



Grid y Computación
de Altas Prestaciones

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GRID PROTOTYPE TO SUPPORT CANCER OF BREAST DIAGNOSTICS IN CLINIC PRACTICE

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Introduction



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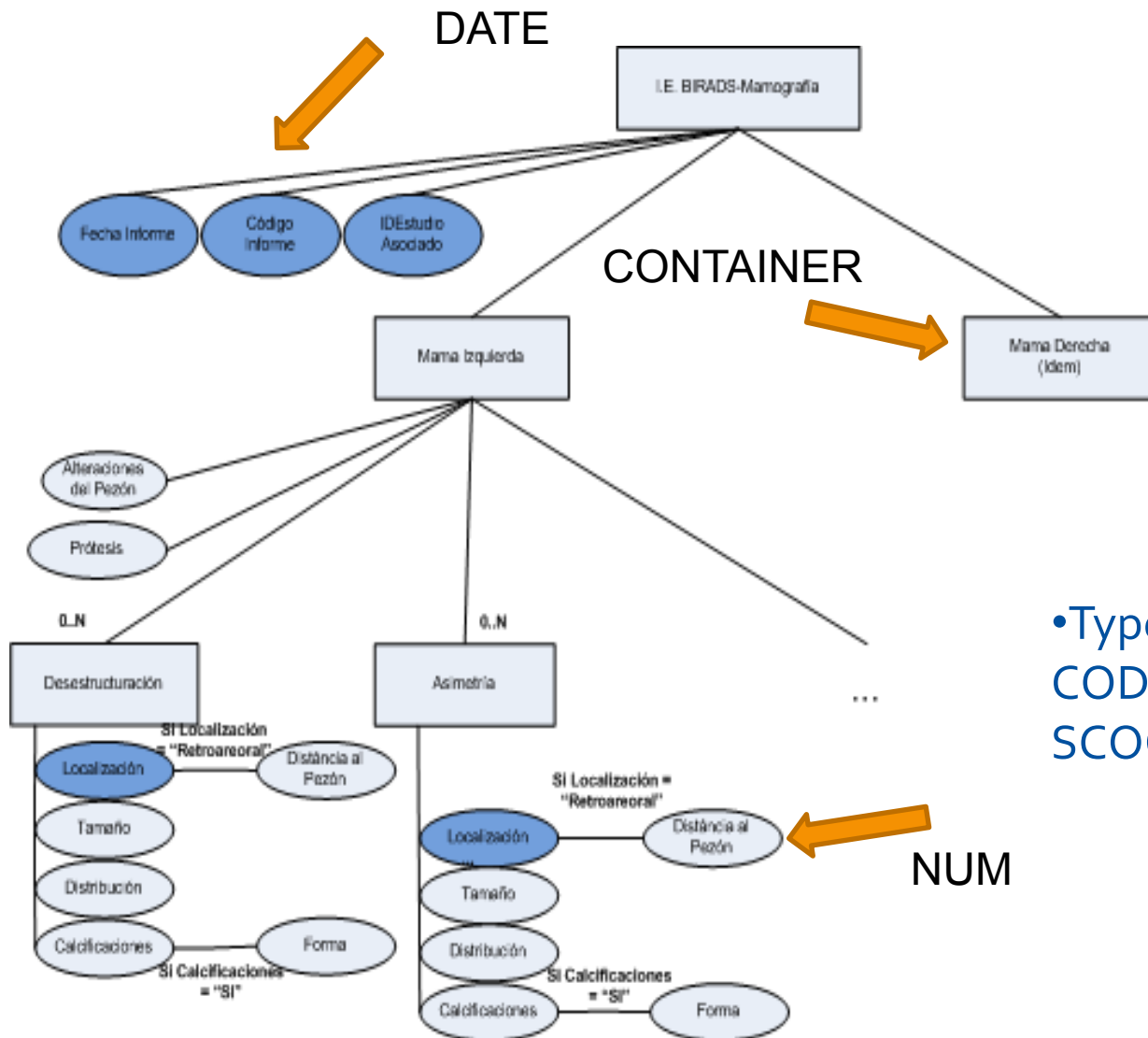
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- **DICOM** was created to aid in the distribution, integration and viewing of medical images (mammography, scan, MRI...) in Hospital Systems.
- DICOM has developed new features and now it is also used to manage diagnostic reports (DICOM Structured Reporting - **DICOM-SR**).

Introduction

DICOM-SR Information tree



•Tree based structure

•Unique identifier (Concept Names)

•Types of Nodes (CONTAINER, CODE, NUM, TEXT, DATE, SCOOD, etc...)

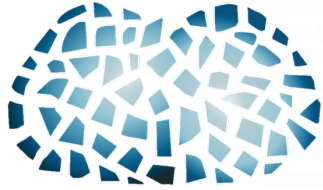
NUM

- **Motivation:**

- DICOM-SR reports based on **federated** report templates → Hospitals would be able to share and exploit all their information through computing procedures.
- But it is not enough...

- **Difficulties:**

- **Total Consensus** of all the centres involved in the definition of the federated report templates is nearly impossible.
- **Protocols and systems** used at intra-hospital level are not valid to joint different centres (different administrative domains).
- **Data security** is a key requirement due to the different national regulations and procedures in terms of privacy.



TRENCADIS

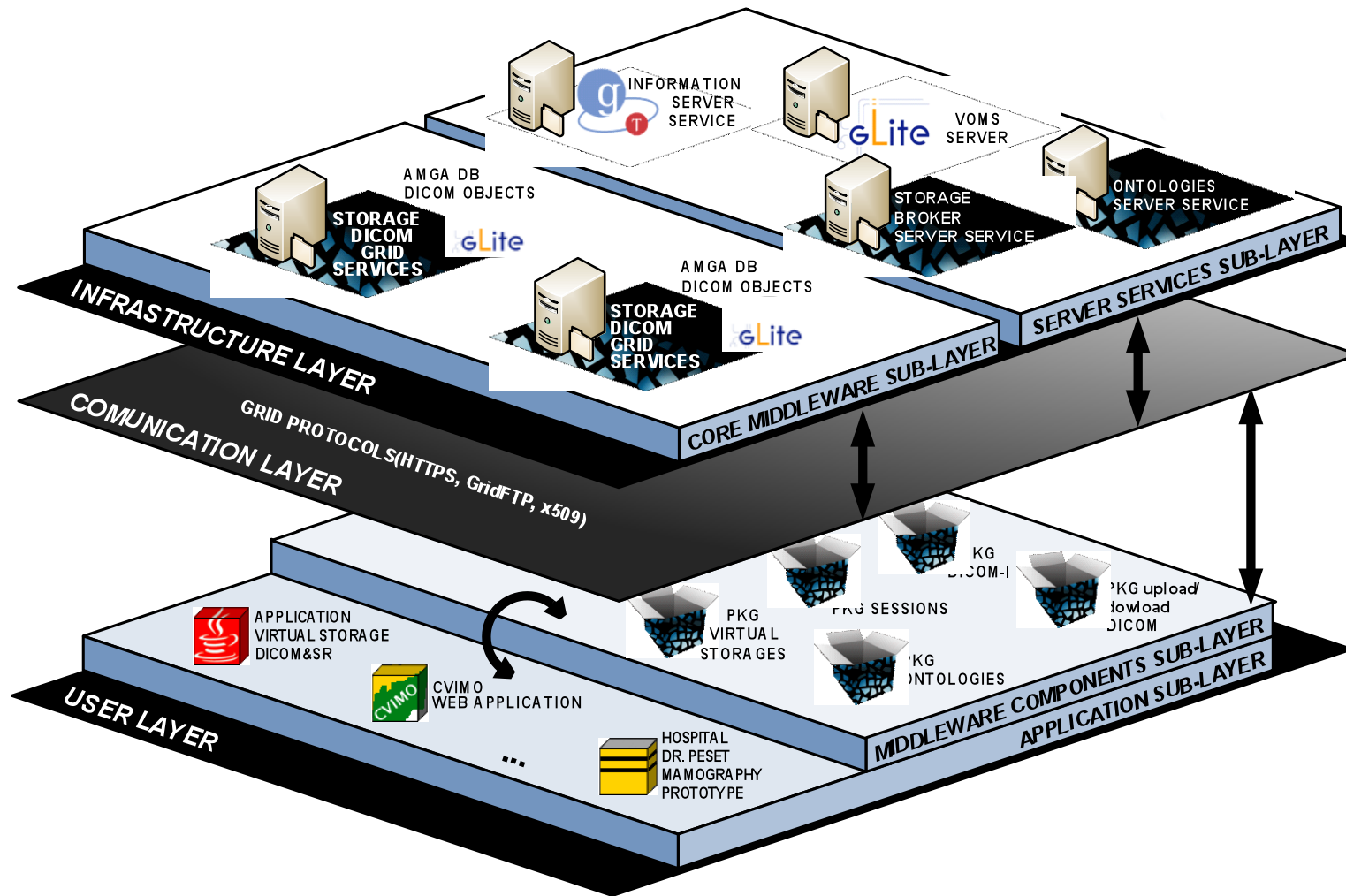


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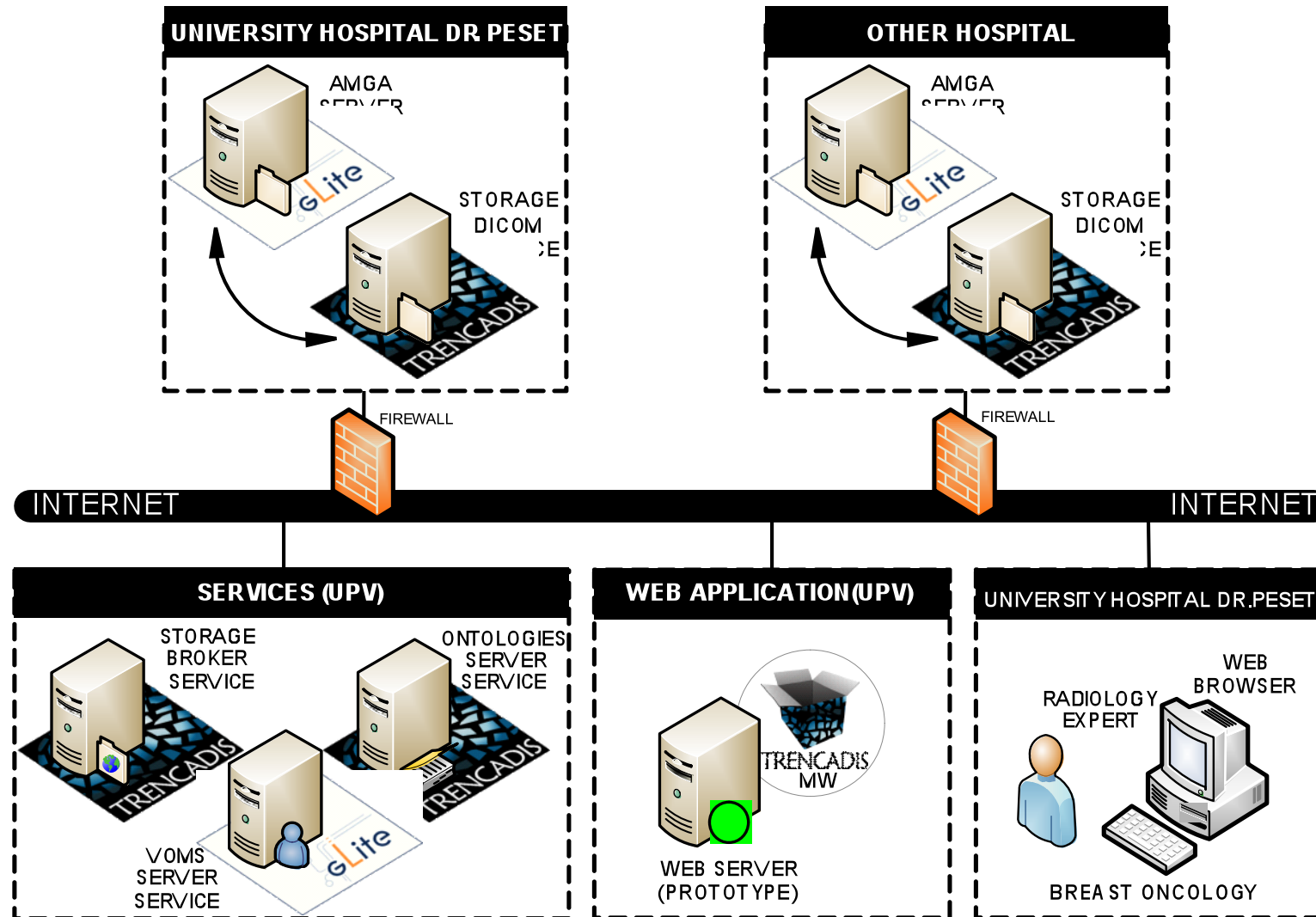
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- **TRENCADIS** (Towards a Grid Environment for Processing and Sharing DICOM Objects).
- The specific objective of **TRENCADIS** is to **share DICOM objects** among different medical centres, including annotation data from DICOM-SR.
- It uses **Standard Components** that can be integrated in existing Grid infrastructures (such as EGI or ES-NGI).
- A test infrastructure of TRENCADIS has been deployed (CVIMO).



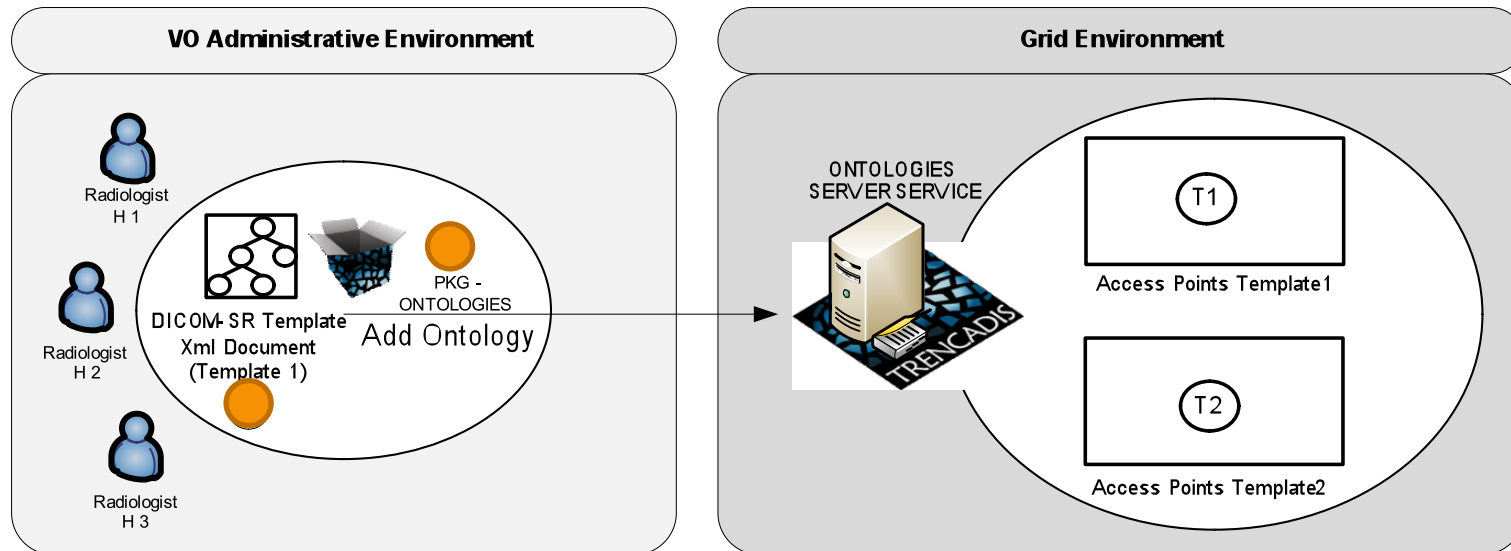
- The prototype manages all the **explorations** for any breast cancer episode (**Diagnostic, Follow-up and Response**).
- In clinic practice, each **episode** has a related set of **explorations** (DICOM Study), and each DICOM Study has one or more DICOM-SR associated.

Prototype - Deployment



Prototype - Use Cases

- Defining Report Templates in the VO

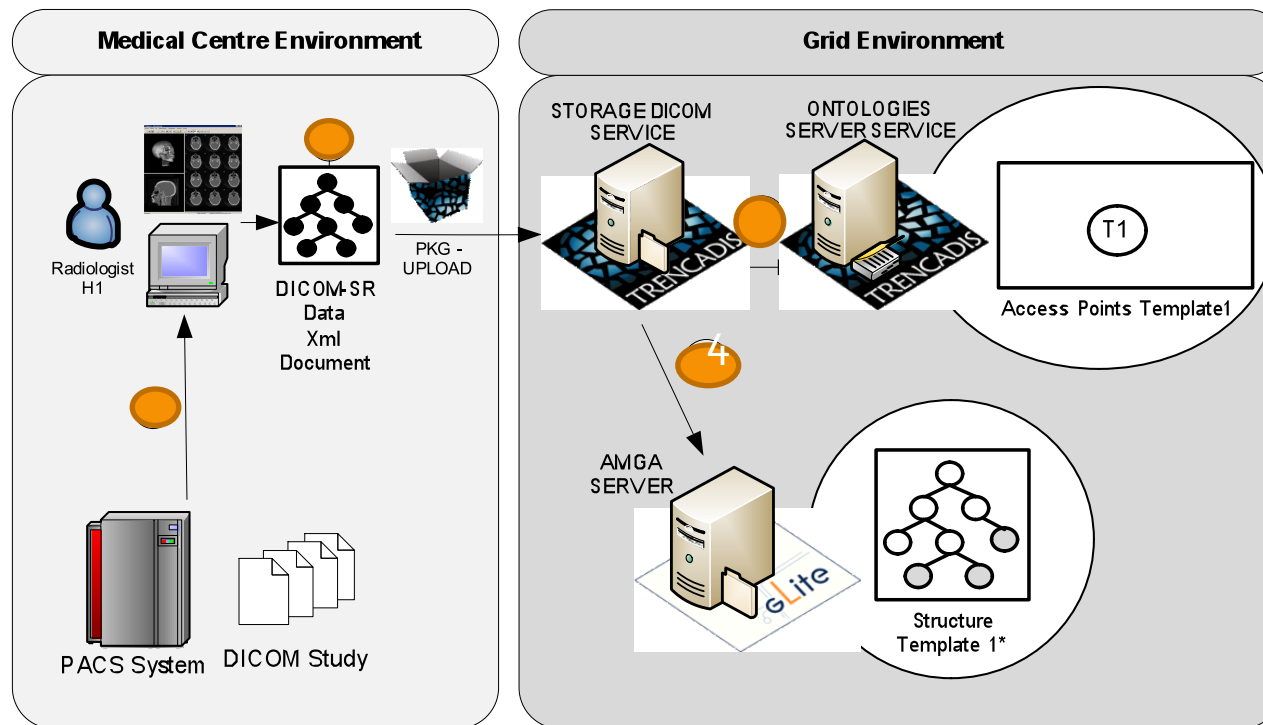


Step1 - Templates are defined by a consensus from all the centres involved.

Step2 - Uploading an XML file with the template definition to the Ontologies Server using Middleware components from PKG-Ontologies.

Prototype - Use Cases

- Interaction: Inserting DICOM-SR data from Medical Centres



Step 1 - A user decides to add a new report to a study of images.

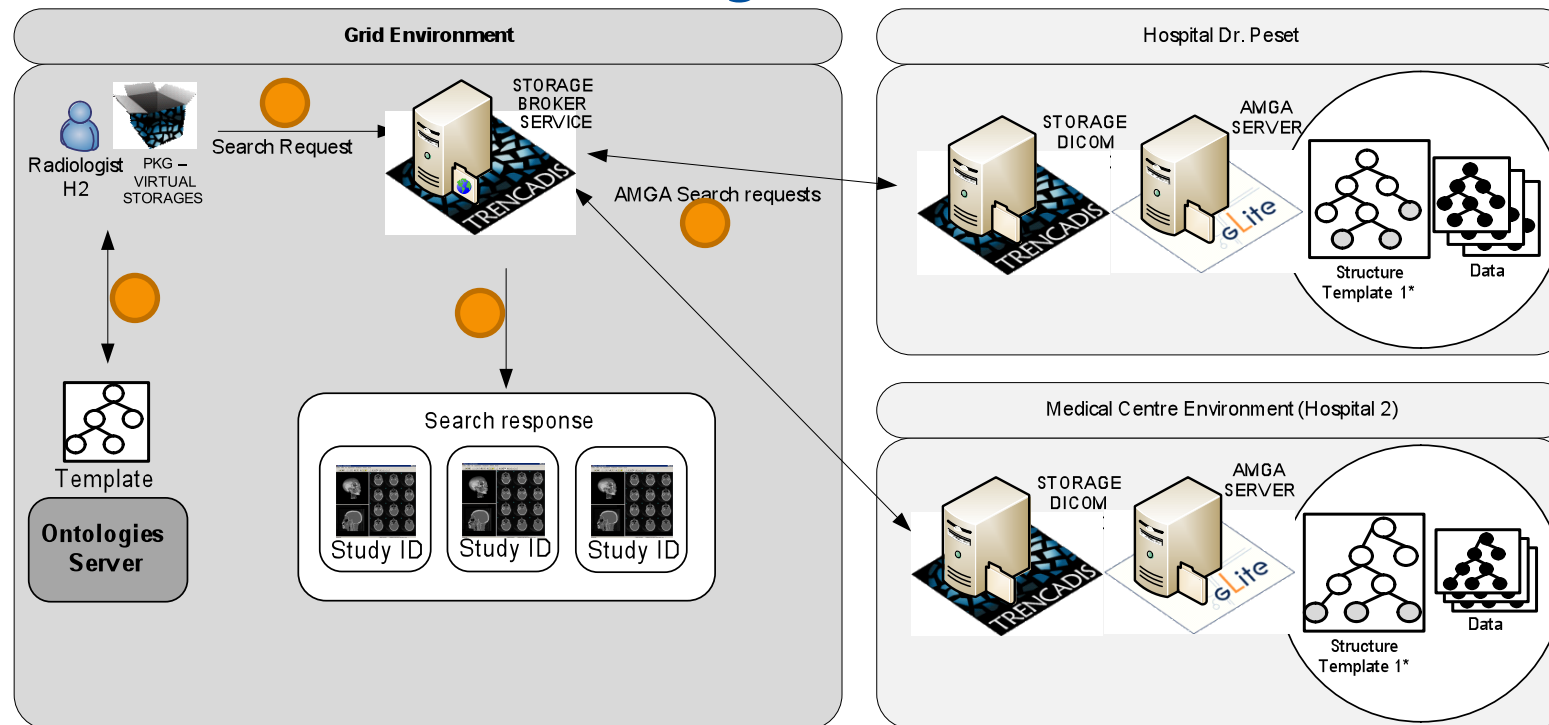
Step 2 - Clinician must choose a report template and introduce data report.

Step 3 - Storage DICOM gets the template from the Ontologies Server.

Step 4 - Document structure fits the template structure and is stored in AMGA Server.

Prototype - Use Cases

- Interaction: Searching DICOM-SR Data



- Step 1 - The user decides to create a query based on a given template.
- Step 2 - The user sends the query to the Storage Broker.
- Step 3 - The query is performed concurrently in all data repositories.
- Step 4 - Mediator joins the results and presents a single result to the user.

Prototype - Web Interface



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- **Use in real clinical practice** → provide a high level of efficiency when managing large amounts of information from various sources.
- Reports must be integrated following the **tree structure** defined in the underlying DICOM Storages Grid Services (AMGA).

Prototype - Web Interface - Use Cases

- Web Interface : Inserting DICOM-SR data from Medical Centres

Paciente: J. Damian Segrelles Quilis

TRENCADIS


>Informe


- Informe (Introducción)
- BI-RADS en Mamografía(A7-1)
 - Mama Izquierda(A71-1)
 - Desestructuración(A714-1)**
 - Calcificaciones Aisladas(A717-1)
 - Hallazgos Asociados(A718-1)


BI-RADS en Mamografía - Mama Izquierda - Desestructuración -

subir nivel : anterior siguiente nivel inferior n

Localización	<input type="text" value="Retroareolar"/>
↳ Distancia al Pezón (SI Localización igual Retroareolar)	<input type="text"/> milímetros
Tamaño	<input type="text"/> milímetros
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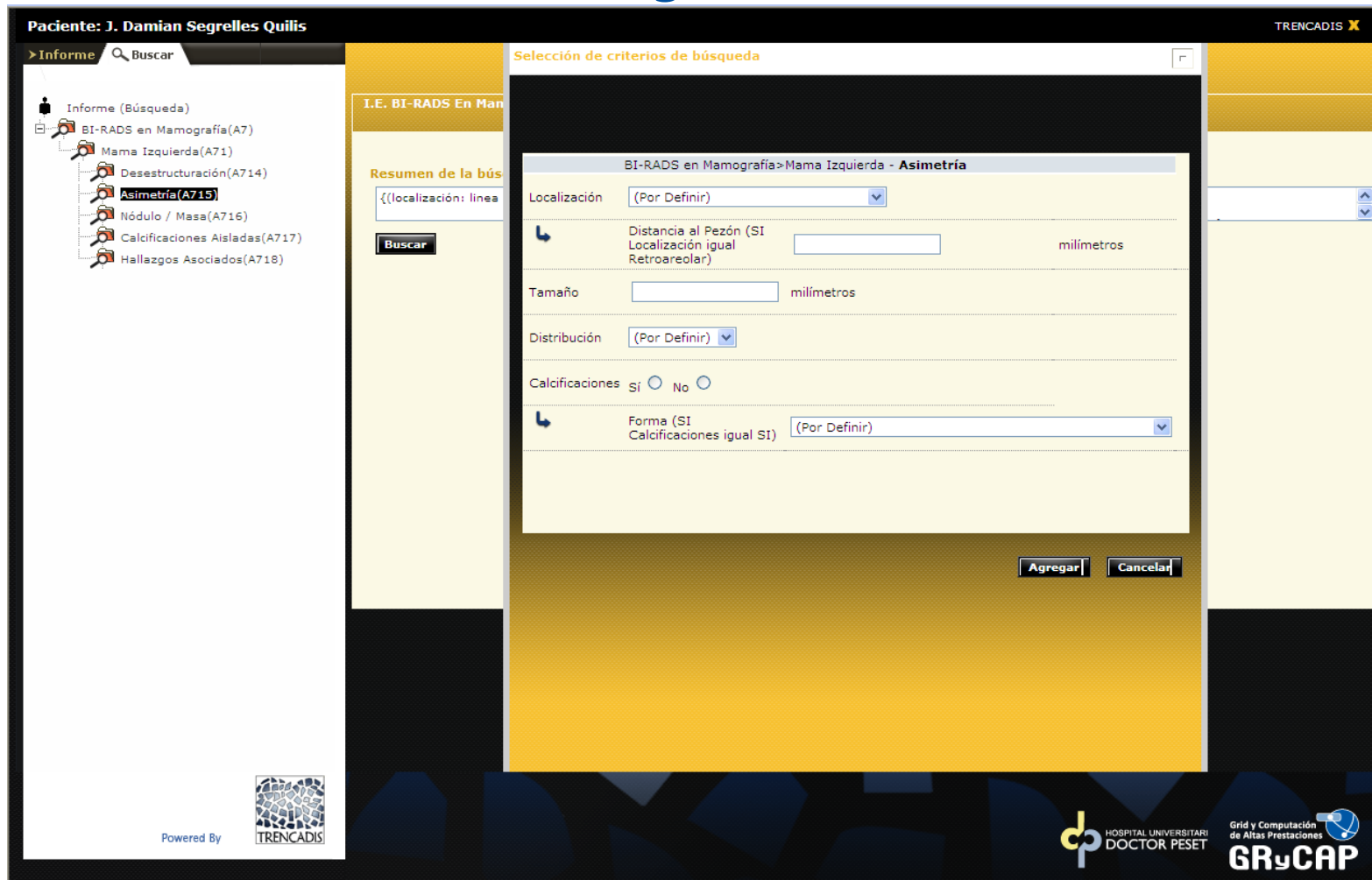
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Prototype - Web Interface - Use Cases

- Web Interface: Searching DICOM-SR Data



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Selección de criterios de búsqueda

Resumen de la búsqueda

BI-RADS en Mamografía > Mama Izquierda - Asimetría

Localización: (Por Definir)

Distancia al Pezón (SI Localización igual Retroareolar): milímetros

Tamaño: milímetros

Distribución: (Por Definir)


Calcificaciones: Sí No


Forma (SI Calcificaciones igual S1): (Por Definir)

Buscar **Agregar** **Cancelar**

Informe (Búsqueda)

- BI-RADS en Mamografía(A7)
- Mama Izquierda(A71)
- Desestructuración(A714)
- Asimetría(A715)**
- Nódulo / Masa(A716)
- Calcificaciones Aisladas(A717)
- Hallazgos Asociados(A718)

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CONCLUSIONS

- The prototype allows sharing DICOM Studies and DICOM-SR reports based on TRENCADIS.
- The infrastructure is able to integrate new centres (adding new Storage DICOMs), integrating users in the VO.
- The most important use cases have been identified and implemented.
 - Flow of information among the Grid services.
 - A customized interface has been designed, easing the structured report data input and search tasks.

Future Works

- Contacts have been made with other middleware developed at Spain and Portugal (DRI).
 - It is envisaged that the annotated mammographic database being developed in Portugal by INEGI, using the DRI technology of CETA-CIEMAT, will be linked to the deployment at the Valencian Hospital Dr. Peset.

Questions



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