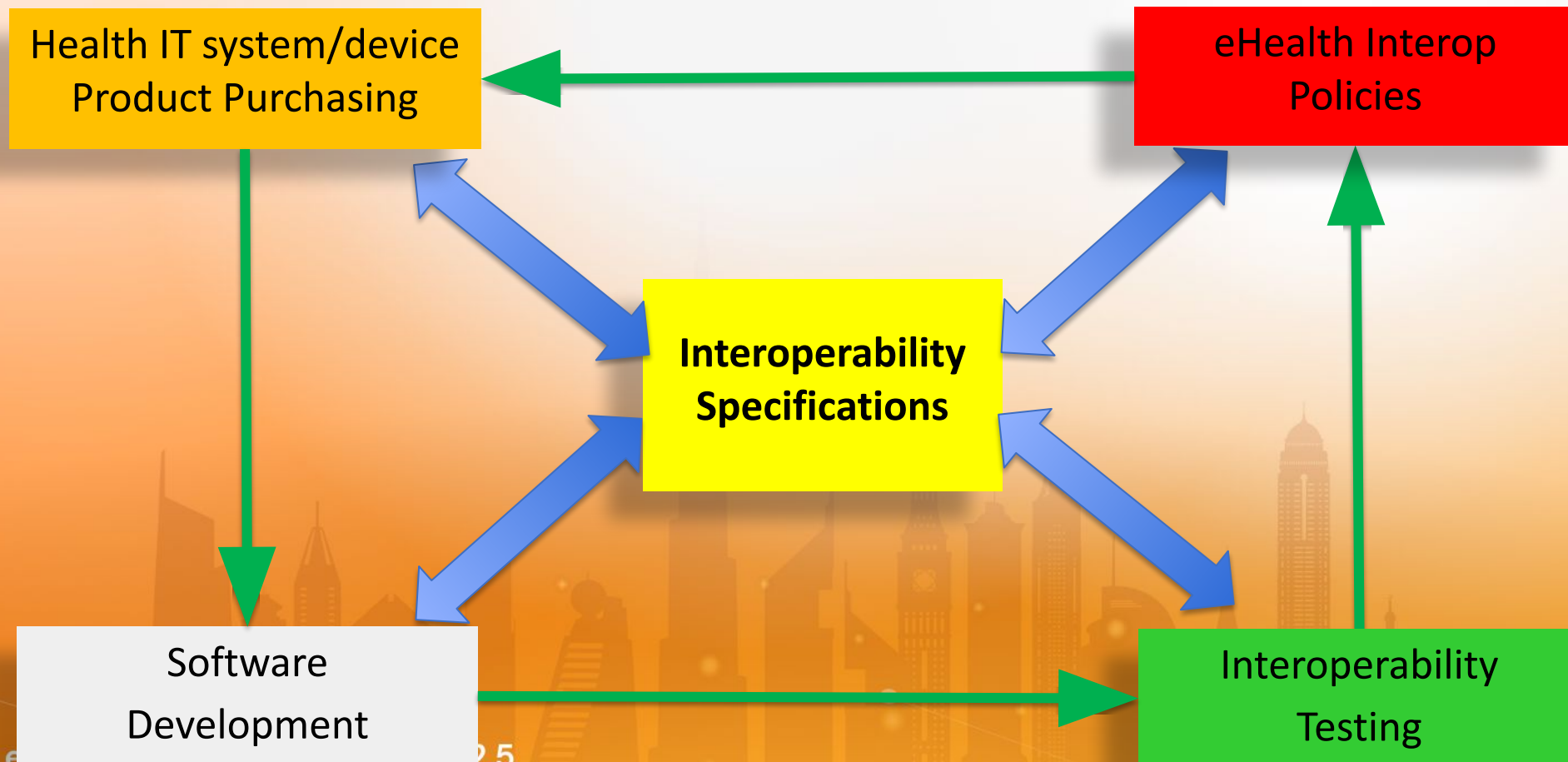
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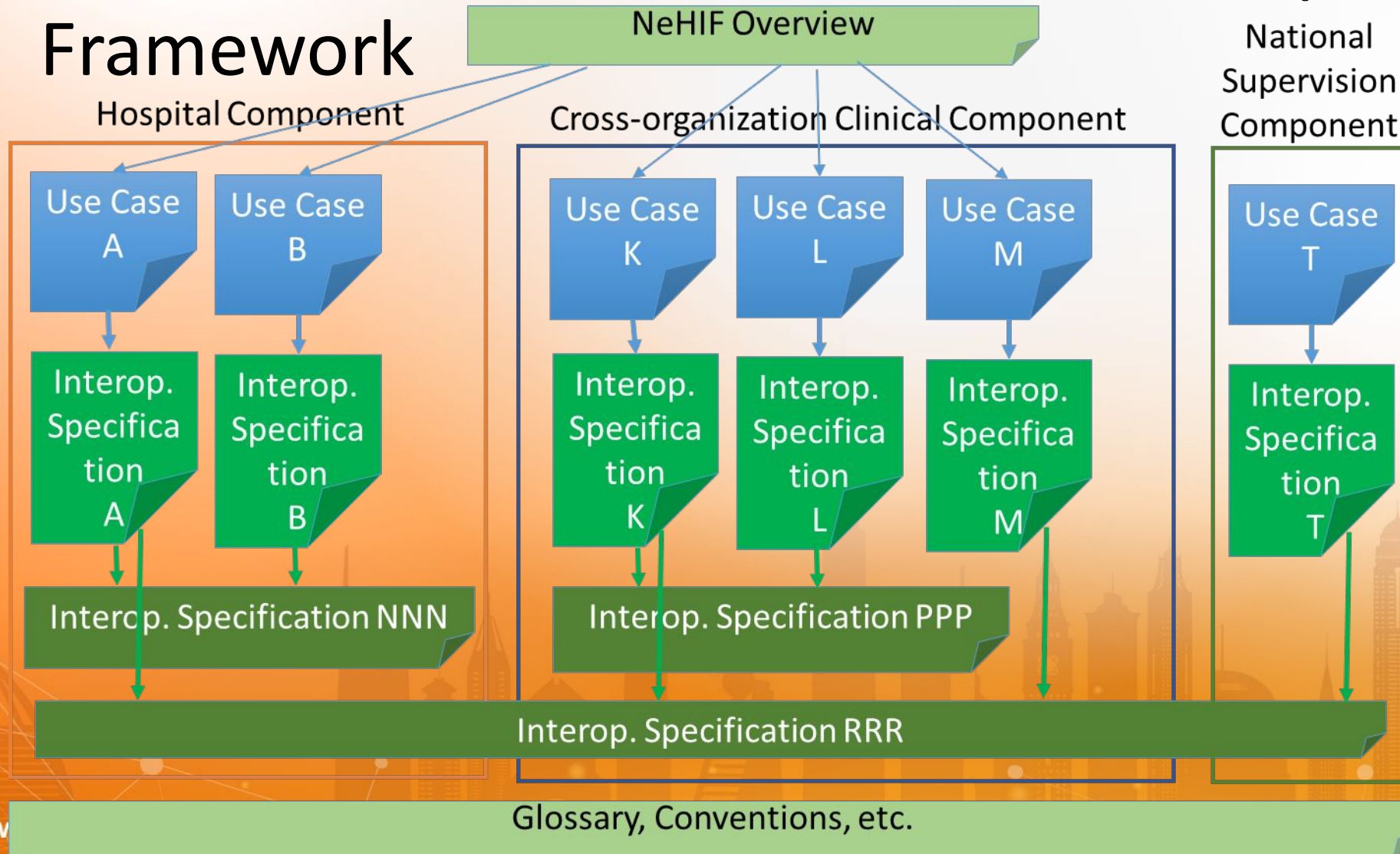
From Refined eHealth European Interoperability Framework
EU eHealth Network, 23/10/2015

Critical Role of Interoperability Specifications

Interoperability “referee” – Closes the loop



Overview of a National eHealth Interoperability Framework

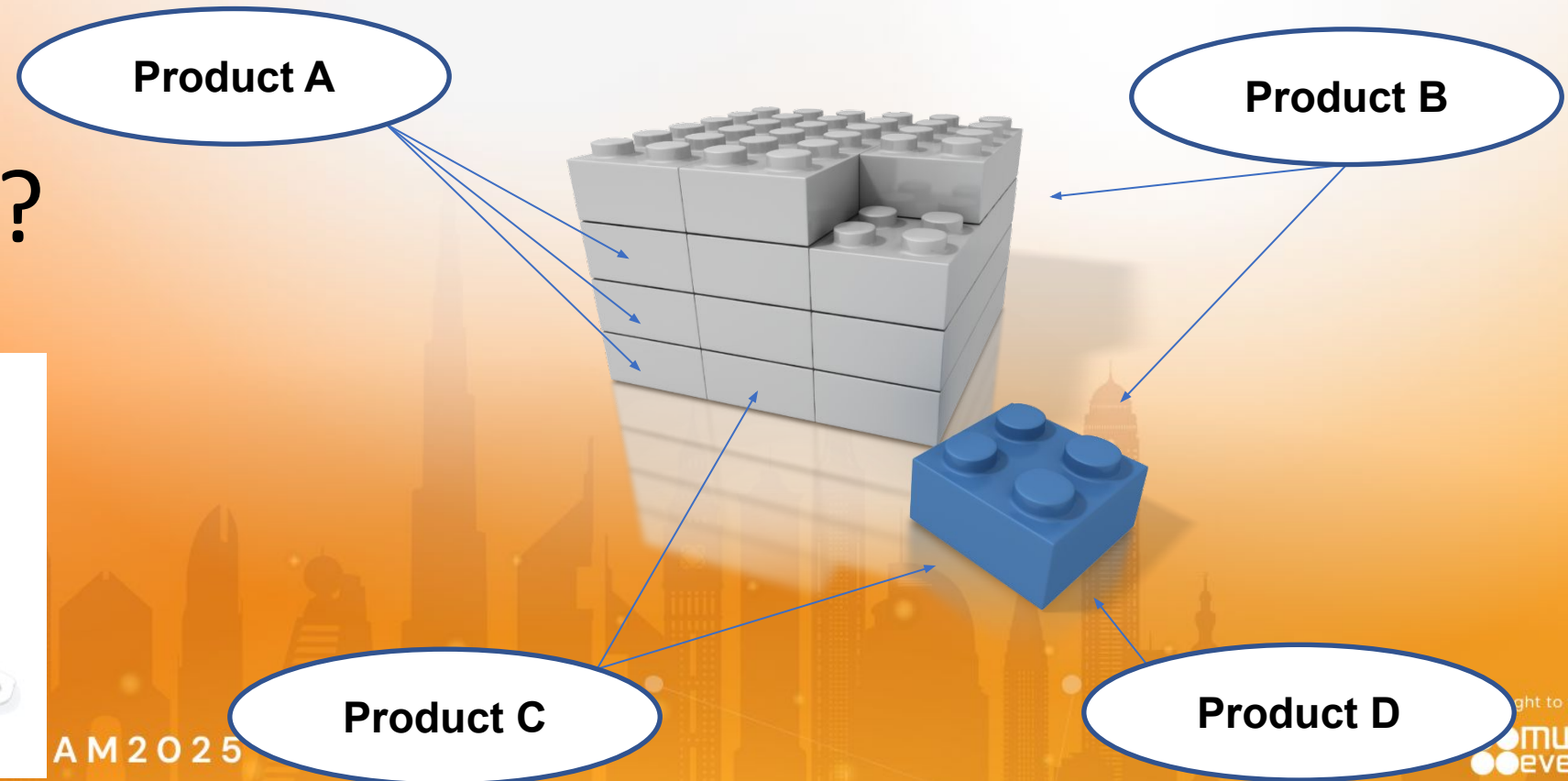


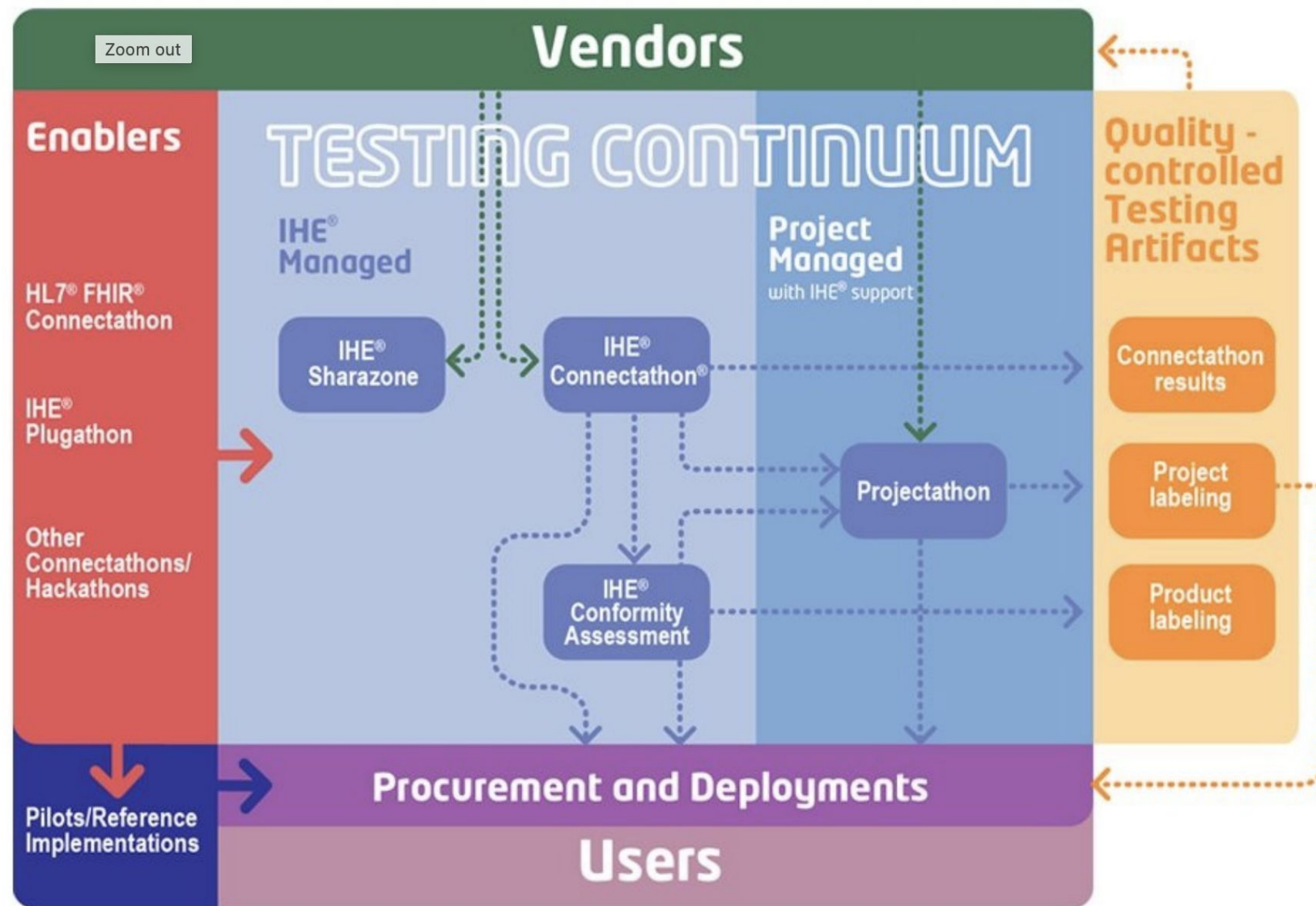


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Why testing?





What is an IHE Plugathon?

- An IHE Plugathon is a hands-on interoperability event where developers, startups, and vendors test how their solutions exchange health data using international standards (HL7 FHIR, DICOM, IHE profiles, etc.).
- Organized by IHE (Integrating the Healthcare Enterprise) and partners (IHE Catalyst, national eHealth bodies).
- Focus: early-stage testing and innovation validation in a trusted, collaborative environment.
- Plugathons complement formal IHE Connectathons by encouraging new participants and prototypes.

Why Plugathons Matter for Policy Makers

- Standardization: Ensures national and EU digital health projects adopt common, tested standards.
- Trust: Builds confidence that systems can securely exchange patient data.
- Innovation: Encourages SMEs and startups to integrate with national infrastructures (e.g., EHRs, ePrescription, patient summary).
- Capacity Building: Creates a community of trained experts aligned with policy frameworks (EHDS, WHO interoperability roadmap).

IHE Connectathons

Connectivity Marathons

- Open invitation to vendor and other implementers community
- Advanced testing tools (GAZELLE, a GITB platform)
- Testing organized and supervised by IHE technical management team and monitors
- Thousands of cross-vendor tests performed
- Results recorded and published



Connectathon – triple purpose

1. **Test implementation of the IHE profiles** within product/open source
 - Verify that the vendors did a good job
2. **Verify that what the committees specified** is clear!
 - Verify that the Technical Frameworks are not ambiguous
 - Verify that that the Technical Committee did not miss anything
3. **Build a community** of computer geeks who loves local brewed beers and have fun working together to connect healthcare



Connectathon From Monday to Friday noon

A journey to victory

MONDAY
Game on



- Grab your badge from 8h at the venue
- Locate your table
- Connect your computer
- Start testing

TUESDAY
Work in progress



- Meet your partners
- Keep on testing
- Cooperate with monitors

WEDNESDAY
Work in progress



- Keep on testing
- Cooperate with monitors

THURSDAY
Crunch time



- Identify the critical test runs to pass your capabilities
- Finalize testing
- Relax at the social event in the evening

FRIDAY
Victory



- Last tests
- Pack

- **Countries test their Interoperability specifications**

- National Interoperability specifications should use IHE profiles
- Testing concept same as Connectathon (“familiar”)
- All eHealth use-cases can be tested in the same way

Efficient!

- **Triple purpose**

1. **Test implementation of the specifications** by vendors active in the country
2. **Test and refine** the quality of your interoperability specifications
3. **Establish digital health ecosystems and communities of practice**



	Connectathon®	Projectathon
Governance	Under the supervision of IHE regional/national deployment.	Under the supervision of the project (the lead organisation).
Rules for passing	IHE test methods are used. Criteria are developed in the IHE Test Plan.	Test methods are customized to fit the project specifications. Criteria are developed by the project.
Publication of the results	IHE Connectathon® Results.	Published by the project (the lead organisation).

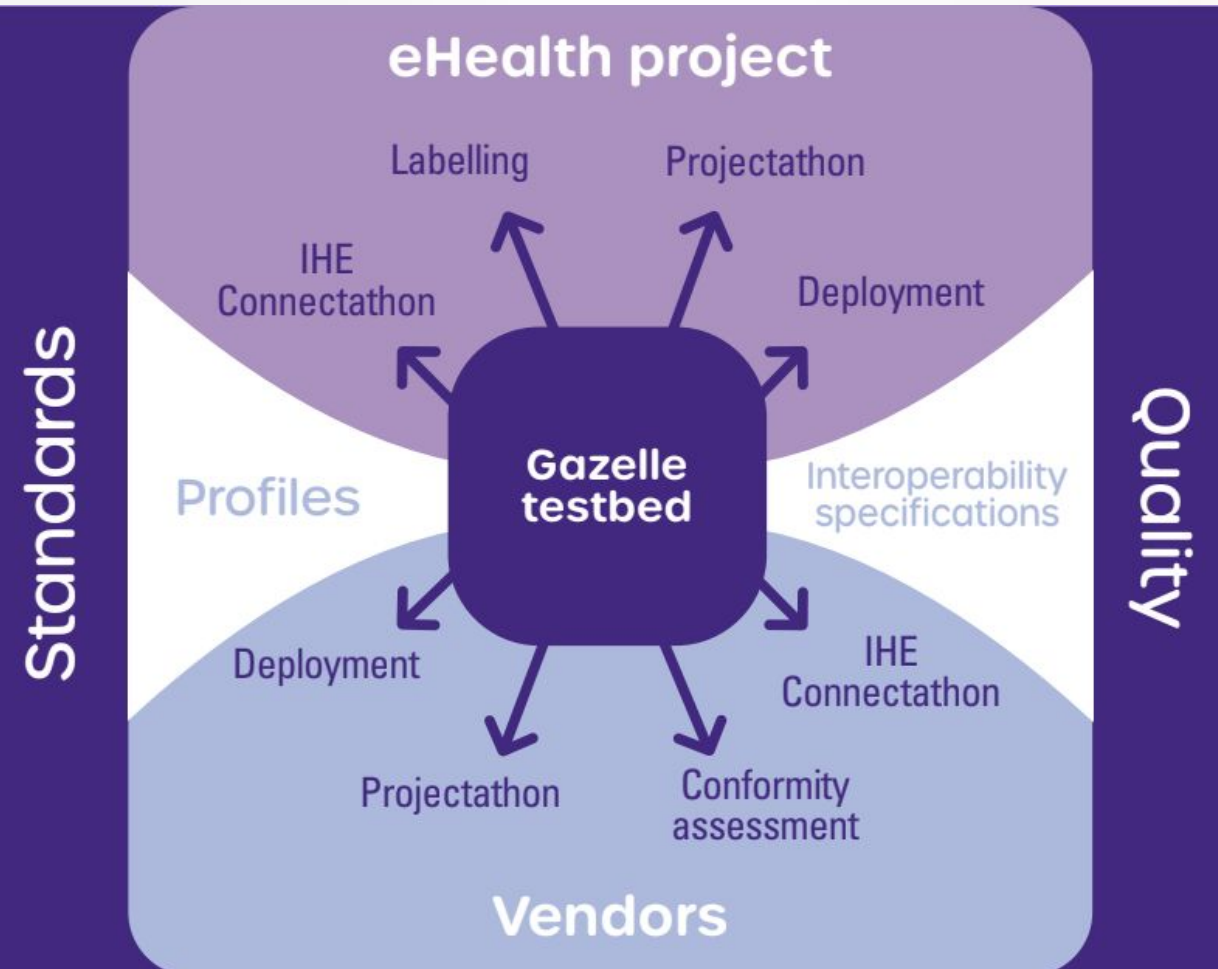
Examples of Projectathons

- **Enable co-creation** of interoperability specifications at a national, regional or project level:
 - **Country level examples:** Austria, Switzerland, Ireland, Greece, France, Finland, Canada, South Africa, Gabon
 - **Regional level examples:** Abrumet (Brussels eHealth Network), Veneto region, Friuli-Venezia Giulia region
 - **Cross Border/Project level examples:** epSOS, UNICOM, myHealth@EU, WHO DDCC, PH4H, Hajj

Gazelle is an **open-source test bed** for „scaled“ interoperability testing

Gazelle is an open-source, web-based test platform supporting a wide portfolio of interoperability test tools suited to validate interface conformity to IHE Profiles and project-specific standards-based interoperability specifications.

Vendors can validate their eHealth projects to procure interfaces they deploy.



What is Gazelle?

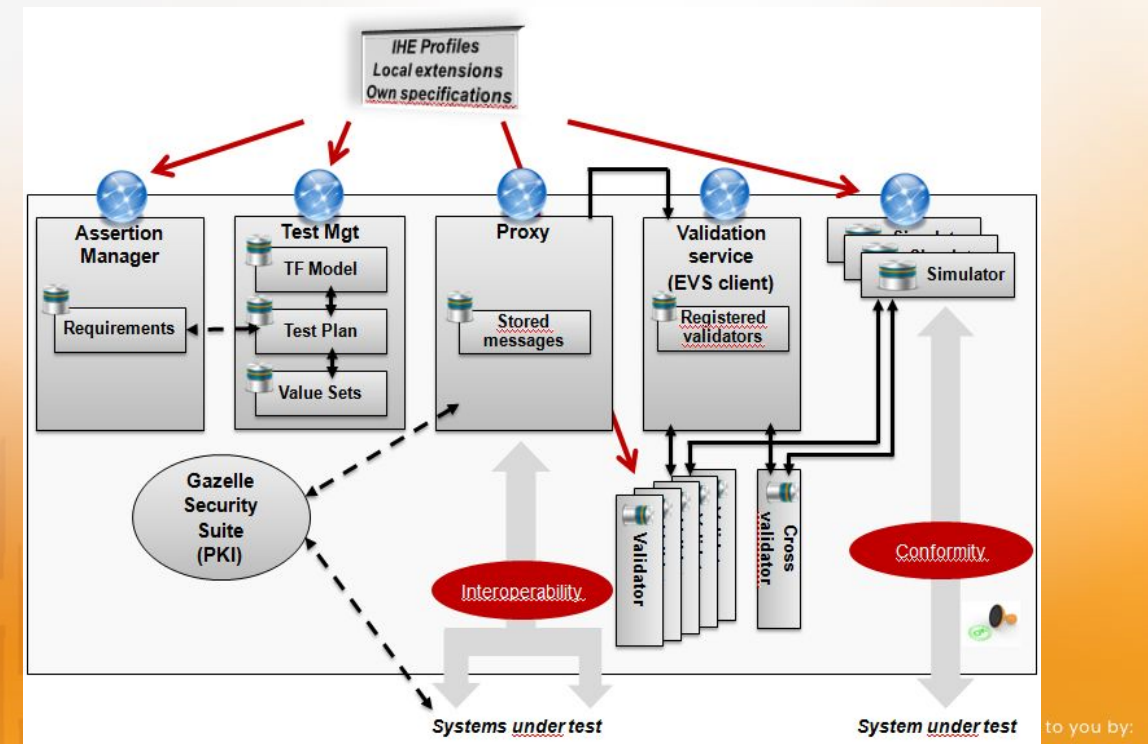
Gazelle is the eHealth interoperability and conformity testing platform that has been supporting the IHE Connectathon for the last 15 years.

Long run project

- Has been developed for 20 years
- More than 2M lines of code

It integrates about 106 components :

- A test management tools oriented toward interoperability & conformance testing
- A suite of IHE actor simulators
- A suite of IHE conformance checking tools
- A suite of tools for testing support
- Tools for data generation
- Tools for automation of testing



Gazelle delivered either as an in-house version or a cloud-based version. It includes:

Test Management

manages test campaigns from start to finish

Assertion Manager

manages IHE Profile specifications assertions. Links them to test plans in Test Manager

Proxy

captures on-the-wire messages exchanged between products to validate conformance.

Security Suite

verifies conformance to Security protocols.

Validation Services

conformance verification of services, messages, documents.

Simulators

emulate IHE actors and facilitate testing of stand-alone eHealth products.

<https://gazelle.ihe-europe.net>

What is in the Gazelle testing platform?

Gazelle Core

Test Management

Test Execution

User
Management

System &
Product

Session
Management

Interop
model / Test
Design

Test
orchestrat
ion
(Maestro)

Validation Portal (EVS)

Validator
Management

Validation API

Service
Registry

Datahou
se

Message Capture (Proxy)

Engine

Channel
Manager

Assertion
/ Spec
Manager

Simulation Portal

Simulation
Portal

Simulation API

Security
Suite (
GSS)

Gazelle Tools

HL7 Validators

HL7 v2
Validator

HL7 v3
Validator

Gazelle Object
Checker

HTTP
Validator

DCC Validator

CDA Validator

X validator

Schematron
Validator

FHIR Validator

XDStarClient

XD* Validators

XD* Simulator
Clients

IUA Simulator

Demographic
Data Server

HPD Simulator

Order
Manager

Patient
Registry

Patient
Manager

SVS simulator

STS simulator

Ecosystem Tools

NIST

NIST XDSTools

NIST FHIR
Toolkit

HL7 IGAMT



Engine &
XML/JSON



AHDIS
Matchbox



ART-DECOR



DCM4CHEE



MITRE
HL7® FHIR®



Dicom3tools

Gazelle Instances (2025)

Used by 3 international organisations, 15 national & 3 regional ehealth programs, 5 vendors internal labs, 4 IHE Instances

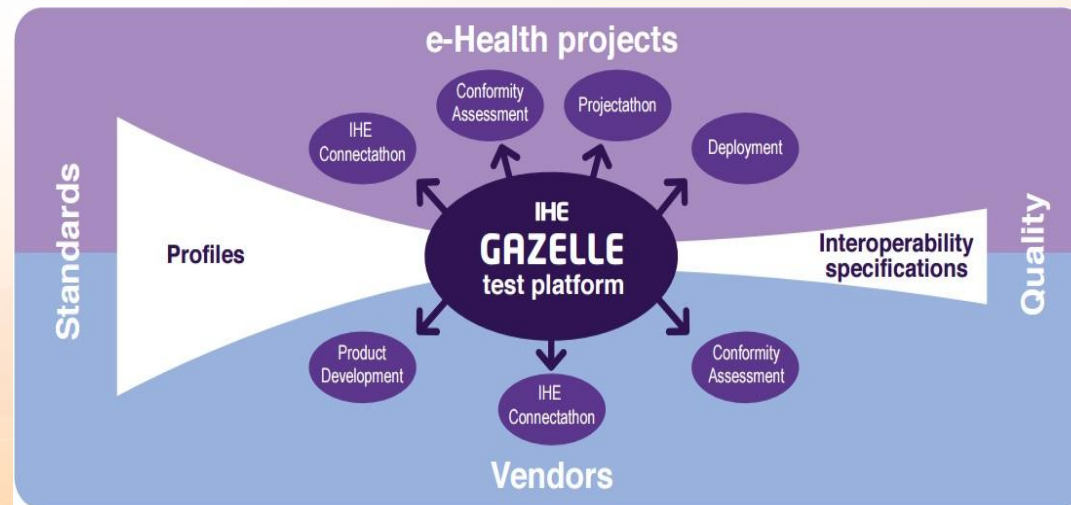
1. Arsenal.IT (Italy Venice Region)
2. Abrumet-Brussels eHealth (Belgium)
3. Insiel SPA (Italy)
4. Canada Health Infoway
5. GE
6. Agfa
7. InteropLAB (NL)
8. Technikum Wien (Austria)
9. IHE USA
10. IHE-Europe
11. IHE China
12. IHE Japan
13. Agence eSanté-Luxembourg
14. InterAMC France
15. eHealth Finland
16. eHealthSuisse & Federal MoH – Digi-Santé
17. EU DG Santé-European Cross Border
18. Sequoia-USA
19. EFS-French Blood Transfusion-France
20. Ireland eHealth (HSE)
21. French ehealth (ANS)
22. Gabon MoH
23. Greece MoH
24. WHO Clearinghouse
25. CENS-IDB
26. PH4H Latin America
27. DG DIGIT OOTS
28. ITALIAN PTN
29. South Africa
30. Czech Republic



Gazelle is about connecting people and tools



Thank You



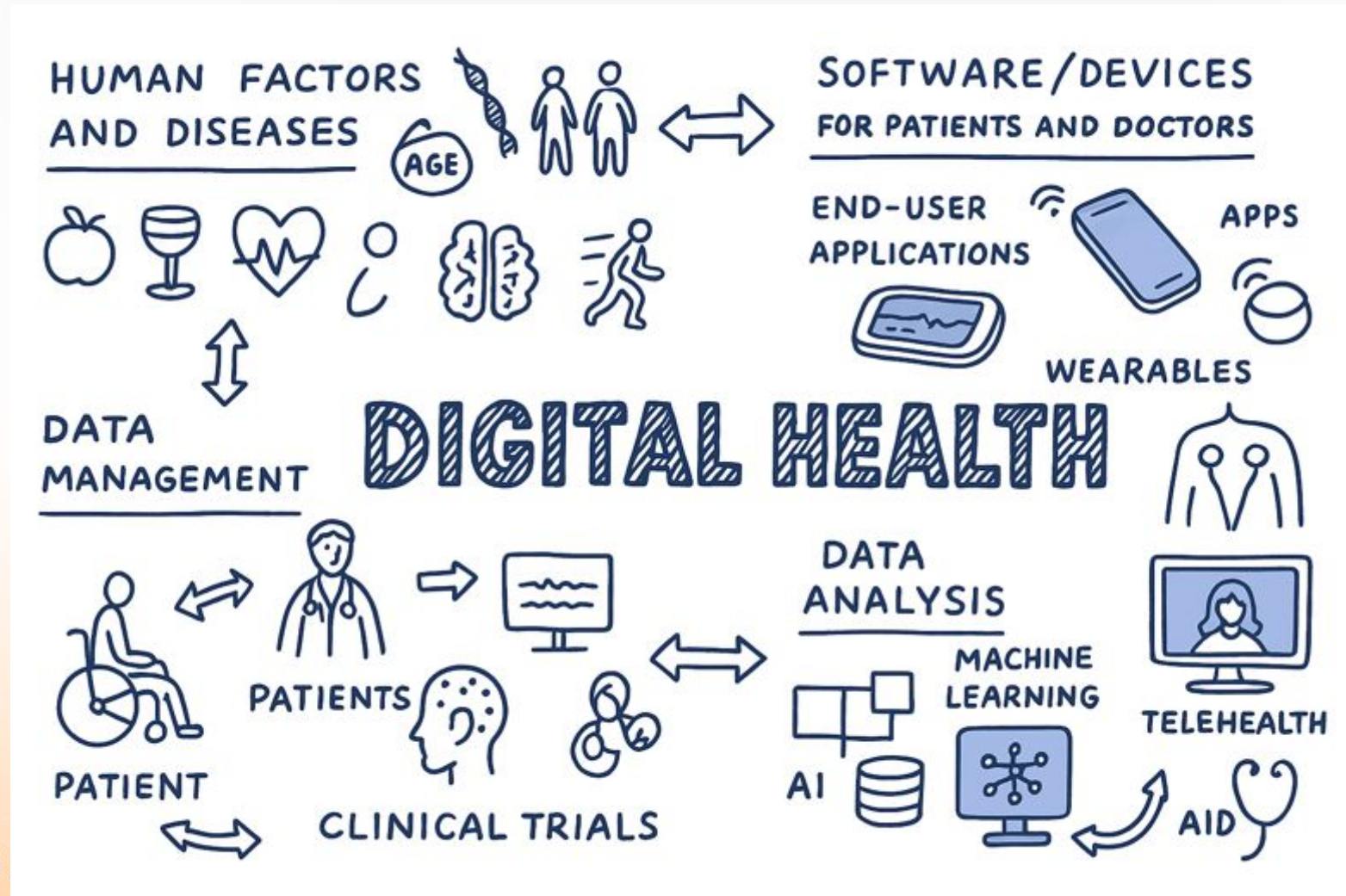


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Healthcare is changing... need Interoperability by design

Interoperability is a race without a finish line:

- New clinical knowledge
- New technologies and data resources
- Organization and regulatory shifts
- New requirements of data flow and consumption across the ecosystem
- New data standards to mapped to legacy
- Ensuring compliance is key



The cost & complexity of establishing and maintaining interoperability is always underestimated.
2 Scenarios:

Old way

- ❖ Small select group of experts engaged
 - ❖ (both clinical and technical)
- ❖ Development in house and when a near to final draft is complete- put it out for limited community feedback
- ❖ Separate clinical , industry, government discussions
- ❖ Testing commences with external parties once spec is near final draft
- ❖ Build it and hope they will come
- ❖ Longer time to adoption – normally requiring both carrots and sticks
- ❖ Implementation challenges only identified towards the end of development or in implementation phase

Democratized way (currently being demonstrated through Sparked in Australia)

- ❖ Open, transparent, collaborative and consensus driven
- ❖ Change management commences through the standard development process
- ❖ Clinician led, quality data focused first
- ❖ Joint clinical, consumer, industry and government discussions
- ❖ Establish a large, ever- growing group of change champions- consumer, clinical, technical and policy
- ❖ Build workforce capacity in clinicians, industry and government
- ❖ Agile, iterative, development and testing of the specs and industry implementation of the specs in parallel
- ❖ When standard is published, industry already/close to conformant and implementation
- ❖ Policy implications identified earlier through the community process
- ❖ Guided workshops- making sure its not just the loudest, most confident voices in the room
- ❖ Build it together, test it together, go live together

The Solution: build an interoperability lab ecosystem



Create and operate an interoperability framework as the cornerstone of building complex digital transformation strategies in healthcare



Bring experts together and solve problems



Test before you implement



Reuse, collaborate, co-create do not re-invent the wheel



Align implementation with real capacity of the stakeholders and make realistic roadmaps

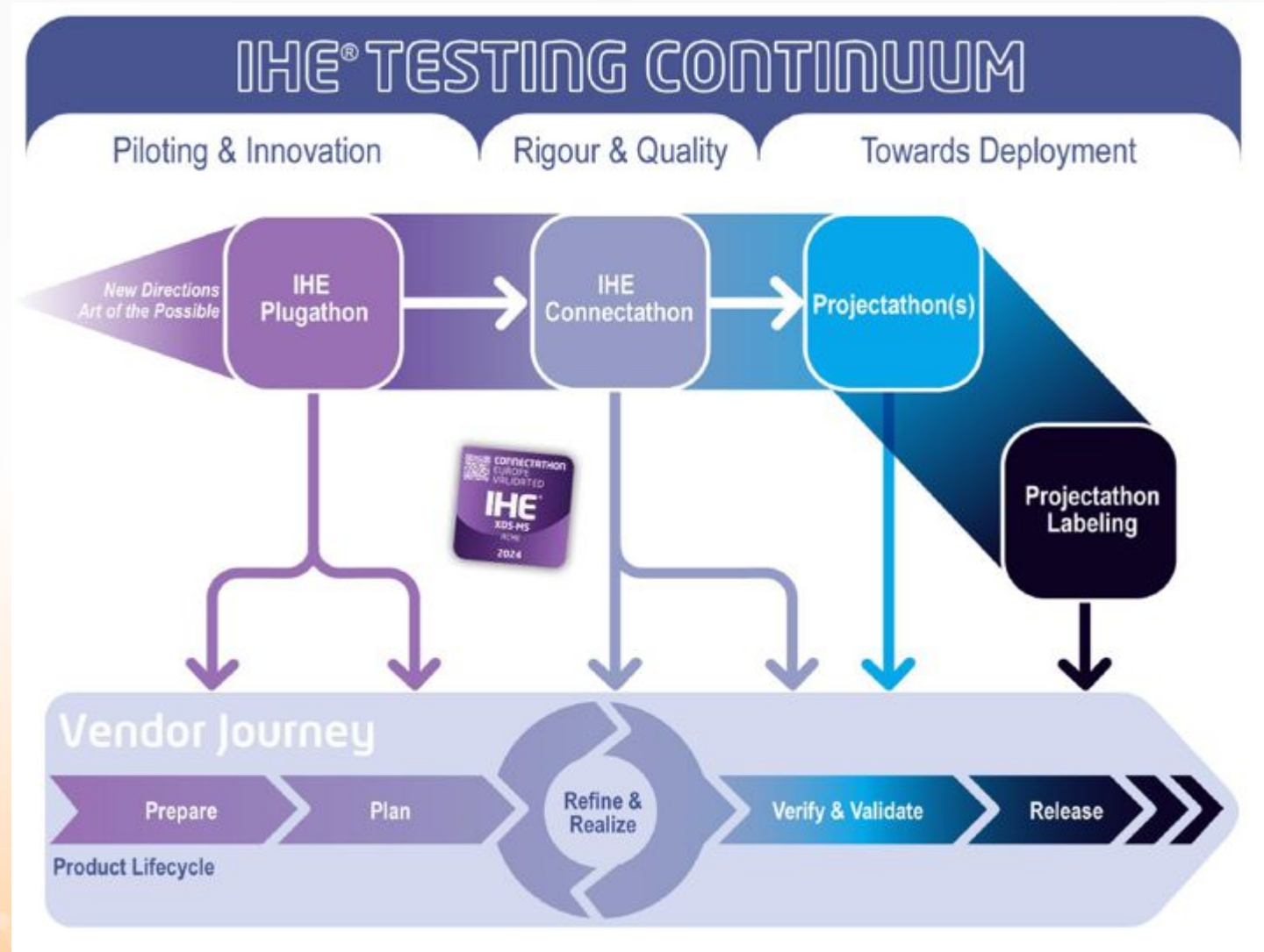


Perform continuous education and capacity building



Enable the ecosystem of stakeholders

Injecting IHE for Scenario-based specification & Compliance Testing



From Monday, 23 March to Friday, 27 March 2026

Brussels, Belgium

Where?

The EGG, Rue Bara 175, 1070 Brussels

About a 10-minute walk from Brussels-South Station (Gare du Midi)





Canada Health Infoway



HealthT.gov

USCDI

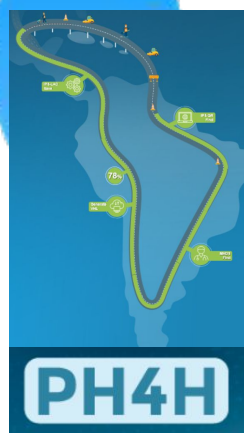
United States Core Data for Interoperability



IDB PAHO



RACSEL
RED AMÉRICA LATINA Y EL CARIBE DE SALUD DIGITAL



Patient-mediated

HCP-mediated

Examples of Projectathons



Canada Health **Infoway**
Inforoute Santé du Canada



My Health @ EU   European Commission
eHealth Digital Service Infrastructure
A service provided by the European Union



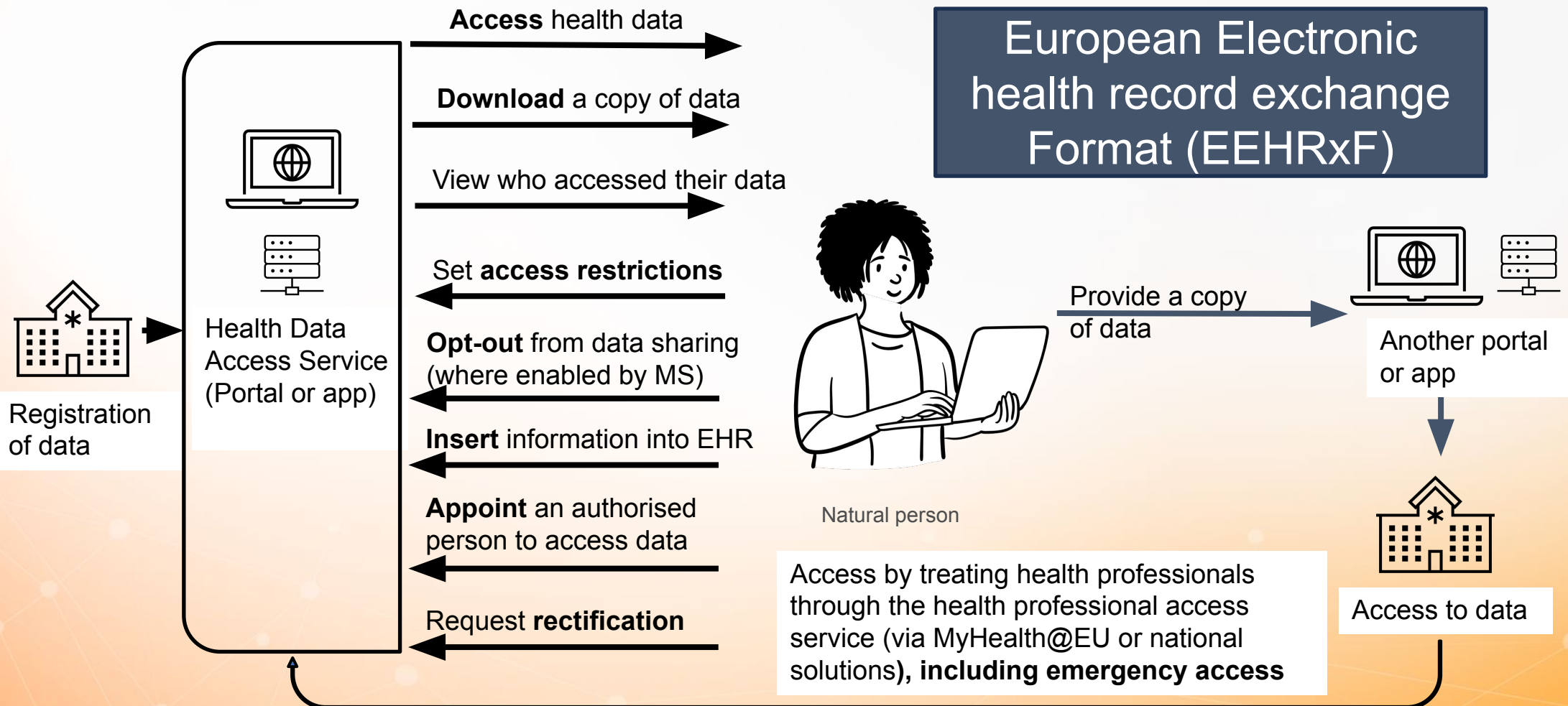
The European Union Use Case

- Implementation of the myHealth@EU services



<https://eur-lex.europa.eu/eli/reg/2025/327/oj/eng>

Rights of natural persons in primary use



Building on existing cooperation

MyHealth@EU under Cross-border Healthcare Directive

- Voluntary system for exchanging patient summaries, prescriptions and dispensations (= first group of priority categories) **16 countries** live with at least one service, up to **9 more** expected to go live with first service(s) this year

Evolution of MyHealth@EU for the EHDS

- Voluntary => mandatory
- New services
- New data categories



MyHealth@EU high-level architecture

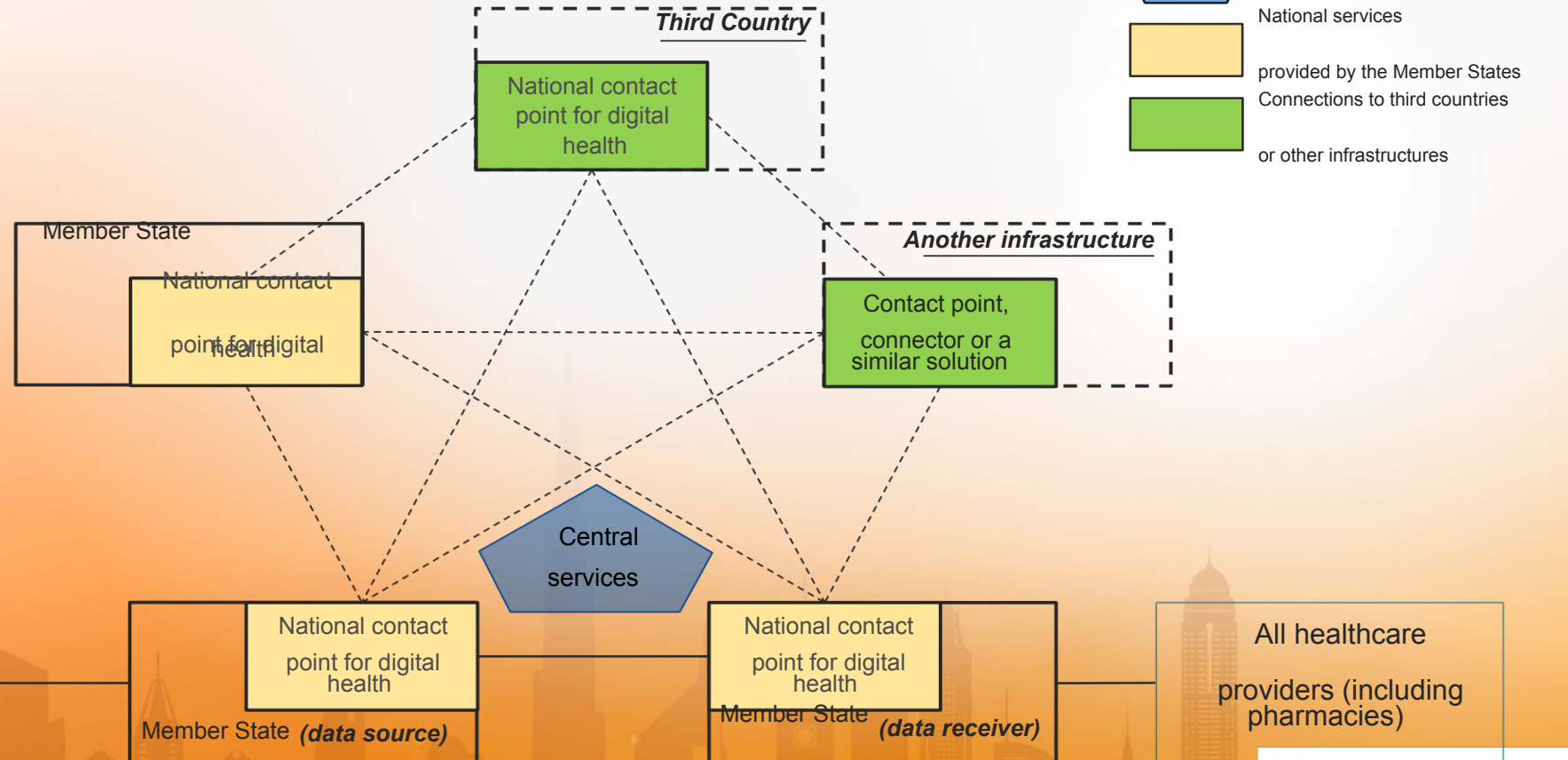
Article 23

Data categories

Priority group 1:

- Patient summaries
 - ePrescriptions and eDispensations
- ### Priority group 2:
- Medical test results: laboratory, other diagnostics, related reports
 - Medical imaging: studies and reports
 - Discharge reports
- Additional data categories:**
May be exchanged where supported

Data suppliers:
All healthcare providers.



European Health Data Space during EHDS Plugathon/Projectathon in Brussels – March 2026

- **EHDS – Specifications – EHDS Projectathon 2026**

- «Content Profiles» for EHDS use-cases
 - Developed by Xt-EHR (with support of HL7 Europe and IHE Europe)
 - Taken over by European Commission (future)
- Familiarize yourself with the European FHIR Implementation Guides for EHDS use-cases:
 - Patient Summary: [HL7 Europe Patient Summary](#)
 - ePrescription/eDispensation: [HL7 Europe Medication Prescription and Dispense](#)
 - Laboratory Result Report: [HL7 Europe Laboratory Report](#)
 - Radiology Result Report: [HL7 Europe Imaging Study Report](#)
 - Discharge Summary: [HL7 Europe Hospital Discharge Report](#)
- Talk to experts and discuss the specifications with the editors

INTEROPERABILITY & HL7 FHIR MASTER CLASS + IPS HIE PLUGATHON

Pan-American Highway for Health

<https://worldhealthorganization.github.io/smart-ph4h>



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Human Interoperability – Ecosystems of Stakeholders



IAM2



Thank you!