

IHE[®]
EUROPE

EXPERIENCE
SESSIONS

15-17 JUNE 2021



Imaging Deployment in Europe: IHE profiles in use

IHE-Europe Taskforce

Presented by Karima Bourquard, Director of Interoperability, IHE-Europe EU-Affairs

During the winter 2019-2020, a survey was prepared by the IHE imaging taskforce with four objectives:

- To know more on the landscape on Imaging Shared Platform projects deployed in Europe;
- To learn on which profiles and standards solutions are implemented by vendors;
- To better understand the strengths and weaknesses of IHE profiles
- To identify what are the needs that IHE profiles have not yet covered

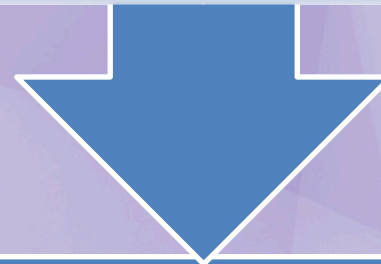
Methodology



Two questionnaires were sent:

one asking the users to
give feedbacks on their
projects

one dedicated to
vendors and the
implementation of IHE
profiles in their products



16 questionnaires were finally
collected: 8 from users (AT, FR,
CH, FI, BE) and 8 from Vendors

User questionnaire

- Contact information
- Project information
 - General description
 - Business cases
 - Scope and functionalities
- Project Management
 - Status and scale of the implementation
 - Technology
 - Systems used
 - Content and images
- Comments on the deployment
 - Expectations/benefits
 - IHE profiles impact
 - Improvement
 - Performance
 - Security aspects

Vendor Questionnaire

- Contact information
- Product and Profiles
 - Product
 - Profiles
 - Comments on the use of the profiles
- Project using your product/profiles
 - Contact
 - Description
- Development Roadmap for integrating profiles

IHE[®]
EUROPE

EXPERIENCE
SESSIONS

15-17 JUNE 2021



Part I - USER QUESTIONNAIRE

Projects have been distributed at different scales from local (for example healthcare providers geographically closed), regional (with more broader actors are involved) and national level (where national authority is also involved).

- **National Projects**

- Framework for Image Sharing
- Nationwide repository for Imaging data
- Exchange of consultation and notes

- **Regional projects**

- Radiological and nuclear medicine
- Images sharing for 27 hospitals
- Images sharing for 40 organisations in one side and 20 organisations in other side that will be connected in the coming years
- Remote access to locally stored images (Regional Healthcare Network, interconnecting hospitals with ambulatory healthcare professionals)

- **Local project**

- This Project includes three hospitals and one cancer hospital

The projects (1/3)

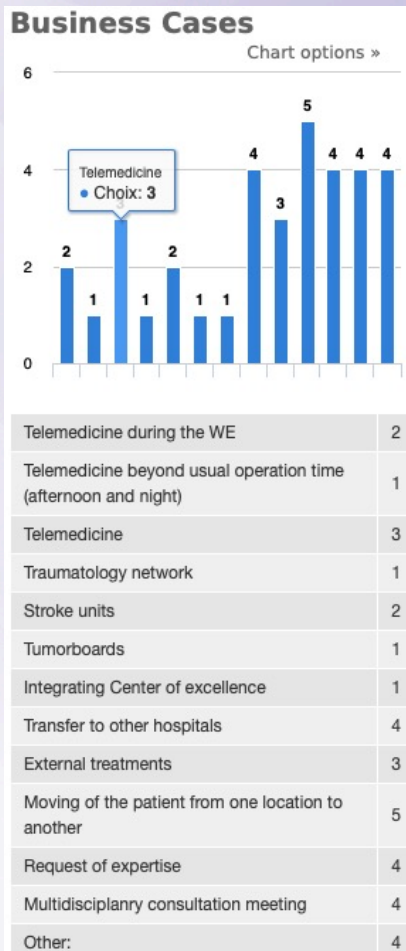
Projects	Description	Techno	Products
TéléO (France) Regional scale	<p>The region Occitanie is the result of the merge of two regions in the South of France. Each of them has been deployed a telemedicine system where Imaging shared platform is one of the component. Today, about 40 healthcare providers are sending examinations with one system and about 20 other from the second region with the other one.</p> <p>Santé Occitanie (the regional centre of competence) is working on a new images sharing project in relation of the first project: the goal is to allow a community of doctors to access all of a patient's exams (according to some rules)</p>	DICOM web	Several PACS (GE, Fuji, Maincare, Philips,...)
Kanta Imaging Data Repository (Finland) National scale	<p>This project is part of the nationwide Kanta services in Finland. The main functionalities are</p> <ul style="list-style-type: none"> - Storing imaging data and related patient clinical data to the national repository; - Enabling access to the stored imaging and patient clinical data - Updates and change management of stored data <p>Future features might be deployed:</p> <ul style="list-style-type: none"> - Secondary use of data - Management of radiation exposure data 	XDS-I XCA-I + proprietary	<p>Archiving PACS : Local Image Manager*, Change Requestor</p> <p>Retrieving PACS : Local Image Manager*</p> <p>Viewer (Imaging) : Document Consumer</p> <p>XDS Registry : XDS Registry</p> <p>XDS Repository : XDS Repository</p> <p>Kvarkki DICOM archive (storing) : Centralized Image Manager* (/ Image Archive)</p> <p>Kvarkki DICOM archive (retrieval) : Imaging Document Source</p> <p>XCA(-I) Gateway : XCA Initiating Gateway, XCA Responding Gateway, Initiating Imaging Gateway, Responding Img. Gateway</p> <p>CDA r2 and HL7 v3 messages</p> <p>National patient archive(+adapter) : XDS Repository</p> <p>* IHE MIMA (Multiple Image Manager Archive) actor</p> <p>Several PACS and RIS (clients)</p>
IRIS Aquitaine (France) Local scale	<p>Image and report Sharing between Public hospitals (Three main hospitals) , private practice (10 providers) and cancer hospital in a big town and its suburbs.</p> <p>The objective is to provide access to previous examinations and to follow the pathologies and cancer of the patients</p>	XDS-I	Several PACS (Fuji, Agfa, Medasys) RIS (Penaranda, Agfa, Xplore)

The projects (2/3)

Projects	Description	Techno	Products
Additional Services to the Swiss EPR (Suisse) National scale	The Suisse law covers only the EPR (Electronic Patient Record). However eHealth Suisse (the national centre of competence) is working on offering additional services such as point to point communication (e.g. radiology referral and results) all over Switzerland. eHealth Suisse just published a recommendation on the use of ORF (order and referral by form), a FHIR Implementation Guide based on Structured Data Capture. The document addresses decision makers (https://www.e-health-suisse.ch/fileadmin/user_upload/Dokumente/F/recommandations-services-supplementaires-interoperables.pdf). Specifications and Implementation Guides for radiology use cases will follow.	HL7 FHIR	Several PACS and RIS FHIR based point ot point communication
NÖBIS Image Sharing	This Project provides Image sharing for all the 27 Hospitals in Lower Austria and is based on IHE XDS & XDS-I. As soon an image acquisition is finished on the modality, the study is transferred to the PACS and immediately forwarded to the local IHE compliant Imaging document source (IDS) called NEC which generate a KOS-object and store it in the country wide XDS affinity.	XDS-I Dicom Web	Several PACS (Vepro, non XDS) SIEMENS (non XDS) SIEMENS (Imaging Document Consumer Dedalus: Imaging document consumer GE: Imaging document Consumer RIS: VEPRO, AGFA, SIEMENS? GE All provide CDA documents
KRYPTON ESEA Nouvelle-Aquitaine (France) Regional scale	Image exchange and image sharing for medical images at the Nouvelle-Aquitaine region level. Radiological and Nuclear medicine images are the first images shared.	XDS-I	Several PACS (Telemis, carestream, Dedalus, GE RIS (Penaranda, Agfa, Xplore, Crossway, etc)

The projects (3/3)

Projects	Description	Techno	Products
Réseau Santé Wallon (RSW) (Belgium) Regional scale	<p>Regional Healthcare Network, interconnecting hospitals with ambulatory healthcare professionals with the following features:</p> <ul style="list-style-type: none"> -Remote access to locally stored images; -Regional secured index with all references to available radiology reports; -Access to the content of the report through a secured tunnel and national SAML authentication; -Access to the images through a link to a secured url. <p>Each image provider chooses its preferable web application to give access to its images.</p> <p>The regional server just manages the references and controls the access rights.</p>	DICOM web Proprietary	Several PACS (Telemis, carestream, vue motion, ets) 50 Hospitals Several RIS: no link
Brusafe+ Belgium Regional Scale	XDS repository for multidisciplinary (medical and non-medical data) exchange in the region of Brussels.	XDS	Several PACS and RIS



- Others:
 - production of examen in one location and interpretation from another
 - sharing one examen to physicien located out of the hospital thanks to a code given to the patient
 - Access to previous examinations in order to give a report that consider other examinations
 - Follow up of pathologies and cancer

Nationwide service

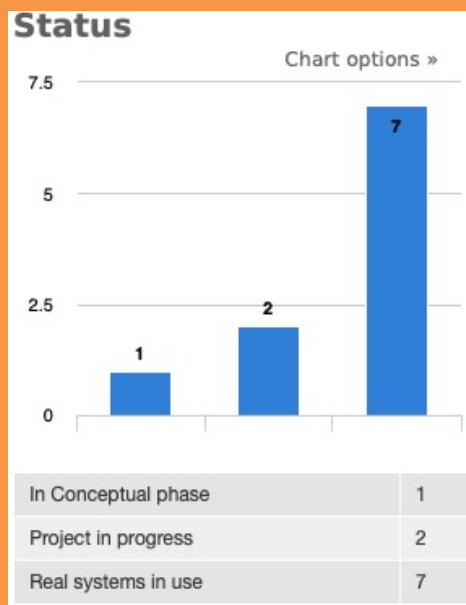
- Storing imaging data and related patient data to the national repository
- Enabling access to the stored imaging and patient data
- Updates and change management of stored data
- Possible future functionalities:
 - Secondary use of data
 - Management of radiation exposure data

Regional folder to secure diagnosis

Order and referral, bidirectional communication

Centralized neutral archive

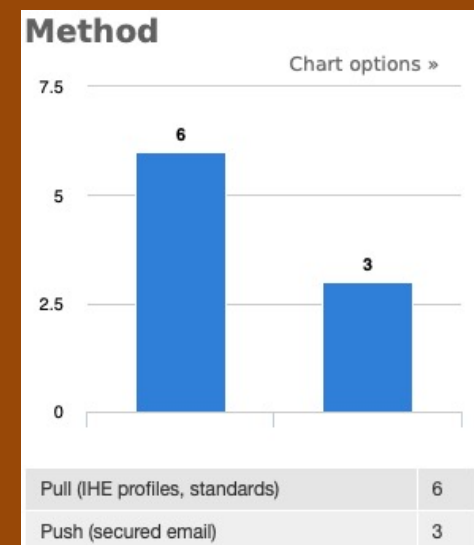
*7 projects are in use
with real systems*



*Most of them are at
the national or
regional scales*



*and use a pull method
(based on IHE profiles
and standards)*



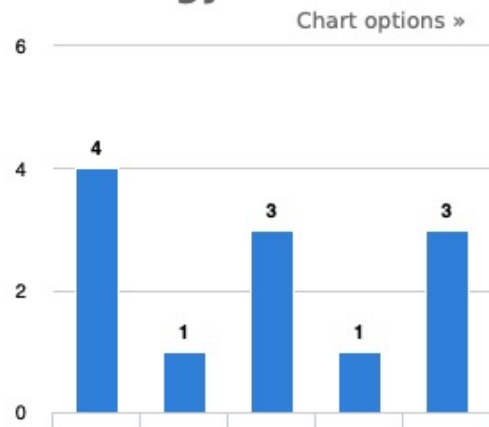
Various consent patient policies in place:

1. ***By oral:*** the healthcare professionals ask the patient if he/she gives his/her consent;
2. ***Opt out policies:***
 1. The patient consent is presumed. If he doesn't want to participate, his Identity is not available in the system
 2. The patient can oppose to participate to the project (project requested by the Ministry of Health)
 3. Via BPPC profiles
 4. Consent documents and restrictions are stored as CDA document. Consent data is automatically applied in the data sharing infrastructure. The solution is not based on IHE profiles.
3. ***National policy for medical exchange***

The projects use XDS environment but also other environments

They are also multi vendor for PACS and RIS

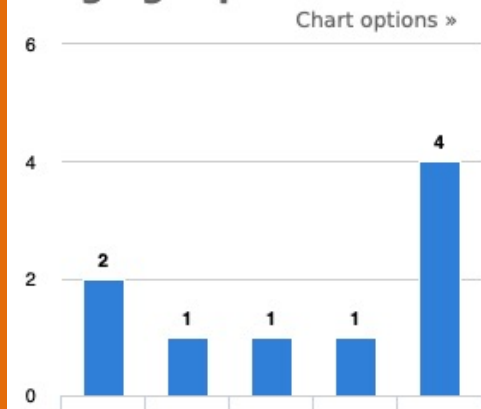
Technology



XDS : XDS-I Environment	4
XCA : XCA-I Environment	1
DICOM Web	3
HL7 FHIR	1
Proprietary solutions	3

Various imaging reports are implemented

Imaging report format

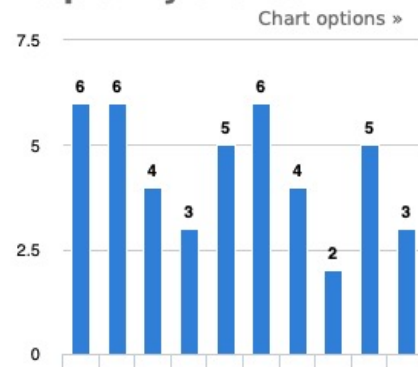


CDA r2 with structured sections (coded header + Body text) as specified in XDS-I	2
CDA r2 with UNICODE test body (non XML) as specified in XDS-I	1
CDA r2 header + PDF body as specified in XDS-SD	1
FHIR document	1
Other	4

Others: HL7v3 medical records, FHIR based point to point, KHMER Hub, CDA referral Summary, National belgian standard interface/xml with encapsulated PDF for report and link to DICOM server

Various types of images

Type of images frequently shared



CT	6
MR	6
PET	4
Mammo	3
Angiography	5
Radiography	6
Tomosynthesis	4
Endoscopy	2
Ultrasound	5
Other	3

Others: Secondary capture, Digital X Ray, X Ray Radiation, Other Nuclear Medicine studies (Spect-CT; Spect)

Type	For Reports since	Imaging reports per year	For Imaging Studies since	Studies per year	KOS per year	Patients per year
Region (France)	-	-	2014	25 000	-	-
Nation (Finland)	2018	-	2018	200 000	200 000	165 000
Local (Suisse)	2013	700 000	2013	750 000		300 000
Region (Austria))	2007	1 200 000	2011	1 200 000	1 200 000	200 000
Region (France)	2019	1 500 000	2019	2 100 000	-	1 500 000
Region (Belgium)	2019	500 000	2017	100 000	-	-

- Cooperation between professionals
- Emergencies management
- Multidisciplinary meetings
- Speed, quality and security of transfers, Accelerate access to information
- To decrease costs on handling imaging data , Good return on investment
- To improve healthcare delivery processes through streamlining the access to data
- Reduce examination redundancy/Reduce duplicate acts
- Interoperable order and referral as well as result transfer between order placers and order fillers in different institutions (practice, hospitals etc.)
- To share Imaging examination rapidly so that they can be used in everyday practice

- Extensive and complex documentation that is sometimes difficult to understand, interpret and apply
- Some profiles are staying in the Trial Implementation mode for too long
- Availability of compliant implementations that would be easy to procure, install and maintain
- Vendors promoting proprietary solutions
- Not used by enough institutions yet
- Inertia of vendors
- Availability of a former national standard

IHE[®]
EUROPE

EXPERIENCE
SESSIONS

15-17 JUNE 2021



Part II - Vendor QUESTIONNAIRE

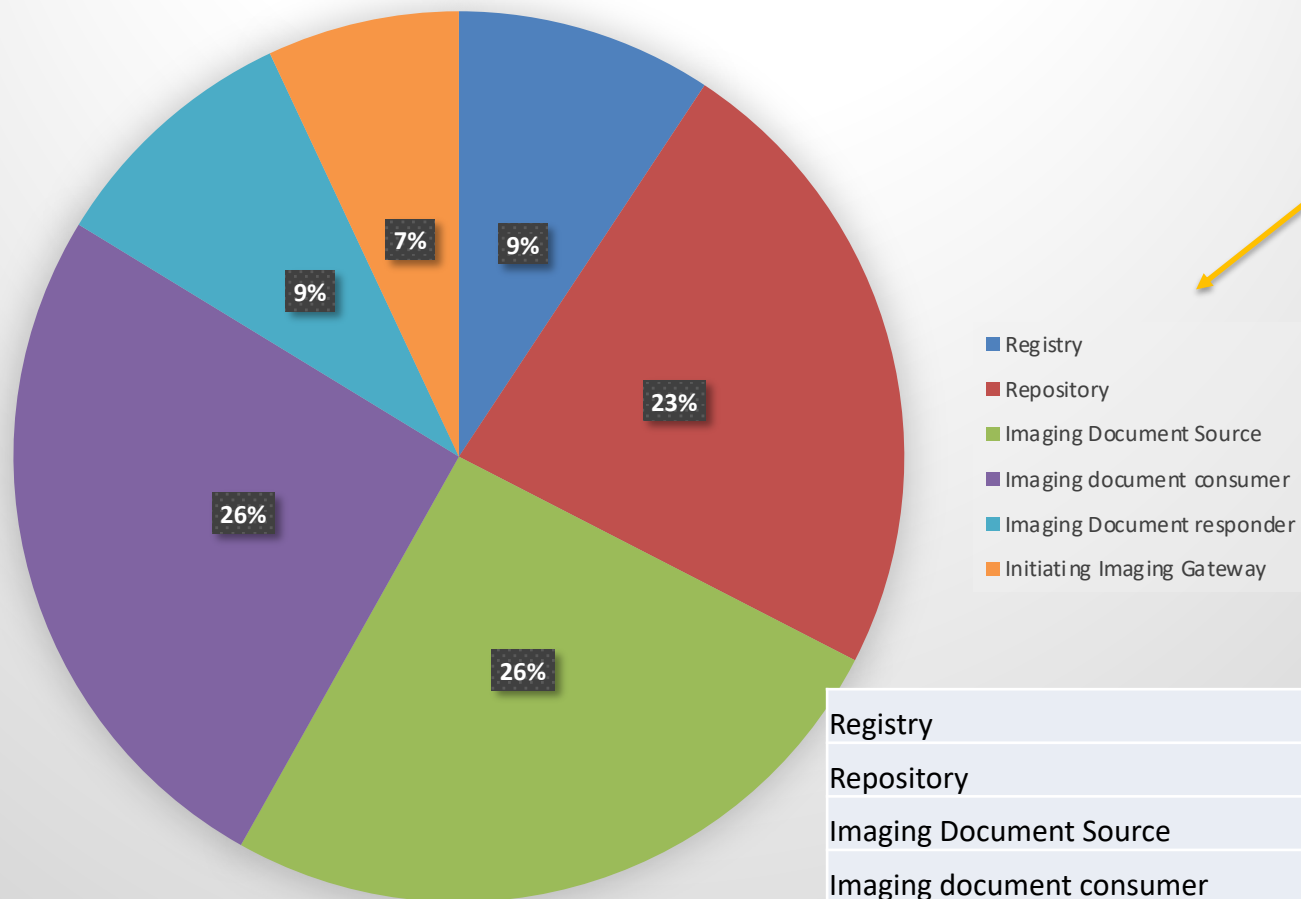
- The following slides provide:
 - For each vendor, their products (PACS or VNA) and the profiles that are used (based on their Integration Statement (IS))
 - Some projects supported by the vendors

Company	PACS	VNA	Profiles/ators
DOBCO Medical systems	PACSoNWEB		Document Registry, Document Repository, Document Source
Chili GmbH	CHILI PACS		PIX Conumer Document Source Imaging Document Responder , Other proprietary messages Profiles: ARI, ATNA, SEC, CPI, CT, XDM, XDS-I.b, ED, HPD, IOCM, IRWF, IRWF.b, IID, KIN, MAMMO, PAM, PDQ, PIX, PIR, REM, SWF, SWF.b, SINR, TCE, WIC, WIA
Siemens	eHealth solutions VA37 (Levante Halifax)		PIX Manager, PIX Conumer, Document Registry, Document Repository, Document Source, Imaging Document Responder , Imaging Document Consumer (WIA), XCA initiating Gateway, Responding Gateway, Profiles: APPC, ATNA, BPPC, CRD, CT, XCA, XCA-I, XCF, XCPD, XDM, XDR, XDS, XDS-I.B, XDS-SD, XUA, XDW, DSG, DSUB
Siemens		Syngo.Share VA26	PIX Manager, PIX Conumer, Document Repository, Document Source, Imaging Document Responder , Imaging Document Consumer (WIA), Profiles: ARI, ATNA, ED-CARD,CPI, CT, XDS, XDS-I.b, XUA, XUA++,EUA,ED,IOCM, IRWF.b, IUA

Company	PACS/Other	VNA	Profiles/ators
Siemens	Syngo.plaza VB301		Document Source, Imaging Document Consumer (WIA), Profiles: SWF, SWF.b, PIR, PDI, ARI, CPI, SIR, MAMMO, CT, NMI, EUA, ATNA, IOCM, XDS, KIN
AGFA	Enterprise Imaging 8.1.x		PIX Consumer, Imaging Document Consumer (WIA), Profiles: CATH, ECHO, ATNA, CT, PIX, PDQ, XDS.b, XDS-SD, ARI, CPI, DBT, ED, IOCM
AGFA		IMPAX DATA CENTER 3.1.1	PIX Consumer,, Document Repository, Document Source Profiles: CATH, ECHO, STRESS, ECED, EYECARE, ATNA, CT, PIX,, XDS.b, XDS-SD, ARI, CPI, DIFF, ED, FUS, IOCM, IRWF, KIN, MAMMO, NM, PERF, PGP, PIR, PWF, REM, RWF,SINR, SWF, XDS-I.b
AGFA	IMPAX EE R20 XVIII Server 2.18.1		PIX Consumer, Document Registry, Document Repository, Document Source, XCA Initiating Gateway, XCA responding Gateway, Responding Imaging Gateway, Profiles: CATH, DRPT, ECG, ECHO,ED CARD, PGP,, STRESS, ECED, EYECARE, ATNA, CT, PAM, PIX,RID, XDS.b, XUA,, ARI, CPI, ED, FUS, IOCM, IRWF, KIN, MAMMO, NMI, PDI, PIR, PWF, REM, RWF,SINR, SWF, TCE, XDS-I.b
AGFA	HYDMEDIA G5 5.11.12		PIX Consumer, Document Repository, Document Source Profile: XDS.B, PIX, CR, ATNA

Company	PACS/Other	VNA	Profiles/ators
GEH	Edison Datalogue (Centricity Clinical Archive)		PIX Consumer, Imaging Document Consumer (WIA), Document Registry, Document Repository, Document Source, Imaging Document Responder Profiles: ARI, ATNA, ED CARD, CPI, CT, XCA-I, XDS.b, XDS-I.b, PERF, EUA, ED, FUS, KIN,DIFF, NM, PIX, REM, SINR
GEH	Edison Datalogue Connect		See above
SYNEDRA IT GmbH	SYNEDRA AIM19 Zephyr &SYNEDRA VIEW		PIX Consumer, Document Repository, Document Source, Imaging Document Source, Imaging Document Consumer (WIA), Profiles: ARI, CT, CPI, HPD, IOCM, PAM, PDI, PDQ, PDQv3, PIX, PIX V3,RMD, SINR, SWF, SWF.b, XDR, XDS.B, XDS-I.b, XDS-SD, XUA
FUJIFILM Europe GmbH	SYNAPSE PACS		PIX Consumer, Document Repository, Document Source, Imaging Document Consumer (WIA), Imaging Document Source Profile: XDS.B, PDQ, BPPC, ATNA
FUJIFILM Europe GmbH		SYNAPSE VNA	PIX Consumer, Imaging Document Consumer (WIA), Document Registry, Document Repository, Imaging Document Source, Imaging Document Consumer (WIA), Imaging Document Responder, XCA Initiating Gateway, Responding Imaging Gateway

IHE Landscape on Products

**Actors****Number of systems**

Registry	4
Repository	10
Imaging Document Source	11
Imaging document consumer	11
Imaging Document responder	4
Initiating Imaging Gateway	3

Projects in deployment (1/2)

Companies	Projects	Start date
SYNEDRA IT	Various EPD (Switzerland) Primarely we fulfill the role of an (imaging) document source in several EPD projects. For some of the customers we also take the role of an (Imaging) Document Consumer.	2018
AGFA and Dedalus	Various Teleradiology sites using ORBIS RIS and IMPAX EE (Germany, Austria, Switzerland)	
	Web application is provided to allow access to DICOM studies of a patient. This is typically used to replace physical media (CD/DVD) to share images of a specific patient.	
GEH	NHS EMRAD (East Midlands Radiology) NHS EMRAD (East Midlands Radiology), a consortium of seven trusts utilizing Enterprise Archive and Edison Datatalogue Connect	2015
GEH	AHPM France	
AGFA	VUMC Amsterdam - The Netherlands Project with Agfa Enterprise imaging http://3f4fgv1h77fa41lbai1qpcj7.wpengine.netdna-cdn.com/wp-content/uploads/2017/03/VUMC_01_LowRes.pdf	2017
AGFA	SIMRAL (e-mage) - East region France Simral (e-mage) is a image data sharing service deployed in the east region of France. The PACS of the various hospitals of the region can archive their images in a central XDS-I repository (Agfa IDC). And the external physicians / patients can get access to the patient images through a secured portal based on patient consent. They can display the images using Agfa Web viewer XERO.	2015

Companies	Projects	Start date
SIEMENS	Image exchange based on the electronical health record in Austria. Project in test environment https://www.elga.gv.at/fileadmin/user_upload/Dokumente_PDF_MP4/Technisches/Anbindung_von_Bilddaten_V1.51.pdf anbindung_von_bilddaten_v1.jpg	2018
CHILI	INFOPAT www.infopat.eu , https://mis-hd.eu/en/projects/infopat/ The 'Raum für Gesundheit' health region in the Rhine-Neckar Metropolitan Region is one of the five BMBF-funded "Health Regions of the Future" in Germany. The aim is to connect all actors involved in health care and thus to establish structures and processes that allow the cross-sectoral care of chronically ill people. Starting from the premise of "the citizen and the patient at the center", technologies are developed that take into account complex treatment processes, the need for care, and the requirements for efficiency and quality. For this purpose, a number of application and development projects involving a wide range of research projects in collaboration with 26 partners from science, research, industry, social services and the public sector are being carried out for diabetes and colorectal carcinoma, around a patient-controlled personal cross-enterprise patient record.	2012
DOBCO	Belgium - 75% Coverage (with a coverage of 95% in Flanders) of Private and Public medical imaging departments.	2012
DOBCO	Patient portal / Referring physician portal / Direct exchange of images / integration with e-health (all workflows to eliminate the need for a CD Burn Robot / other portal / ...)	2015

- This first study provides a good overview on the existing projects on the implementation of IHE profiles in Imaging platforms at the national/regional and local healthcare providers
- More thorough gap analysis should be performed in order
 - To highlight evidence on the interoperability solutions used in the projects as presented in the previous slides
 - To collect numbers of systems/actors that are really implemented in a multi vendors environment

IHE[®]
EUROPE

EXPERIENCE
SESSIONS

15-17 JUNE 2021



QUESTIONS ?

Contact: Karima.bourquard@ihe-europe.net