



A RIM Based IHE XDS Registry / Repository, using a RIM based database

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Topics



- Introduction
- IHE and XDS
- XDS on ebXML RIM
- XDS on HL7 RIM
- “Images on the net” Project
- O3 Enterprise
- Conclusions

Introduction

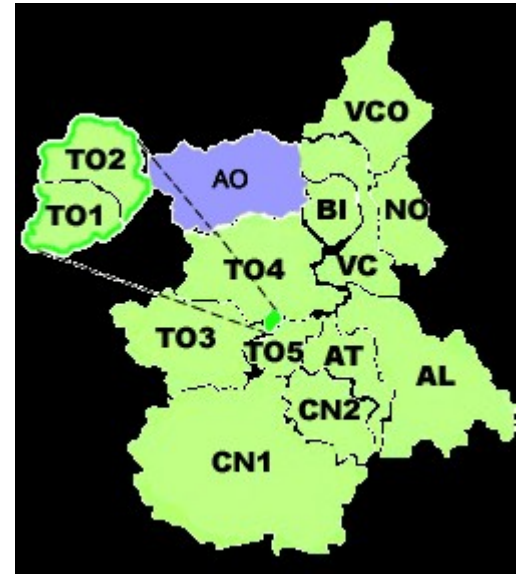
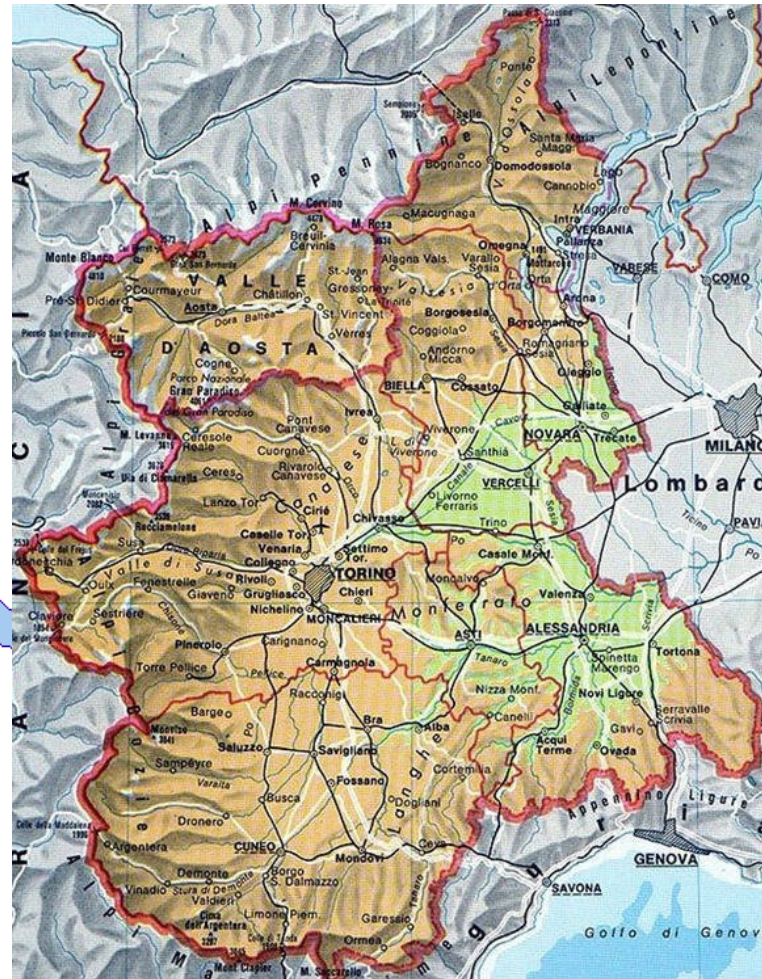
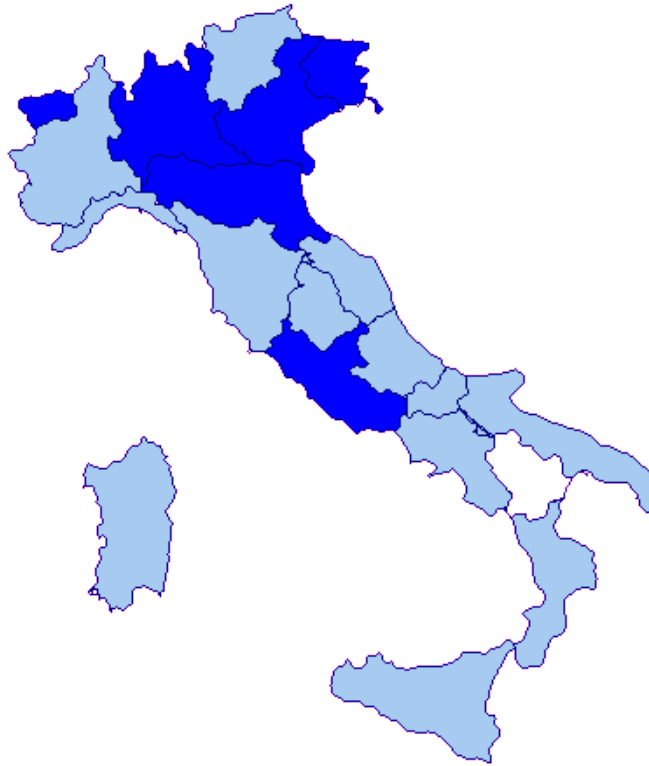


- In 2009 the “CSI Piemonte”, Consortium for IT development of the Public Administration of the Piedmont Region, launched a tender for:
- Regional system for storing, managing and distributing all radiological images produced in two health enterprises
 - ASL TO1 and ASL TO2
 - 1 Million inhabitants

Introduction



- Piedmont Region



Introduction



- ITALTBS SPA and O3 Enterprise Srl proposed an innovative project based on
 - Open Source
 - Open Standard
- The system proposed for the project were:
 - O3-DPACS
 - PHI-RxPortal
 - O3-XDS

Introduction



- The issue has been that O3-XDS and PHI-RxPortal were meant to cooperate.
- The systems use different kind of data model:
 - O3-XDS with a ebXML RIM Database
 - O3-RxPortal with a HL7 RIM Database
- The idea has been to use the same database model, migrating O3-XDS from the ebXML RIM to HL7 RIM

IHE and XDS

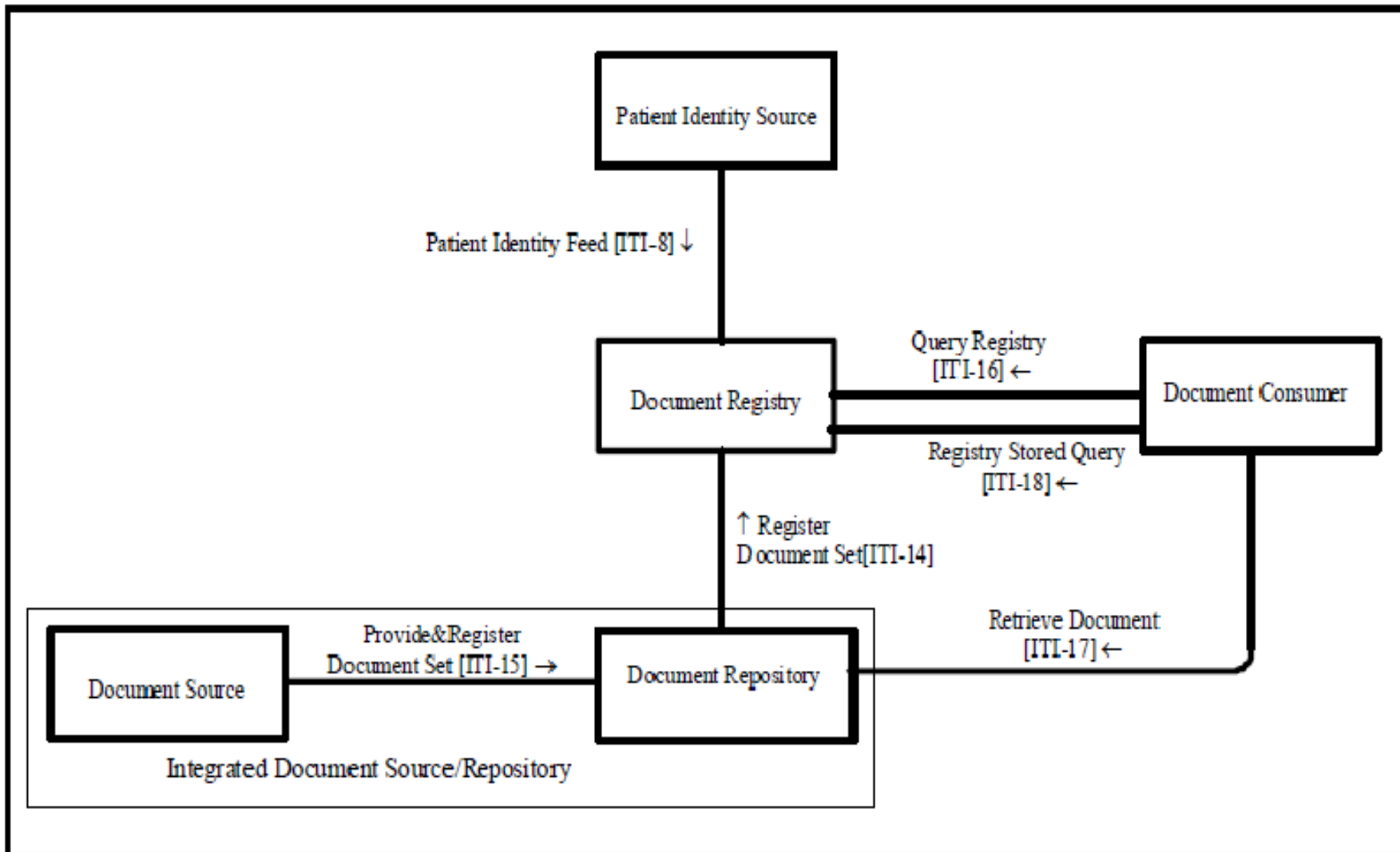


- IHE Cross Enterprise Document Sharing (XDS) is a group of standards and rules for document sharing amongs different Enterprises
- It logically separates indexing information (the meta-data) from the content.
- This allows XDS to support a wide range of documents, though presenting a simple and consistent method to store, index, locate and retrieve them for clinical use

IHE and XDS



- XDS provides the following actors/transactions



- XDS Objects

- XDS Document



document-describing metadata

-
- XDS Folder



contains one or more documents

-
- XDS Submission Set



contains one or more documents and folders

XDS on EBXML RIM

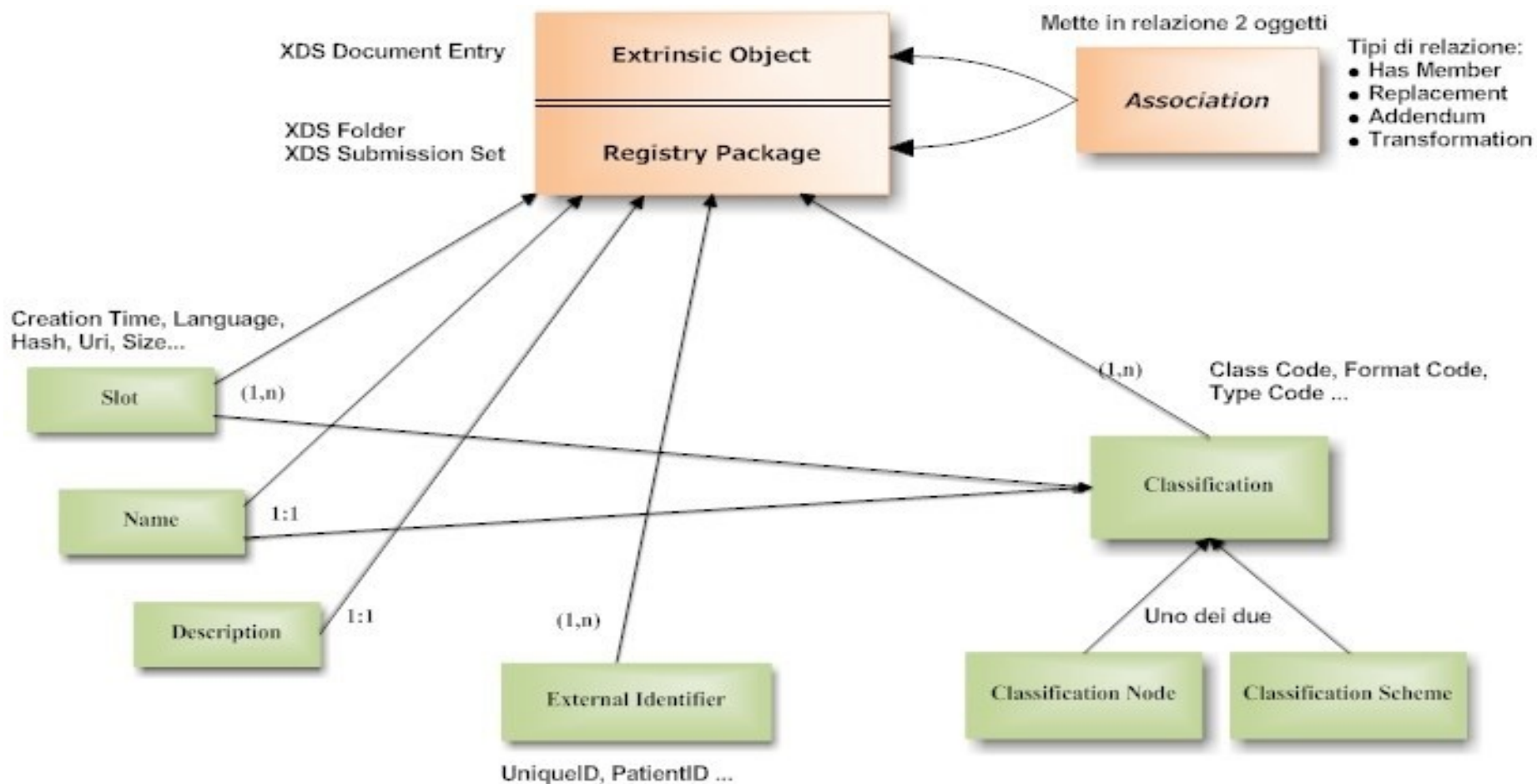


- The first version of O3-XDS used a EBXML RIM
- There were no 1-1 correspondence between XDS objects and ebXML Classes
- XDS Objects are “abstract” objects built starting from ebXML Classes



- **EbXML important classes**
 - **Registry Object:** abstract class, doesn't represent any logic object
 - **Registry Package:** objects container
 - **Extrinsic Object:** "XDS document"
 - **Association:** defines objects associations
 - **Slot:** object attribute
 - **External Identifier:** an identifier not maintained by the Registry
 - **Classification Scheme**
 - **Classification Node**
 - **Classification**

XDS on EBXML RIM



XDS on EBXML RIM



- XDS Document mapped by ExtrinsicObject

ID:
a universal unique id

Object Type:
urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1
means "XDSDocumentEntry" (coded)

Document Mime-type

Versioning

Document Status

pgAdmin III Edit Data - PostgreSQL Database Server 8.2 (localhost:5432) - registry - extrinsicobject

	accesscontrolpolicy character varying(5)	id [PK] character varying(64)	objecttype character varying(54)	expiration character varying(10)	majorv integer	minorv integer	stability character varying(10)	status character varying(10)	userv character varying(10)	isopaque character varying(10)	mimetype character varying(100)
1		0:91835c-a4ea-413-a0b0-a7a76ac1c131	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
2		0695hda9-7b7d-4ac5-aaab-eb5cf4df8d49	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
3		00c0407a-50a5-430e-b003-bab070032ecd	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
4		1:4be920-3d7f-4e2e-9ece-c6390320db5c	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
5		14a13/hk-3fad-48c8-h1f1-4Rfhea176fh	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
6		223d4015-0872-452c-b024-c43d849f8a3	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
7		2dda0c21 a5e3 15cc b151 838c1303f3d	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
8		33f74eac-5bfc-4f00-3b16-e97c8a08fc28	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
9		456435b0-e323-4f0c-8efa-a6f5e50a63e9	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
10		19205b10 :58d 13db bb8c cc373bcb0130	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
11		57e4b4ab-56e9-4055-ad4e-c313c6bd5e7	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
12		637d4d06-c363-45d6-9c24-f96d0a6c73e6	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
13		640af417-bd5e-4bcb-900b-911d0909b0fd	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf
14		7143070-474c-4700-0000-000000000000	urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1		1	0		Approved		-	application/pdf

XDS on EBXML RIM



- XDSDocument properties mapped by Slot

slot **name**:
custom attribute name

slot **value**:
attribute value

parent:
the document id

pgAdmin III Edit Data - PostgreSQL Database Server 8.2 (localhost:5432) - registry - slot

File Edit View Help

No limit

	name character varying	slottype character	value character varying(128)	parent character varying(64)	pk [PK] seq
1	sourcePatientInfo		PID-3 pid1^^^domain	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1055
2	URI		http://localhost:8080/o3xds/repository?doc=1701200817012115_140.105.63.34.1	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1056
3	sourcePatientId		jfjff^^^jfjff	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1057
4	size		154166	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1058
5	serviceStartTime		200412230800	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1059
6	sourcePatientInfo		PID-7 19560527	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1060
7	sourcePatientInfo		PID-11 100 Main St^^Metropolis^I^44130^USA	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1061
8	serviceStopTime		200412230801	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1064
9	sourcePatientInfo		PID-8 M	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1065
10	hash		7b18cd0be607dc3347f330013e155db6	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1066
11	sourcePatientInfo		PID-5 Doe^John^^^	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1068
12	authorInstitution		Fairview Hospital	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1069
13	languageCode		en-us	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1070
14	creationTime		20051224	Fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a	1074

SIZE

HASH

XDS on EBXML RIM



- XDSDocument name mapped by Name

charset:
charset coding

lang:
language

value:
document name

parent:
the document id

	charset character varying	lang [PK] character varying(2)	value [PK] character varying(255)	parent [PK] character varying(64)
1	UTF-8	en-us	Example	fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a
*				

XDS on EBXML RIM



- XDSDocument uniqueID mapped by External Identifier

registryobject:
the document id

identificationscheme:
urn:uuid:96fdda7c-d067-4183-912e-bf5ee74998a8
means "XDSDocumentEntry.UniqueID"
(coded)

value:
the identifier value

min III Edit Data - PostgreSQL Database Server 8.2 (localhost:5432) - registry - externalidentifier

View Help

No limit

id [PK] character varying(64)	access character varying(64)	objecttype character varying(64)	registryobject character varying(64)	identificationscheme character varying(64)	value character varying(64)
21efdcc9-40		ExternalIdentifier	ace12872-0880-475f-99af-89815e2b8991	urn:uuid:58a6f841-87b3-4a3e-92fd-a8ffeff98427	fa7c72ccffcc447^^^&1.3.6.1.4.1.21367.2005.3.7&ISO
41a508f4-9		ExternalIdentifier	8f88500f-d01a-4dd1-afa3-be4cddb361c6	urn:uuid:96fdda7c-d067-4183-912e-bf5ee74998a8	140.105.63.34.1
5b16a162-7		ExternalIdentifier	ace12872-0880-475f-99af-89815e2b8991	urn:uuid:2e82c1f6-a085-4c72-9da3-8640a32e42ab	140.105.63.34.1
78a62d50-d		ExternalIdentifier	9ece56a4-ee43-4135-8efb-e9609a32ddff	urn:uuid:75df8f67-9973-4fbc-a900-df66cefec5a	140.105.63.34.1
a09ebb35-f		ExternalIdentifier	8f88500f-d01a-4dd1-afa3-be4cddb361c6	urn:uuid:554ac39e-e3fe-47fe-b233-965d2a147832	3670984664
f2e4b265-fc		ExternalIdentifier	9ece56a4-ee43-4135-8efb-e9609a32ddff	urn:uuid:f64ffdf0-4b97-4e06-b79f-a52b38ec2f8a	fa7c72ccffcc447^^^&1.3.6.1.4.1.21367.2005.3.7&ISO
fc42e84f-74		ExternalIdentifier	8f88500f-d01a-4dd1-afa3-be4cddb361c6	urn:uuid:6b5ae1a1a-874d-4603-a4bc-96a0a7b38446	fa7c72ccffcc447^^^&1.3.6.1.4.1.21367.2005.3.7&ISO

XDS on EBXML RIM



- XDS Document classifications mapped by classification

one from
classificationnode or
classificationscheme
(coded)

classifiedobject:
the document id

Admin III Edit Data - PostgreSQL Database Server 8.2 (localhost:5432) - registry - classification

Edit View Help

No limit

access charac	id [PK] c	objecttype character var	classificationnode character varying(64)	classificationscheme character varying(64)	classifiedobject character varying(64)	noderepresentation character varying(128)
	552824	Classification	urn:uuid:a54d6aa5-d40d-43f9-88c5-b4633d873bdd		8f88500f-d01a-4dd1-afa3-be4cddb361c6	
	c19b8c	Classification		urn:uuid:aa543740-bdda-42	8f88500f-d01a-4dd1-afa3-be4cddb361c6	Group counseling

means
XDSSubmissionSet

means
XDSSubmissionSet.contentTypeCode

XDS on EBXML RIM



- Folder and Submission Set are mapped by RegistryPackage

pgAdmin III Edit Data - PostgreSQL Database Server 8.2 (localhost:5432) - registry - registrypackage

File Edit View Help

No limit

	access chara	id [PK] character varying(64)	objecttype character varying(64)	expiration character v	majorv integer	minorv integer	stability characte	status character	userversion character va
1		0a0ab659-e587-4783-b38d-febbabde31b4	XDSRegistryPackage		1	0		Approved	
2		0c86746c-7a60-4208-b2ec-f874b41d6874	XDSRegistryPackage		1	0		Approved	
3		0fd5fcbd-978e-4594-a808-ac131b1ead39	XDSRegistryPackage		1	0		Approved	
4		157bb90c-0412-44d6-b432-d1f6622018f5	XDSRegistryPackage		1	0		Approved	
5		1803d8d9-3ca7-471c-8ebe-86192eaeaf1e	XDSRegistryPackage		1	0		Approved	
6		1885decc-d7b0-4394-9870-e5b1635dd167	XDSRegistryPackage		1	0		Approved	
7		195874d6-49a5-4245-a1c3-baf93197c5cb	XDSRegistryPackage		1	0		Approved	
8		1b477727-9c05-4884-bf45-c9fd990e18d1	XDSRegistryPackage		1	0		Approved	

XDS on EBXML RIM

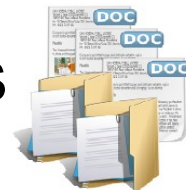


- Relationships mapped by Association

- Folders contain Documents



- SubmissionSets contain Folders and Documents



association type:
the type of this relationship

sourceobject:
the source object ID
of this association

targetobject:
the target object ID
of this association

Admin III Edit Data - PostgreSQL Database Server 8.2 (localhost:5432) - registry - association

lit View Help

No limit

access chara	id [PK] character varying(64)	objecttype character vary	associationtype character varyin	sourceobject character varying(64)	targetobject character varying(64)
	04f81152-f3e3-4415-b971-e0b075da3fd2	Association	HasMember	b4edd5e4-7cb9-4886-9537-a819f2626043	223d4015-0872-452c-b024-c40d849cf8a3
	086a7844-dbd1-40cc-9472-cb5c8ec998da	Association	HasMember	157bb90c-0412-44d6-b432-d1f6622018f5	92b9e888-4820-4929-8515-b38e48f33bdf
	0a70a25b-a56e-4c06-ab7f-aba4f424f2e1	Association	HasMember	56803ee1-56fa-43b7-a8cd-fe07d8d862cc	e3d5f8ad-bcdf-44eb-a910-b33e69d9fdb2
	0fdbb5eb5-ad99-4f70-821b-8ff26d0296f5	Association	HasMember	86b5c878-07fc-4102-8ca8-fca2599f6295	643af417-bd5e-4bcb-988b-911d8989b8fd
	10656166-c607-4764-b30e-fa92a3c00989	Association	HasMember	0c86746c-7a60-4208-b2ec-f874b41d6874	fb986e0f-fde2-40fd-a2dd-a9cfe3a37f5a
	1394eb0f-d502-42b3-9073-a5c67e3d556e	Association	HasMember	c61cf3e2-bd76-4882-b7de-df53db50d63a	e090bb40-6caf-4d88-ad26-e410a86234e8
	14d521d0-1694-4855-9c04-ee18937a7a1c	Association	HasMember	9021632a-671f-4b6d-bbd0-edcf9010d3fe	dae41608-3e8f-4810-af55-a57d2d28380a
	14fc62eb-d2fd-47a3-9436-e662509a26db	Association	HasMember	3341a179-11bf-4a53-a626-8a8afb64fd02	ecbf5c11-bdd7-49ad-bd31-e625c152fee8
	166daba8-96ee-440f-a2e5-c5d1822c89a7	Association	HasMember	7f5a23db-dffb-45f0-86f5-de484473423b	cd73a8fe-11ae-40ec-9392-c48ae3593aa3
	168ca253-bdeb-4bb6-9ca1-b7bab07802af	Association	HasMember	e43718c5-923f-4ee9-b98e-96c9ac96da0a	d7e02972-b1f5-4722-bb17-bc7cfe93763b

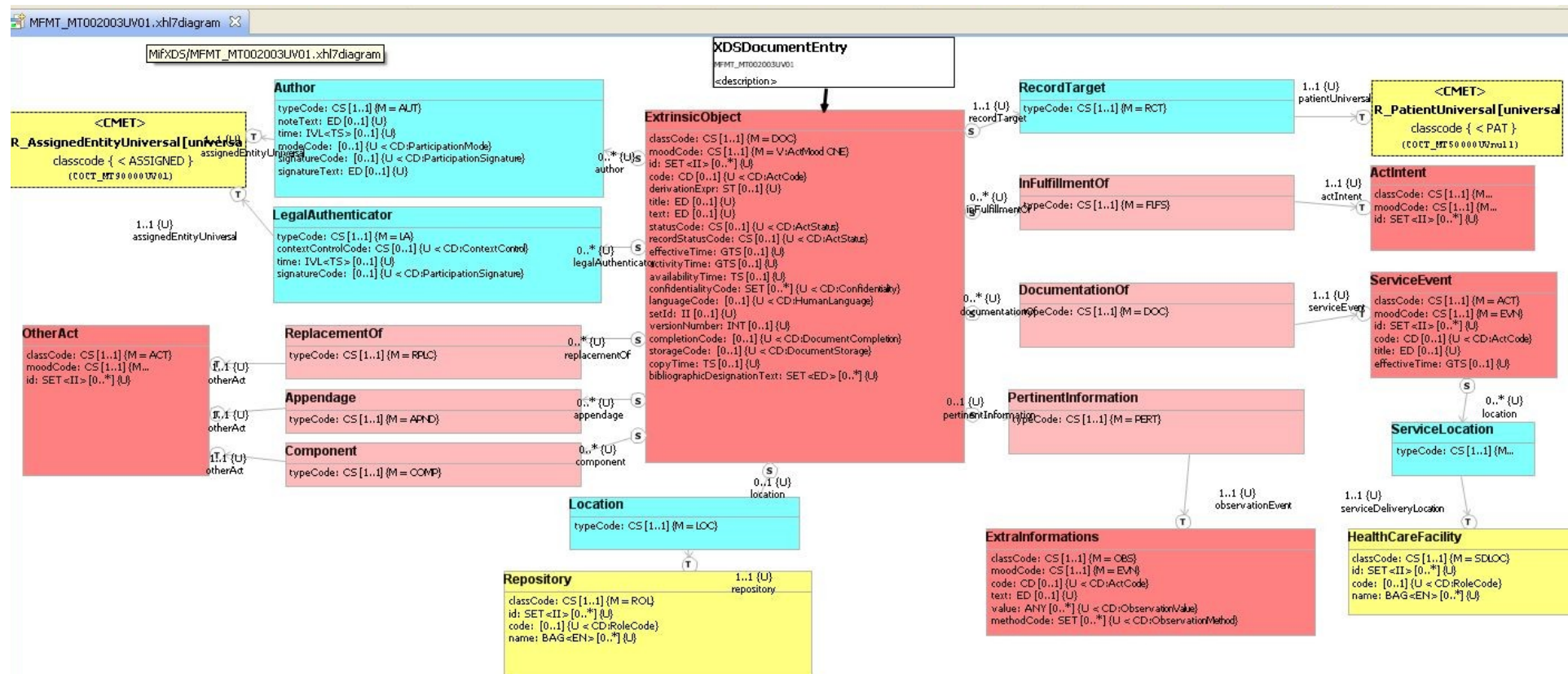


- Two different approaches
 - One R-MIM for all XDS objects
 - A guide line by René Spronk is the following
 - http://wiki.hl7.org/index.php?title=IHE_XDS_mapping_to_HL7_v3
 - One R-MIM for any XDS object
- The second approach has been chosen
 - Better management of XDS communication
 - Facilitates the process of storing and querying information

XDS on HL7 RIM



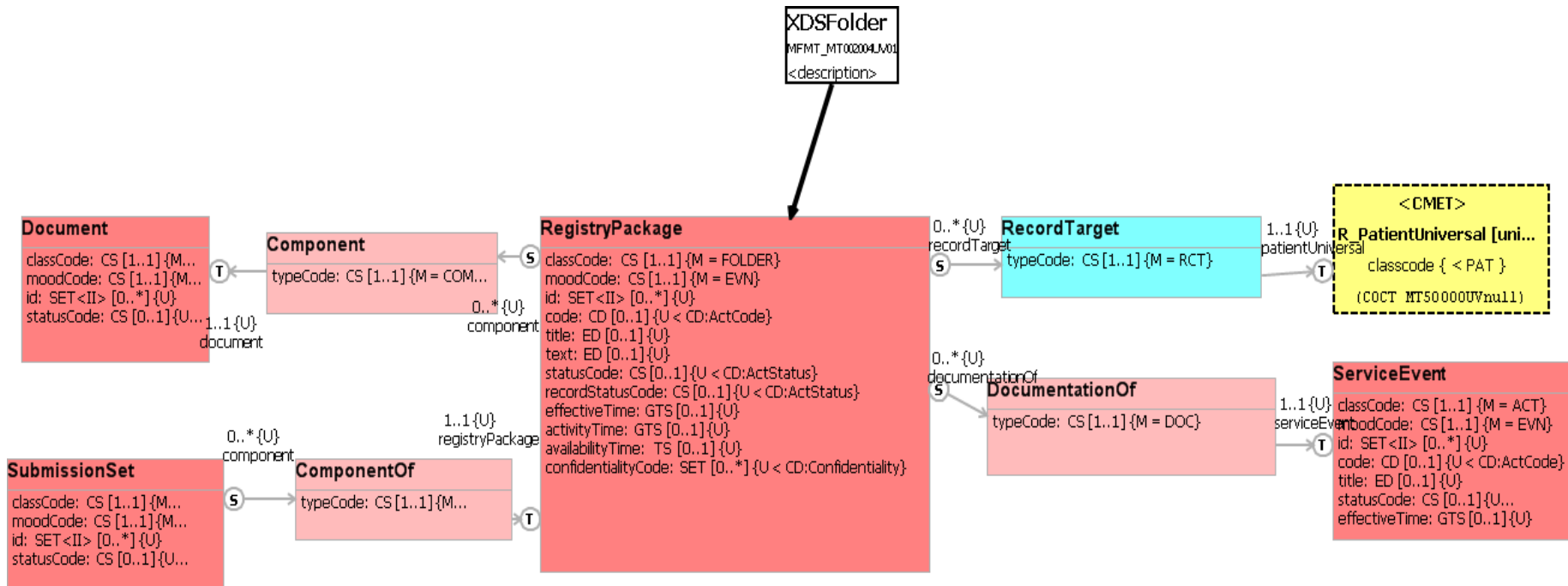
- XDS Document R-MIM



XDS on HL7 RIM



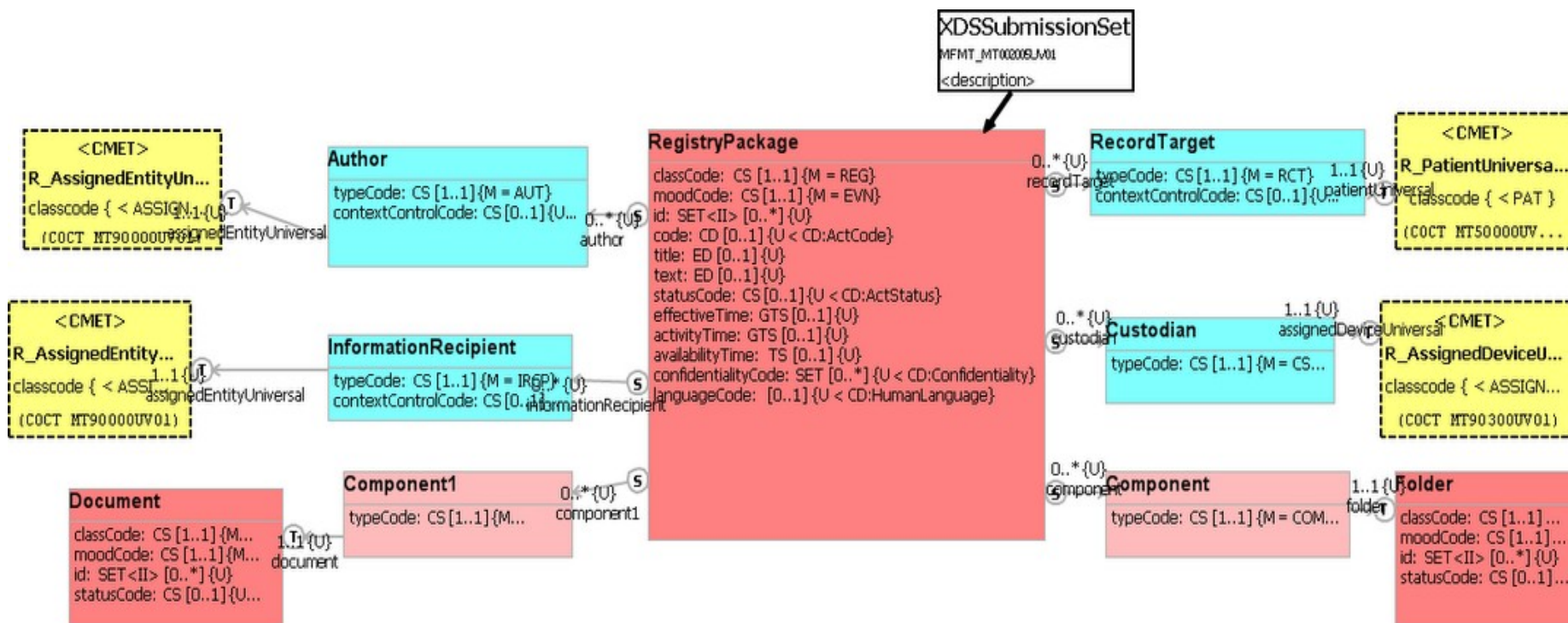
- XDS folder R-MIM



XDS on HL7 RIM



- Submission Set R-MIM



XDS on HL7 RIM



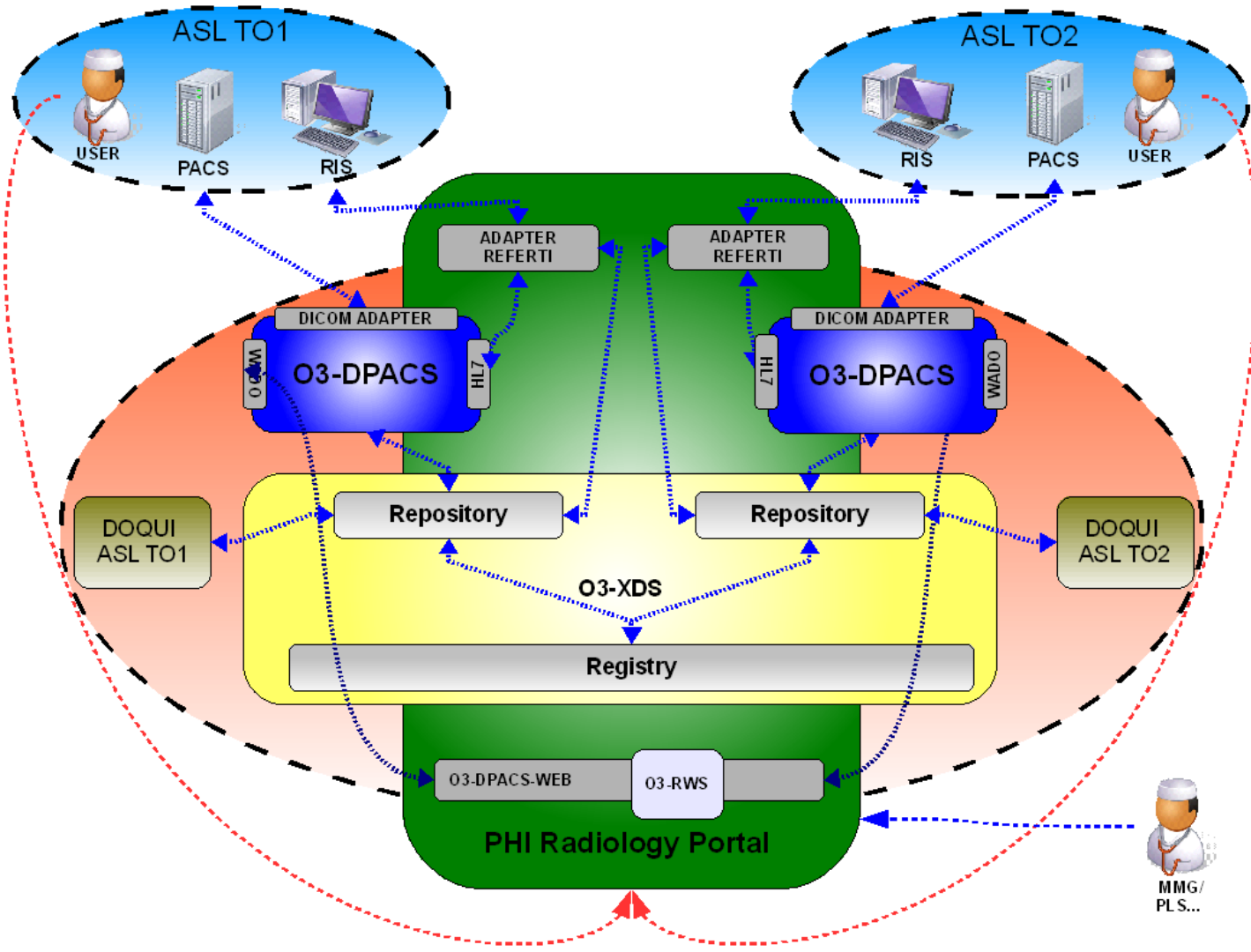
- XDS Repository MIF



RepositoryEntry

```
classCode: CS [1..1] {M = OBS}
moodCode: CS [1..1] {M = EVN}
id: SET<II> [0..*] {U}
code: CD [0..1] {U < CD:ActionCode}
negationInd: BL [0..1] = false {U}
derivationExpr: ST [0..1] {U}
text: ED [0..1] {U}
statusCode: CS [0..1] {U < CD:ActStatus}
effectiveTime: GTS [0..1] {U}
confidentialityCode: SET [0..*] {U...
uncertaintyCode: [0..1] {U < CD:ActUncertainty}
value: ANY [0..*] {U < CD:ObservationValue}
interpretationCode: SET [0..*] {U...
methodCode: SET [0..*] {U...
targetSiteCode: SET<CD> [0..*] {U < CD:ActSite}
```

"Images on the net" Project



O3 Enterprise srl



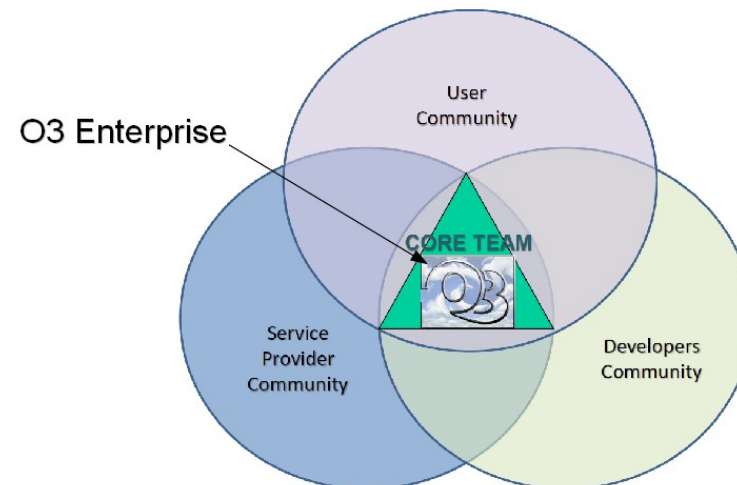
- O3 Enterprise is a University of Trieste Spin-off Company
- The goals are:
 - To offer professional services and guarantees on o3 Consortium Open Source solutions
 - To manage the O3 Consortium Project together with UniTS and to contribute it with new Open Source solutions



O3 Enterprise Solutions



- Solutions for Bioimages management
 - PACS, RIS, Teleradiology, Endoscopy,...
- Open Approach
 - Open Standard
 - Open Source
 - Interoperability
 - Community



Thank for your attention