



Building trust
in eHealth
interoperability

IHE Gazelle Overview

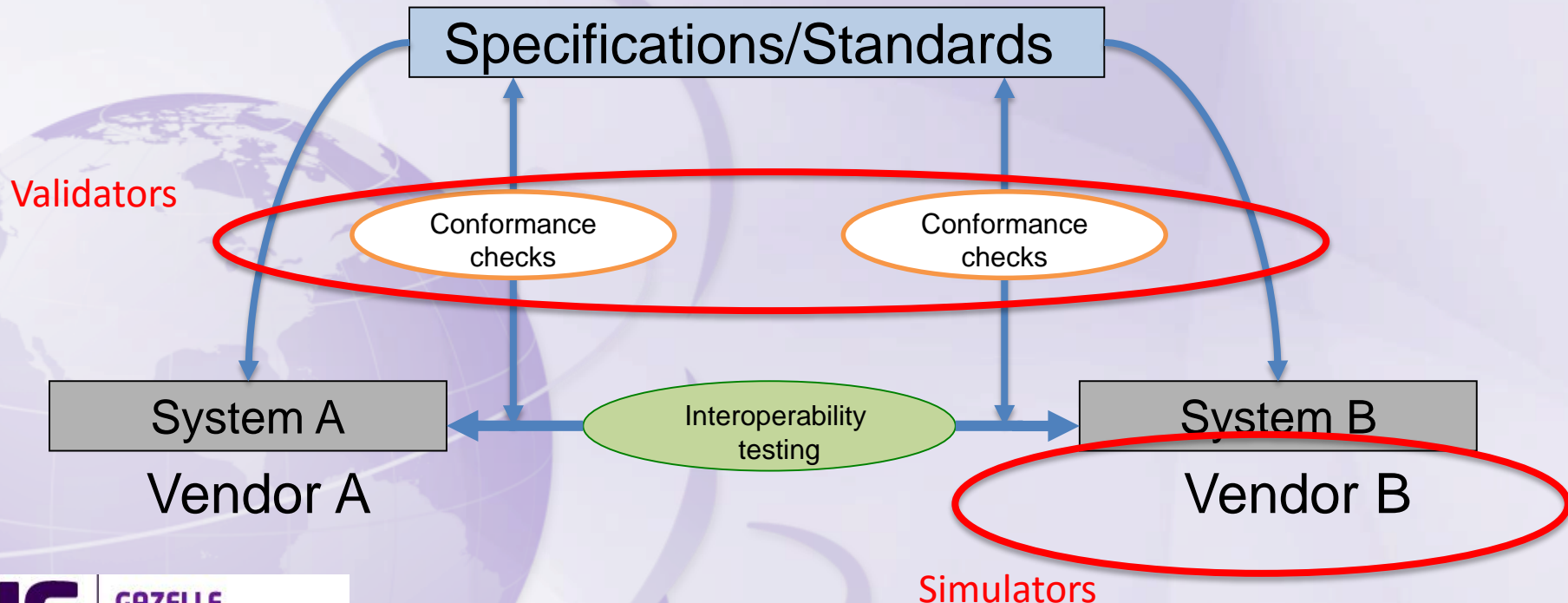
Alexander Berler
IHE Services Director



e-Health Forum
Strategic challenges and
interoperability standards in Health IT
Sopot, Sheraton Hotel, 16/09/2016

Gazelle Test Framework

- ❖ Test management tool oriented toward interoperability and conformance testing.
- ❖ Suite of conformance testing tools.
- ❖ Suite of simulators tools.



Gazelle Maintenance Packages

- **Two** versions of Gazelle (Open source)
 - Community (non-supported)
 - Enterprise (supported + validated)
- **Enterprise** Versions
 - In House
 - Cloud Basic
 - Cloud Premium
 - Cloud EVS
- Maintenance Packages are a **combination of maintenance and additional services tailored to customer's needs** (specification creation, training, consultancy, custom test tools, custom test plans, virtual connectathons, projectathons etc.)

Community Edition	Enterprise Editions			
Downloadable public domain files	Cloud Basic Hosted @ IHE Services Basic Pack	InHouse Edition Onsite Installation	Cloud Premium Hosted @ IHE Services Premium Pack	Cloud EVS Hosted @ IHE EVS Services only

Gazelle Maintenance Packages

	Gazelle Pre Defined Operational Packages				
	Support Services Provided	Any Gazelle Enterprise Edition			
		Patient Management : PM	Order Management : OM (Lab Order – Radiology Order)	Security Management : SM	Document Sharing : DS
Gazelle Components					
Gazelle Test Bed					
Test Management (Gazelle Master Model Included)	✓	✓	✓	✓	✓
Assertion Manager	✓	✓	✓	✓	✓
Gazelle Tools & Applications					
Demographic Data Server	✓	✓	✓	✓	✓
Proxy	✓	✓	✓	✓	✓
ATNA	✓	✓	✓	✓	✓
Simulator Applications	✓	✓	✓	✓	✓
EVS Client Application	✓	✓	✓	✓	✓
Validators List					
Gazelle HL7 Validator (HL7v2 / HL7v3)	✓	✓	✓		
Schematron-Based Validator	✓				✓
ObjectsChecker - XML Validator	✓				✓
ObjectsChecker - CDA Validator	✓				✓
ObjectsChecker - XDS Metadata Validator	✓				✓
ObjectsChecker - XDW Validator	✓				✓
ATNA Validator	✓			✓	✓
Certificate Validator (TLS)	✓			✓	✓
HPD Validator	✓				✓
SVS Validator	✓	✓	✓		✓
WADO (DICOM) Validator	✓		✓		✓
DICOM Validator	✓		✓		
WS-TRUST Validator	✓			✓	✓
Current Simulator list					
Patient Manager	✓	✓	✓		
Order Manager	✓		✓		
XD* client	✓				✓
HPD Simulator	✓				✓
SVS Simulator	✓	✓	✓		✓
LCSD Simulator	✓				
LBL Simulator	✓				
HMW Simulator	✓				
TLS Simulator	✓			✓	
WS-TRUST Simulator	✓			✓	
XCPD Responding Gateway	✓			✓	
Additional Tools					
MIR MESA Tools		✓	✓	✓	
NIST XDS toolkit					✓
DCM4CHEE			✓		✓

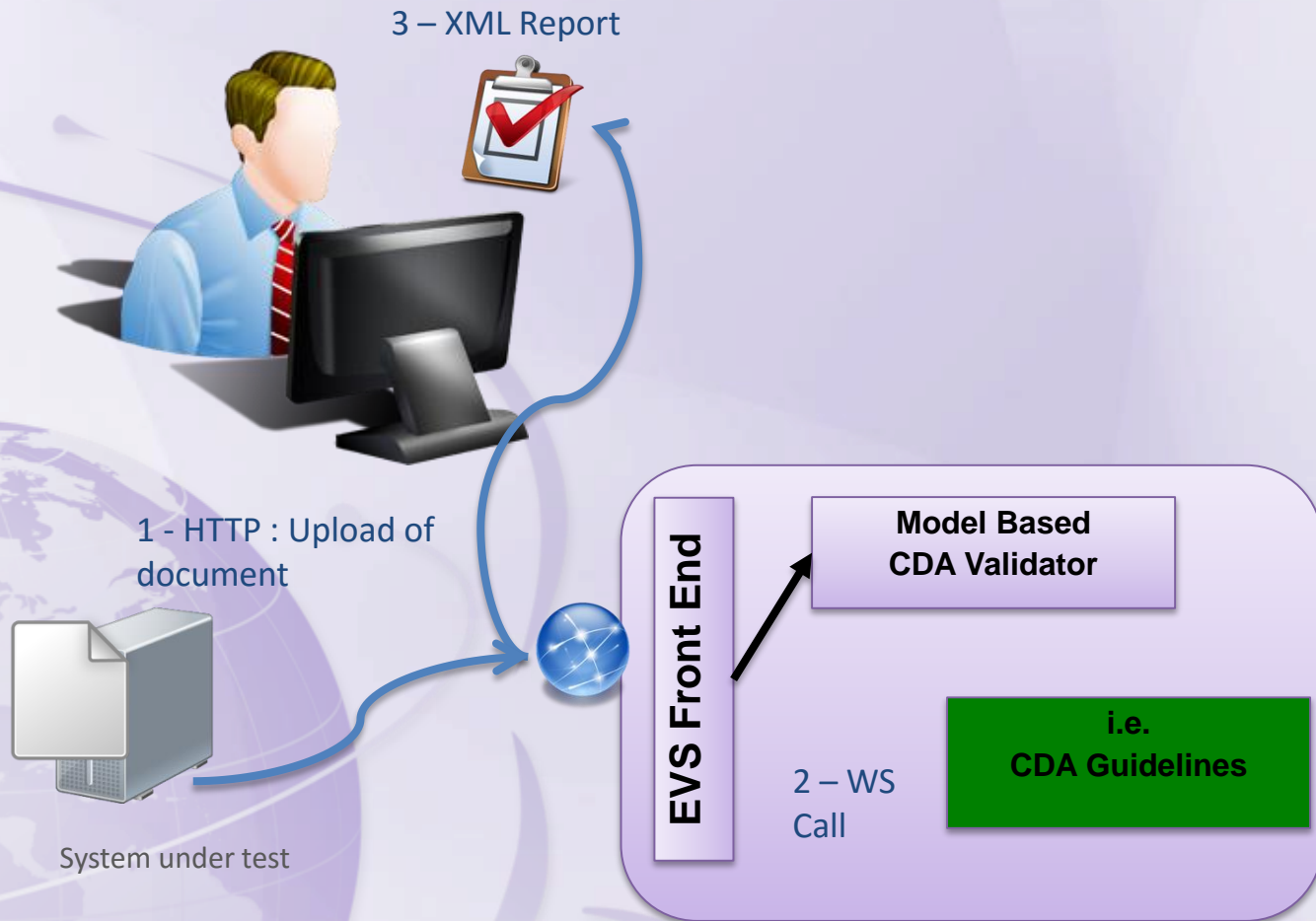
- Gazelle Components
 - Gazelle test bed
 - Gazelle tools and apps
 - Validators List
 - Simulators List
 - Additional Tools
- Operational Packages
 - Patient Mgmt
 - Order Mgmt
 - Security Mgmt
 - Document Sharing

Gazelle Maintenance Packages

	Community Edition	Enterprise Editions			
	Downloadable public domain files	Cloud Basic Hosted @ IHE Services Basic Pack	InHouse Edition Onsite Installation	Cloud Premium Hosted @ IHE Services Premium Pack	Cloud EVS Hosted @ IHE EVS Services only
Services					
First Level Support (email, phone resolution)					
Online ticketing (Jira)	✓	✓	✓	✓	✓
Helpdesk (Monday-Friday, 9:30-17:30 CET, excluding Holidays)	N/A	✓	✓	✓	✓
Second Level Support (developer intervention) Service Level Agreement Parameters					
Mean Time to Reply (MTTR) Response Time	Upon Availability	Next Business Day	Same Business Day	Same Business Day	Same Business Day
Mean Time to Fix (MTTF) Resolution Time during Testing Periods (1 month prior notice)	N/A	20 days/yr	20 days/yr	30 days/yr	20 days/yr
critical & blocker issues	Upon Availability	24 business hours	8 business hours	8 business hours	8 business hours
Major issues	Upon Availability	4 business days	2 business days	2 business days	2 business days
Minor & Trivial Issues	Upon Availability	2 business week	5 business days	5 business days	5 business days
Mean Time to Fix (MTTF) Resolution Time during non testing periods					
critical & blocker issues	Upon Availability	4 business days	2 business days	2 business days	2 business days
Major issues	Upon Availability	5 business days	3 business days	3 business days	3 business days
Minor & Trivial Issues	Upon Availability	2 business months	1 business week	1 business week	1 business week
Availability	N/A	95%	N/A	99%	99%
Additional Services					
Installation Days	N/A	N/A	<7 days	N/A	N/A
Quality assured version	N/A	✓	✓	✓	✓
Third Level Support (system enhancements)	Next Release	Next Release	✓	✓	✓
Training Days - Webinar	N/A	2/yr	2/yr	4/yr	4/yr
On Call Service - Pay as you Go Services - System Management	N/A	Included	Upon client request	Included	Included
On Call Service - Pay as you Go Services - Trainer Onsite	N/A	2 days	2 days	5 days	5 days
On Call Service - Pay as you Go Services - Developer					
On Call Service - Pay as you Go Services - Senior Consultant - Manager					
Maintenance Services					
Backup - System, configurations and databases	N/A	Weekly	N/A	Daily	Daily
Server Monitoring	N/A	✓	Upon client request	✓	✓
Bug fixes	✓	✓	✓	✓	✓
Install software patches, service packs and other updates	Next Release	✓	✓	✓	✓
Install software upgrades (Jboss, etc)	Next Release	2 upgrades per year	1 upgrade per year	2 upgrades per year	2 upgrades per year
General server maintenance	N/A	✓	Upon client request	✓	✓
System Diagnostics	N/A	✓	Upon client request	✓	✓
Dedicated enhancements					
Dedicated Document validation (specifics)	N/A	N/A	✓	✓	✓
Specification Management	N/A	N/A	✓	✓	✓
Test plans	N/A	N/A	✓	✓	✓
Security features	N/A	N/A	✓	✓	✓
User rights enhancements	N/A	N/A	✓	✓	✓
Business Analytics	N/A	N/A	✓	✓	✓

- **First Level support**
 - Jira, Helpdesk
- **Second Level support**
 - Response time
 - Resolutions times
- **Additional Services**
 - Installation, Quality assurance, training, etc
- **Maintenance services**
 - Bugs, new versions, etc
- **Dedicated enhancements**
 - Localisation, test plans, document validation, etc

Standalone Document Validation



Available IHE Validation Tools

- ❖ HL7v2 messages
- ❖ DICOM objects
- ❖ XML documents/messages
 - HL7 CDA Structured Document
 - HL7v3 messages
 - IHE XD* transactions metadata
 - DSUB metadata
 - HPD messages
 - Sharing Value Set messages content (SVS)
 - Workflow documents (XDW)
 - ATNA audit messages
 - X509 certificates
 - SAML Assertions

Validation Tool Example : CDA Document

CDA Validation tool for IHE / epSOS / DMP

— [Link](#)

The screenshot shows a web application interface for validating CDA documents. The page has a blue header with the title "External Validation Service Front-end" and a "login CAS" link. Below the header is a navigation bar with icons and labels for "Home", "IHE", "epSOS", "ASIP", "Schématrons", and "Statistiques". The main content area is titled "Valider des documents CDA" and features a "Validation" section. This section includes a text prompt: "Télécharger le fichier XML que vous voulez valider - sont autorisés uniquement les fichiers avec l'extension « .xml »-". Below this is a file upload area with an "Add..." button. Further down, there are two dropdown menus: "schéma" and "Validation basée modèle", both currently displaying "Enter some value". To the left of these dropdowns, the text "Sélectionnez un validateur" is visible. At the bottom of the form area, there are two buttons: "Valider" and "réinitialiser". The footer of the page contains navigation links: "A propos", "Nous contacter", "Suivi de problèmes", "Copyright 2013 IHE International", and a language selector set to "français".

External Validation Service Front-end login CAS

Home IHE epSOS ASIP Schématrons Statistiques

Valider des documents CDA IHE Gazelle

Validation

Télécharger le fichier XML que vous voulez valider - sont autorisés uniquement les fichiers avec l'extension « .xml »-

Sélectionnez un validateur

schéma

et / ou

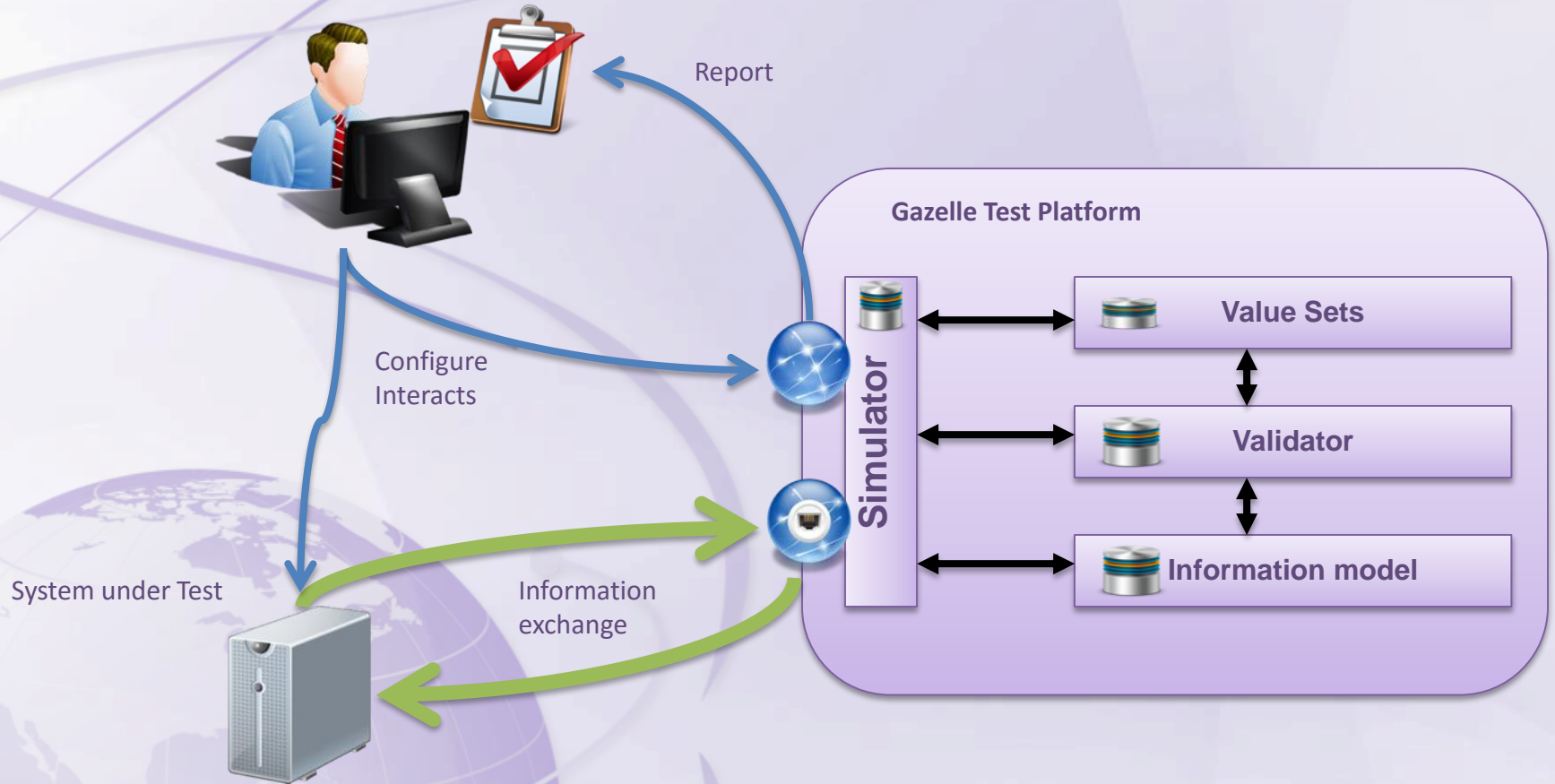
Validation basée modèle

A propos | Nous contacter | Suivi de problèmes | Copyright 2013 IHE International français

Simulator Tools

- Goal
 - Test the interoperability of an application
 - Simulators are not reference implementations
 - Simulators can be controlled to perform test cases
- Target
 - Developers
 - Testers
- Interface
 - GUI for humans to interact with the tool
 - Network socket for the tested protocol
 - Web service to call validation tools
 - Dynamic access to coded value set

Simulator Architecture



Example XDS.b Document Source

Provide and Register Set-b (XDS profile)

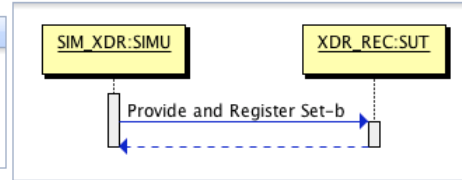
Provide and Register Set-b (XDS profile)

This tool provides the possibility to send documents to a repository or a document recipient using the transaction ITI-41
To use this tool you have to :

- Select your repository configuration or add a new one on the page [configurations](#).
- Fulfill metadatas of the submissionSet. The patientId of the submissionSet is required.
- Upload the document(s) to submit, and fulfill IHE metadatas related to the document(s).
- Click on execute button to send the document(s) to the selected configuration.

Configurations

Simulator	
Name	XDRSRC Simulator
sourceID	1.3.6.1.4.1.21387.2012.2.1.1



System Under Test	
Name	Nist Repository
System Name	Nist Repository
URL	http://hit-testing.nist.gov:12080/tfb/services/xdsrepositoryb

Affinity Domain IHE (XDS.b)

Transaction ITI-41

SubmissionSet :: XDS Submission Set

Submission Set	
SubmissionSet title	<input type="text" value="XDS Submission Set"/>
patient Id *	<input type="text"/>
Opt.	Metadata Name
R	XDSSubmissionSet.sourceId
R	XDSSubmissionSet.uniqueId
R	XDSSubmissionSet.contentTypeCode

Add OptionalMetadata

- please select ..
- Admission evaluation
 - Admission history and physical
 - Autopsy
 - BLOOD BANK STUDIES
 - BLOOD GAS STUDIES
 - Case conference
 - CELL COUNTS+DIFFERENTIAL STUDIES
 - CELL MARKER STUDIES
 - CHEMISTRY CHALLENGE STUDIES
 - CHEMISTRY STUDIES
 - COAGULATION STUDIES
 - Communication
 - Comprehensive history and physical
 - Conference**
 - Confirmatory consultation
 - Consult
 - Counseling
 - Discharge summarization
 - Education
- please select ..

Value(s)

Sharing Value Set Simulator

Value Set Browser

Find below the list of value sets registered in this tool.

[Click here to access the configuration of the value set repository part of this tool](#)

Search criteria

OID	<input type="text"/>	display name	<input type="text"/>
Version	<input type="text"/>	Purpose	<input type="text"/>
Group OID	<input type="text"/>		

[Filter](#) [Reset Filter](#) [Show extended filter](#)

Group browser

OID ↕	display name ↕	Version ↕	Purpose ↕	Action
1.3.6.1.4.1.19376.1.8.5.67	Endometrium-Infiltrating malignant neoplasm-Lesion site	20110331		
1.3.6.1.4.1.19376.1.8.5.5	Generic-Infiltrating malignant neoplasm-Lesion focality	20110331		
1.3.6.1.4.1.19376.1.8.5.106	Skin (melanoma)-Infiltrating malignant neoplasm-Histologic type	20110331		
1.3.6.1.4.1.12559.11.4.2.6	Medical Alerts	20110405		
1.3.6.1.4.1.19376.1.8.5.142	Esophagus-Lesion-Histologic type	20110331		

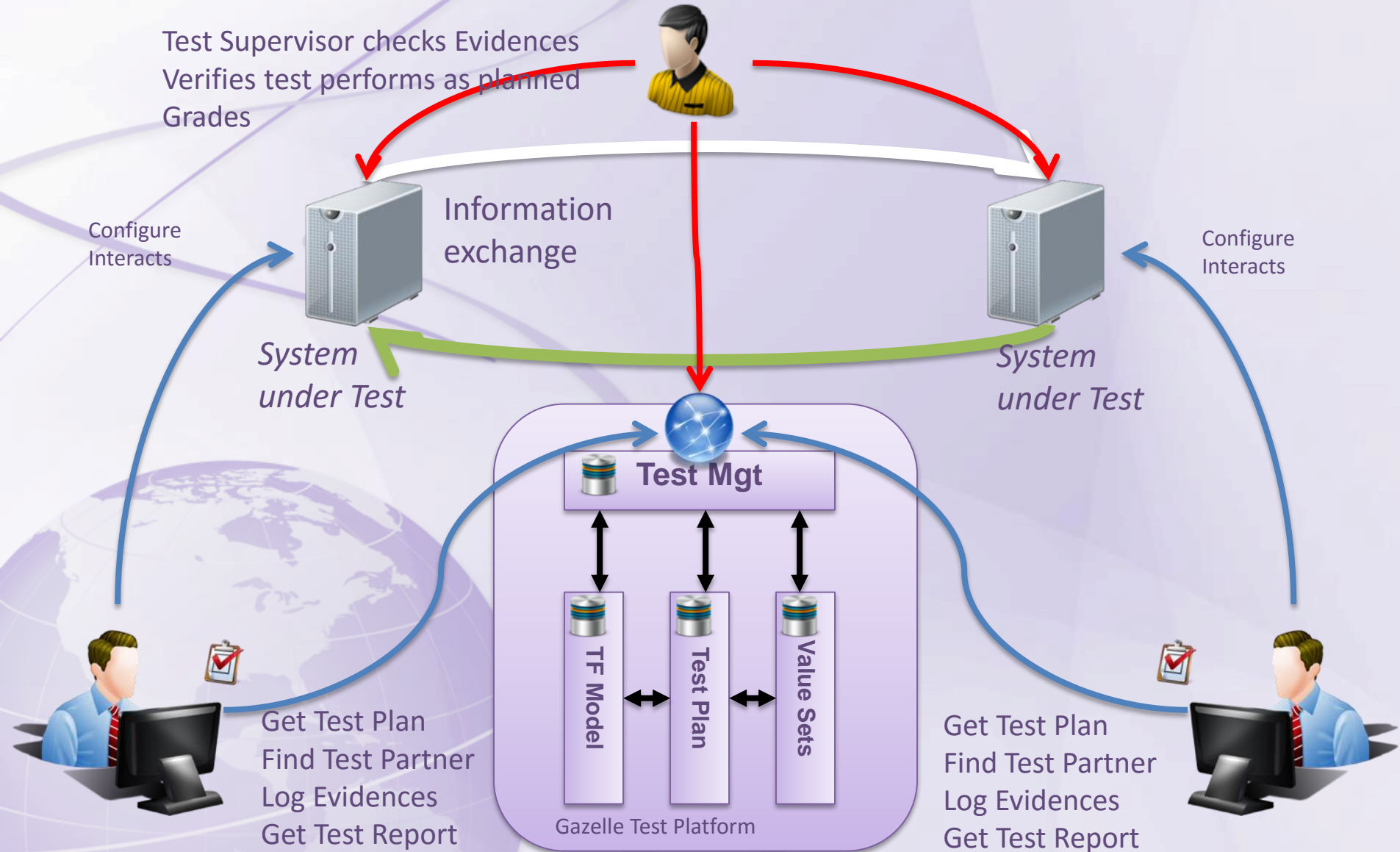
Available IHE Simulators

- ❖ Patient Manager
 - ITI profiles relative to patient demographics exchange
 - PAM, PIXv2, PDQv2, ADT part of SWF
- ❖ Order Manager
 - Profiles dealing with management of orders
 - LAW, LTW, SWF, EYECARE workflow
- ❖ XD* Client : Initiators from the XD* profiles, DSUB, XDS-I.b
- ❖ Sharing Value Set
- ❖ Healthcare Provider Directory
- ❖ Hospital Medication Workflow (Pharmacy)
- ❖ Lab Barcode Labelling
- ❖ Lab Code Set Distribution

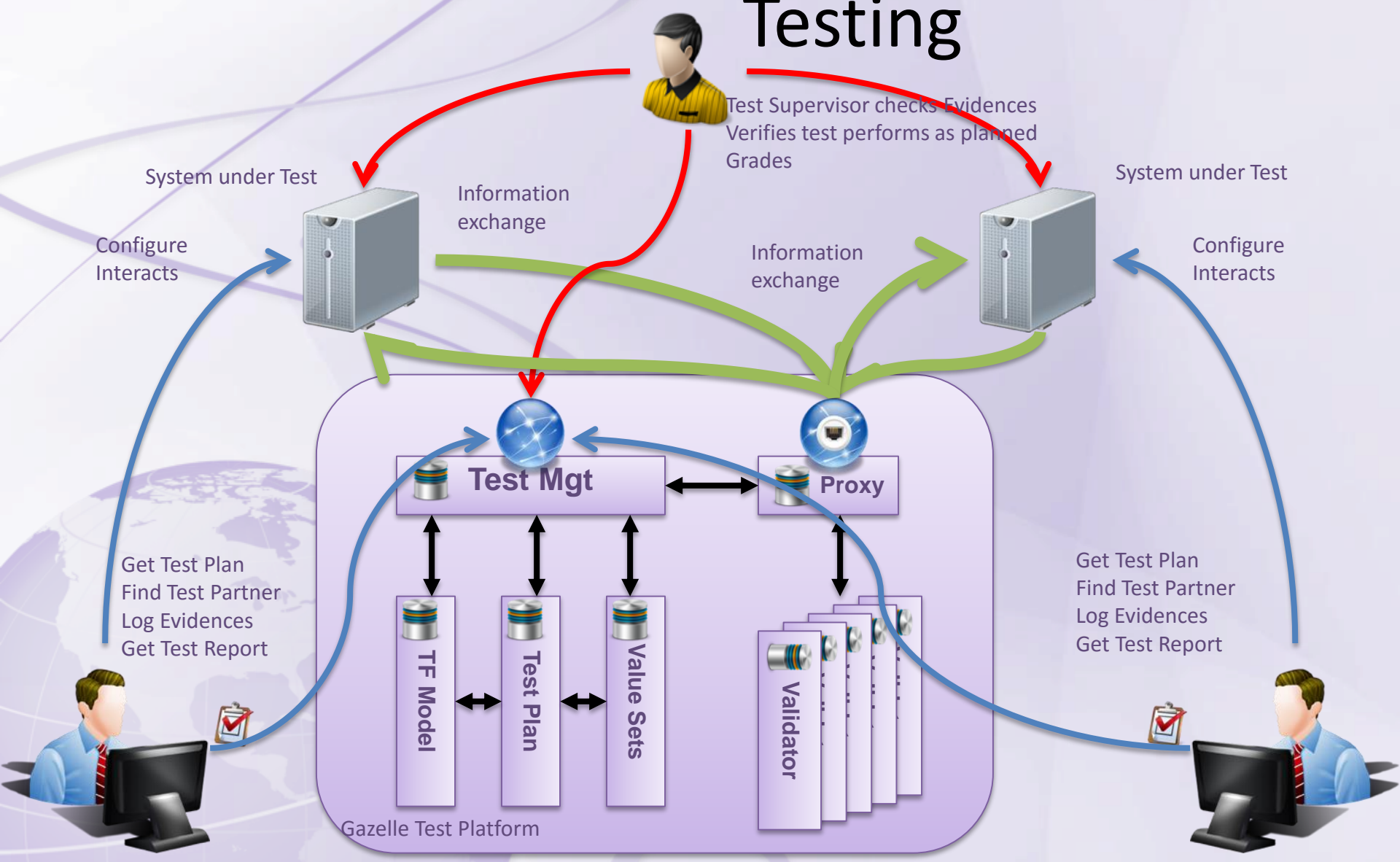
Test Management Platform

- Registration of systems
 - What to test -> select test plan(s)
 - Automation and Quality tracking
- Provide list of test to perform
 - Conformance testing (test to be executed before meeting the actual test partners)
 - Simulators + Validators
 - Interoperability testing (test to be executed system to system)
- Provide Test Campaign reporting

Interoperability Testing



Interoperability + Conformance Testing



System Test Plan

Main Connectathon Page

Search criteria

Testing session:
 Last update : 11/26/12 1:58:45 PM

Organization Keyword:
 System:

Domain:
 Int Prof. option:

Integration profile:
 Transaction:

Actor:
 Test Type: **Thorough**

Results:

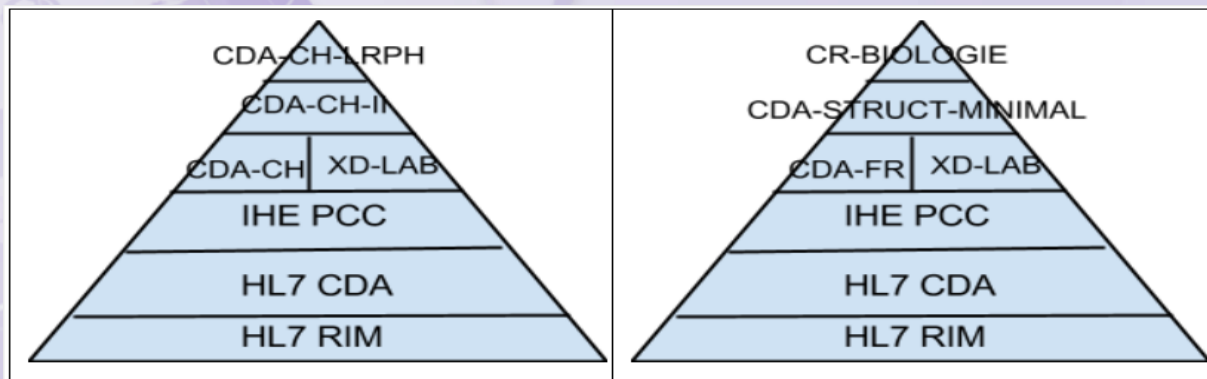
Profile	Actor	Profile Option	Type	R/O	Partners	V	W	P	F	Results
CT	TIME_CLIENT	NONE	T	1/0	1/4	100	?	?	0	Pass
Test		Meta test								
CT_Client_Synch as TIME_CLIENT-CT				R / 1	1/4	18326				
One test										
PAM	PDS	NONE	T	0/0		?	?	?	?	Pass
Test		Meta test								
No test										
ATNA	SA	NONE	T	5/0	3/13	80	0	100	0	Did not complete
Test		Meta test								
ATNA_Audit_Msg_Check as SN_or_SA-ATNA				R / 1		17793				
ATNA_Authenticate_Client as SN_or_SA-ATNA				R / 1		17794				
ATNA_Authenticate_Server as SN_or_SA-ATNA				R / 1				17796		
ATNA_Logging as SN_or_SA-ATNA				R / 3	3/13	18040 18298 18154				
ATNA_Questionnaire as SN_or_SA-ATNA				R / 1		17854				
5 tests										
PAM	PDS	MERGE	T	1/0	3/11	100	?	?	0	Pass
Test		Meta test								
						18338				

Gazelle Support Tools

- Sharing Value Sets
 - <http://gazelle.ihe.net/RetrieveValueSet?id=1.3.6.1.4.1.21367.101.103>
 - <http://gazelle.ihe.net/RetrieveValueSet?id=1.3.6.1.4.1.21367.101.103&random=true>
 - <http://gazelle.ihe.net/RetrieveValueSet?id=1.3.6.1.4.1.21367.101.103&code=A>
- Generation/signature of certificates for testing purposes
 - <http://gazelle.ihe.net/pki>
- Security - Front-end to simulate a TLS connection (HL7v2, DICOM, WS, Syslog)
 - <http://gazelle.ihe.net/tls>
- Gazelle Proxy: Capturing messages exchanged between partners
 - <http://gazelle.ihe.net/proxy>
- Demographic Data Server: On demand generation of demographic data
 - <http://gazelle.ihe.net/DDS>
- Assertion Manager: Manage requirements
 - <http://gazelle.ihe.net/AssertionManagerGui>

Gazelle ObjectsChecker new!

- A methodology to describe informal requirements in healthcare IT specifications based on CDA standard, into a formal description
- An architecture that allows :
 - The validation of the conformance of **any kind of XML requirements**
 - Provide metrics and documentary features
 - Improve the **coupling between rules and requirements**
 - Support the **validation of inheritance** between specifications
 - Coupled with **Art Décor** CDA tool



See more...

- Gazelle tutorials YouTube channel
- <https://www.youtube.com/playlist?list=PL41WsYuE9IdThjLcumP4G1yXeEle4qZZs>