



Grid y Computación  
de Altas Prestaciones

**GRyCAP**

# Integrating TRENCADIS Components in gLite to Share DICOM Medical Images and Structured Reports

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- Introduction and Motivation
  - Basic Concepts.
  - TRENCADIS.
  - Motivation.
- Objectives.
- gLite-TRENCADIS.
- Conclusions and Future Works.

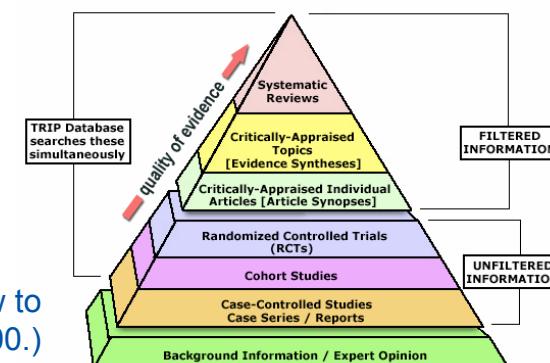


# INTRODUCTION

## Basic Concepts

- Medical Data Standards:
  - **DICOM** aids in the distribution and integration of medical images.
  - DICOM has developed new features and now it is also used to manage diagnostic reports (DICOM Structured Reporting - **DICOM-SR**).
- Image repositories are being created to set-up **knowledge bases**  
→ essential in research and clinical practice.
- **Evidence-based medicine** is a case-based methodology that organizes existing medical knowledge in order to improve diagnosis and therapy.
  - Evidence-Based Medicine is the integration of best research evidence with clinical expertise and patient values.

(Sackett DL, Straus SE, Richardson WS, et al. Evidence-based medicine: how to practice and teach EBM. 2nd ed. Edinburgh: Churchill Livingstone, 2000.)



# INTRODUCTION

TRENCADIS



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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
  - Main feature is the organisation of data by Ontologies matching the Structured Report and users by Virtual Groups.
- A test infrastructure was deployed (CVIMO).
- Storage based on **Own developments**→ These non-generic elements reduce TRENCADIS deployment.

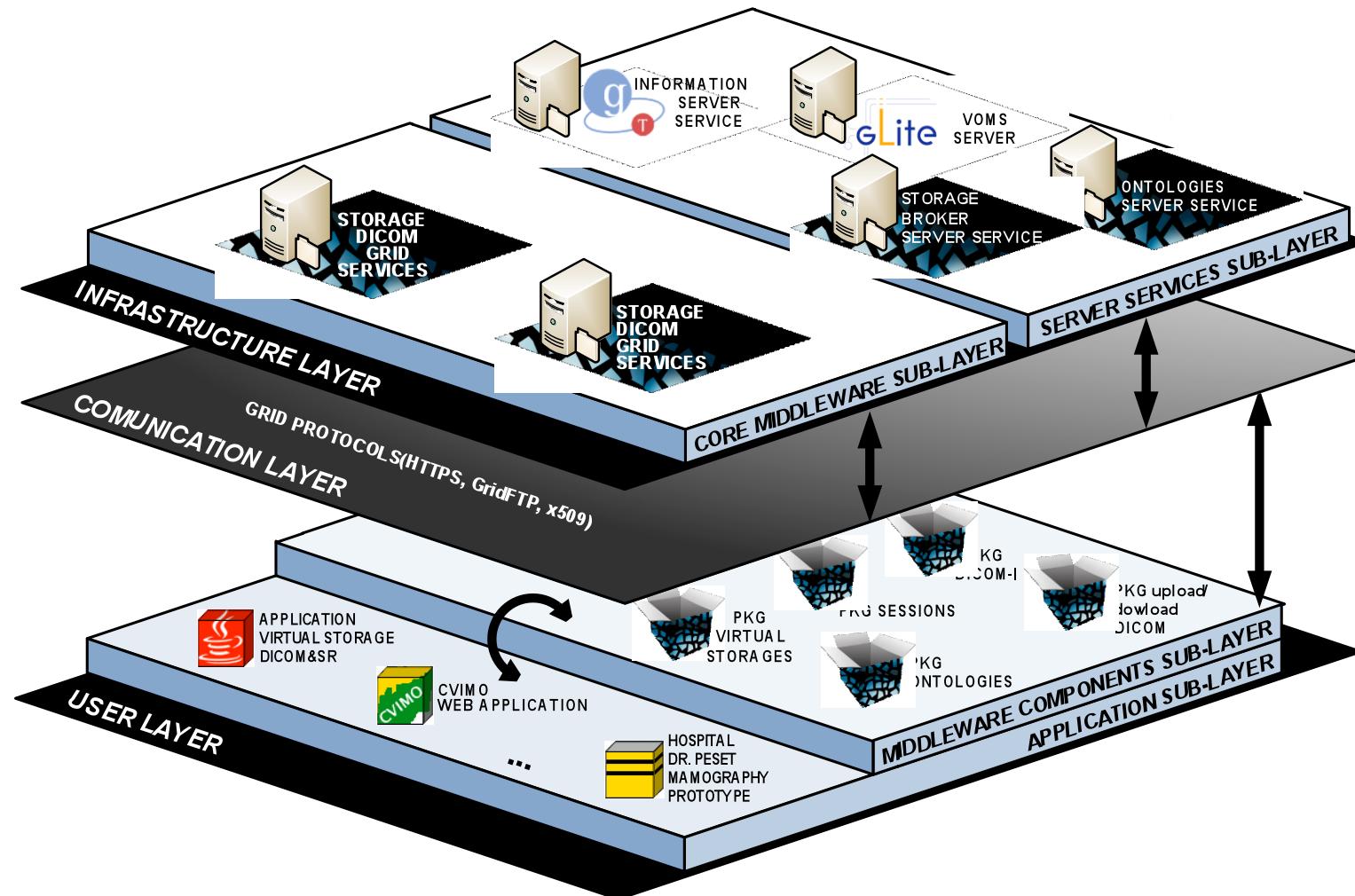


# INTRODUCTION

## TRENCADIS

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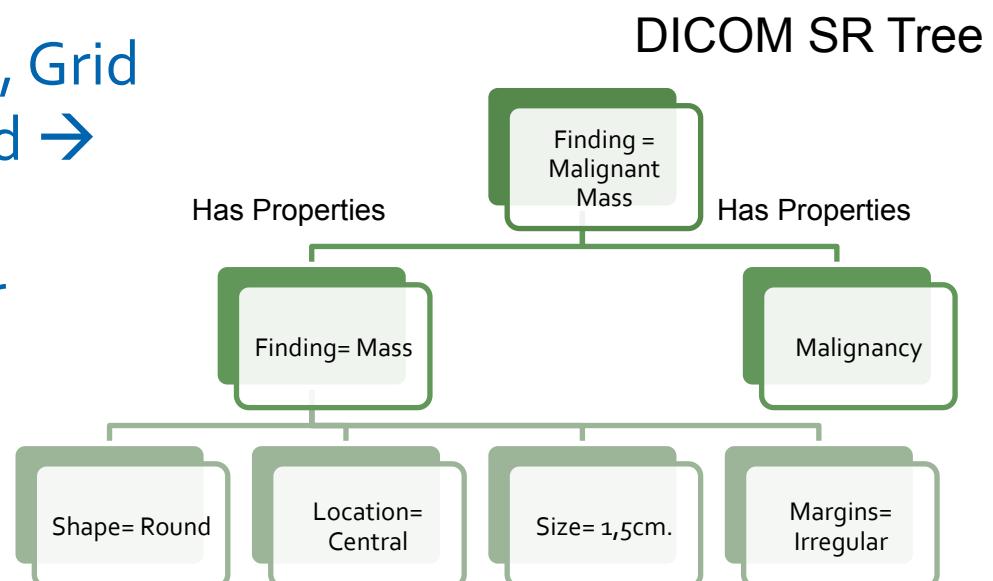
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# INTRODUCTION

## Motivation

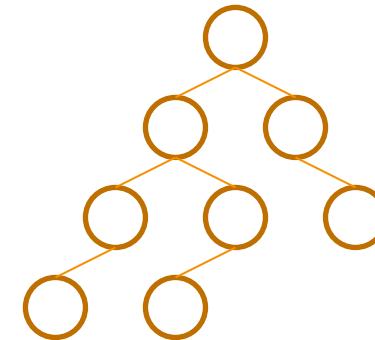
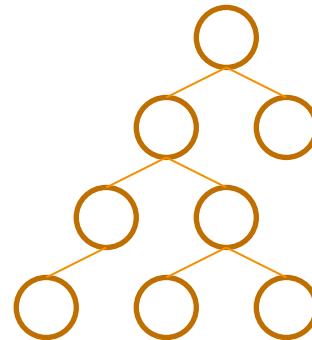
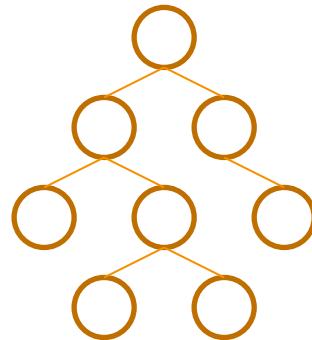
- **DICOM and DICOM-SR** objects are distributed among different medical centres → joining different sources of information could be very useful for research and training.
- The DICOM-SR data follows a **tree structure** → it is important to maintain the content and its structure.
- Along with the local storage, Grid infrastructures could be used → EGI or ES-NGI use **gLite** and provide components for storing such kind of objects.



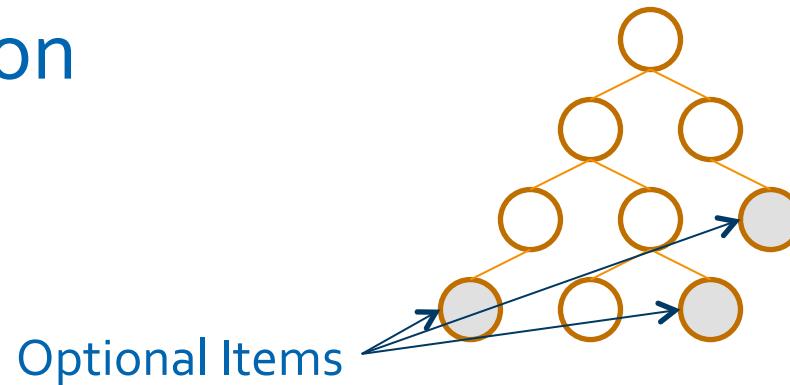
# CREATION OF THE DICOM-SR STRUCTURE

... .....

- Different Hospitals Have Different Templates



- But They Can Agree on Basic Items and Codifications.



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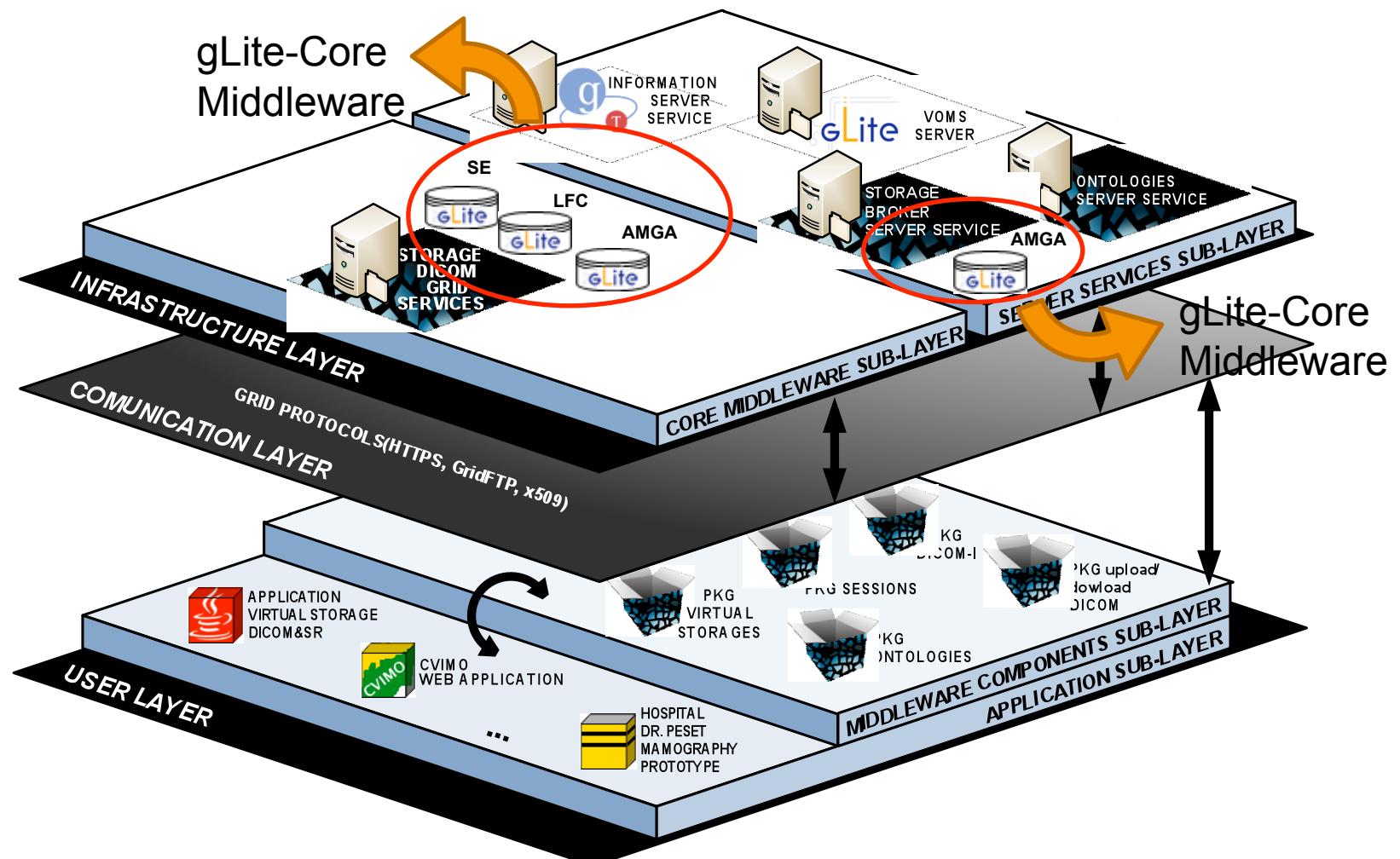
# OBJECTIVES

- To provide **support for gLite storing services** (SE, LFC and AMGA) in TRENCADIS, ensuring a wide spreading development of the middleware.
- To create **an infrastructure** able to benefit from the storage, computing and organisational resources of gLite infrastructures like EGEE or the Spanish NGI.
- To maintain the **tree structure** of the original reports contents when stored as metadata.

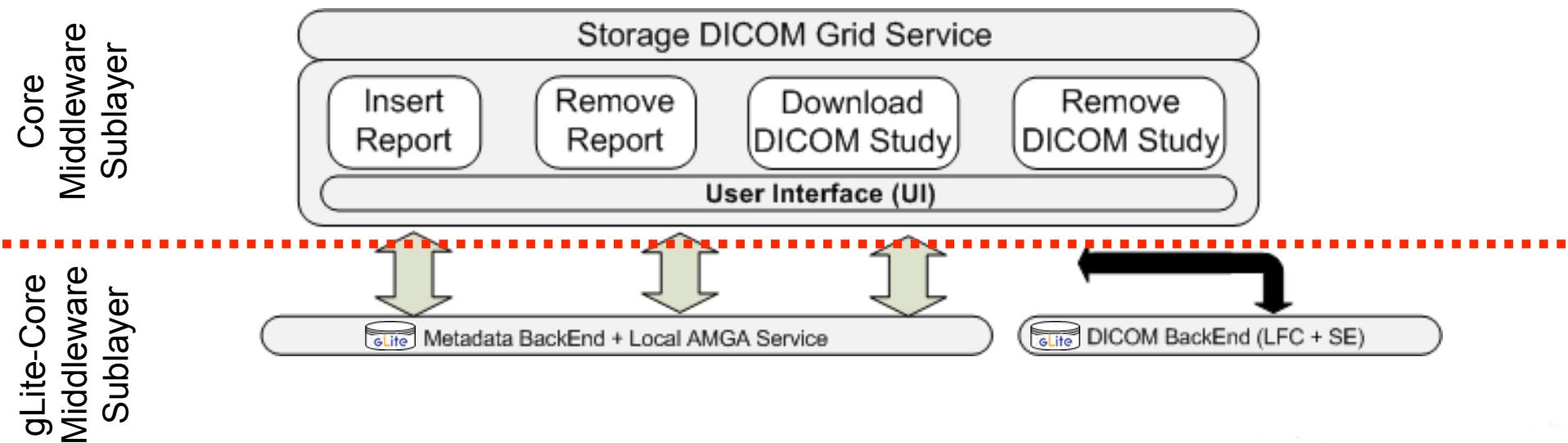


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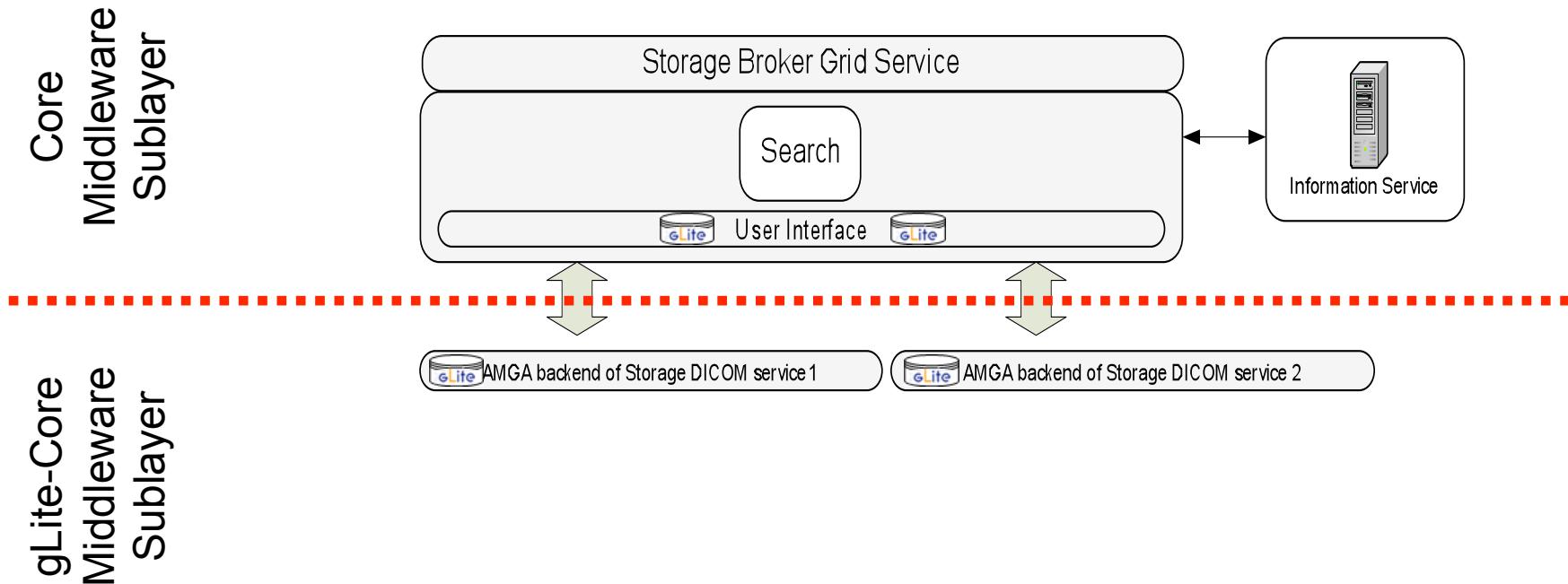
- This layer now implements a wrap-up for the basic gLite resources of the medical infrastructure.
- Services of this layer were rewritten in order to manage data using the resources in the new gLite Basic Core Sub-Layer.



# gLite-TRENCADIS – Server Services Sub-layer



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# GLITE-TRENCADIS – COMMUNICATION LAYER



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- This layer defines protocols used in service communication.
  - LFC / SRM / gridFTP is used for transferring large amounts of data.
  - SOAP on top of HTTPS is used for GRID service interaction.
  - SSL is used for secure transmissions with AMGA backends.

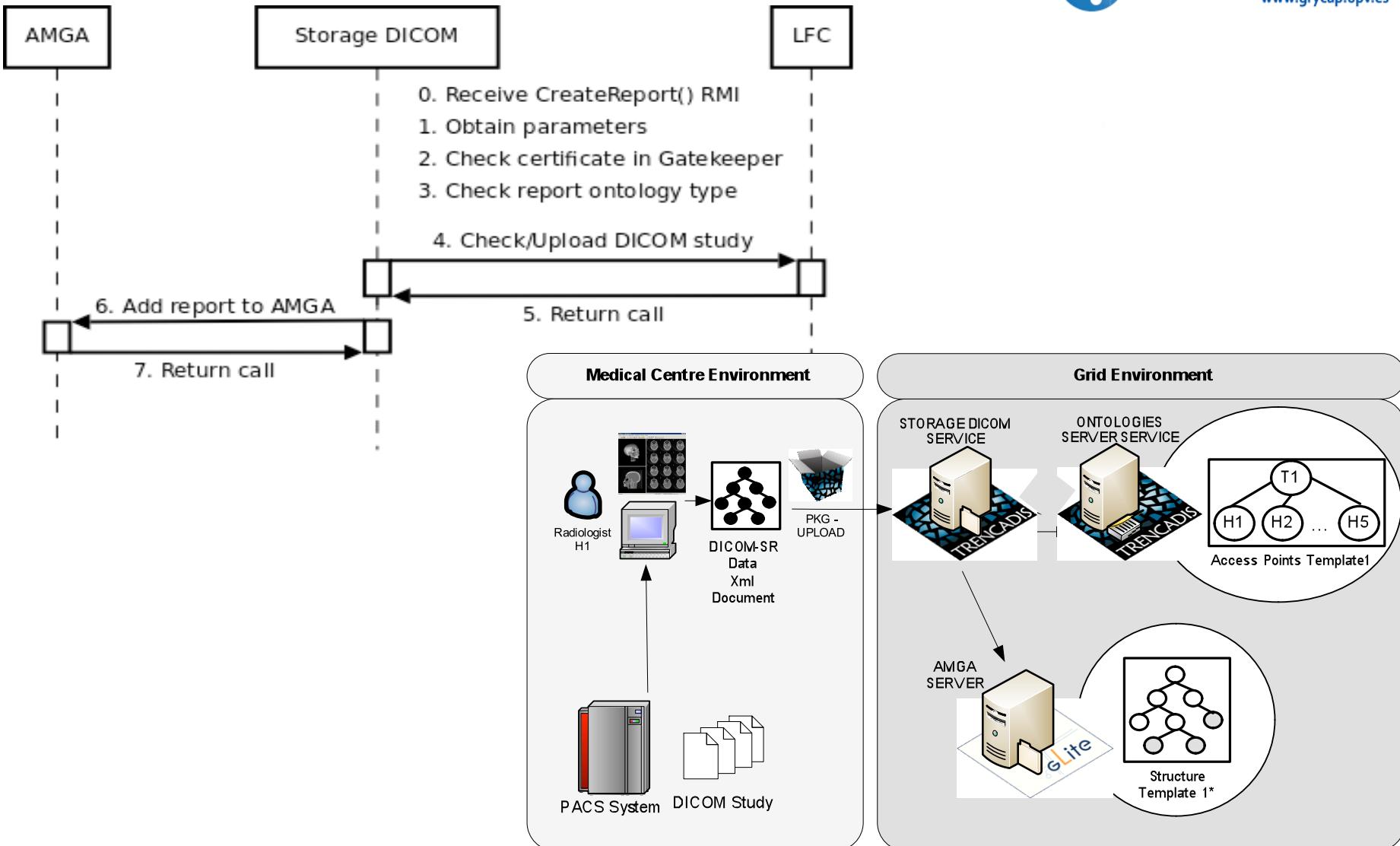
# gLite-TRENCADIS – Middleware Components Sub-Layer



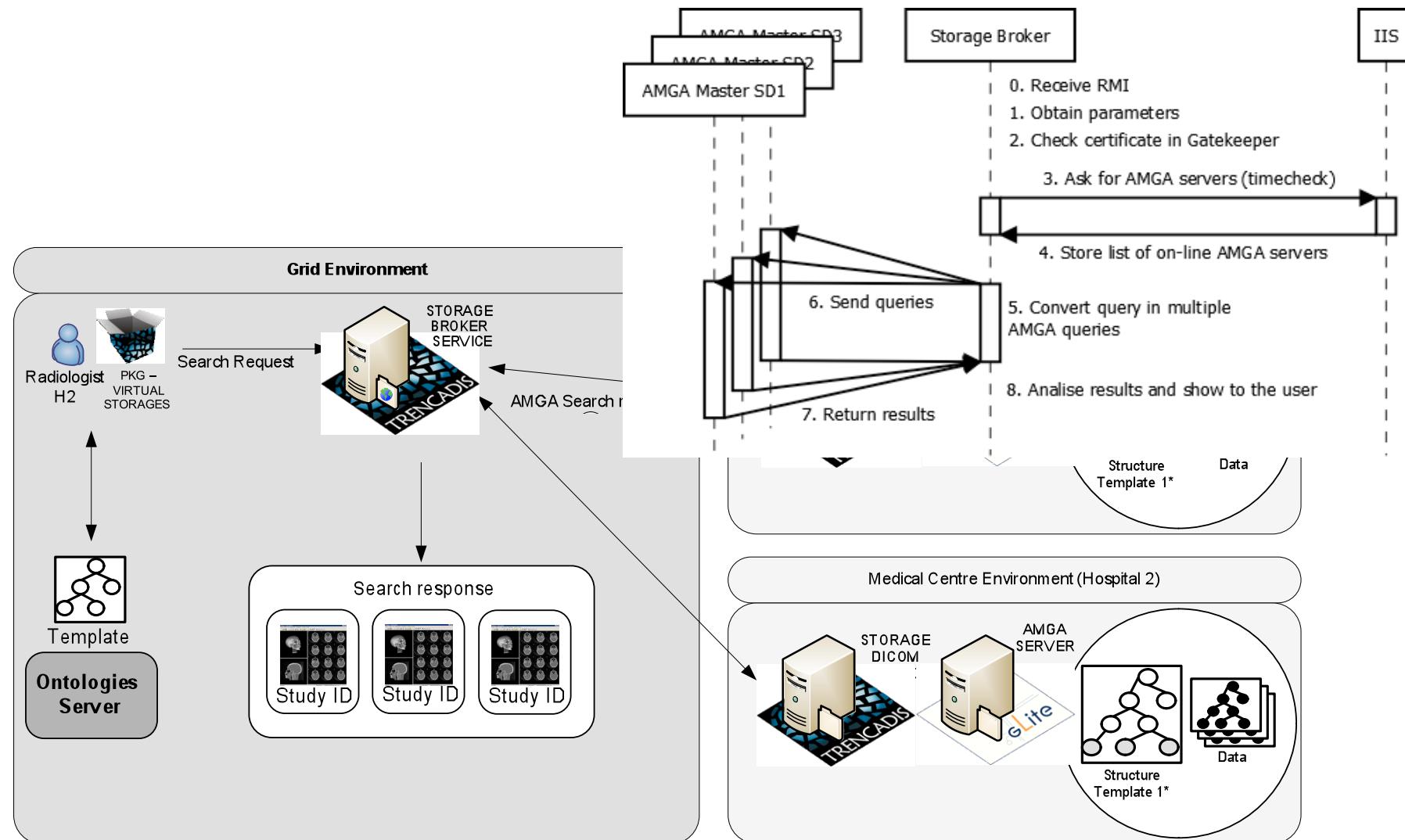
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- This sub-layer provides high-level abstraction components for application developers.
  - Interact with Core Middleware and Server Services GRID services.
  - To provide applications with an object-oriented interface to access TRENCADIS functionalities, hiding middleware internals to the developer.
  - Basic functionalities
    - Add DICOM-SR report
    - Search DICOM-SR Report

# gLite-TRENCADIS – Middleware Components Sub-Layer – Add DICOM-SR Report



# gLite-TRENCADIS – Middleware Components Sub-Layer – Add DICOM-SR Report



# GLITE-TRENCADIS – APPLICATION SUB-LAYER

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- This layer contains the application logic and business rules.
- Application Sub-layer

The screenshot shows a medical application interface for a patient named J. Damian Segrelles Quilis. On the left, a sidebar lists search results for 'BI-RADS en Mamografía(A7)'. One result, 'Asimetría(A715)', is selected. A central panel displays a search dialog titled 'Selección de criterios de búsqueda' for 'I.E. BI-RADS En Mammografía'. The dialog includes fields for 'Localización' (Localization), 'Tamaño' (Size), 'Distribución' (Distribution), and 'Calcificaciones' (Califications). It also includes dropdowns for 'Forma' (Shape) and 'Calcificaciones igual SI' (Califications equal SI). At the bottom right of the dialog are 'Agregar' (Add) and 'Cancelar' (Cancel) buttons.

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# CONCLUSIONS



- TRENCADIS components are extended → making use gLite components.
- The gLite-TRENCADIS is able to benefit from the resources deployed in EGI and the Spanish NGI.
- Introduces a practical and functional approach to organize data from DICOM-SRs → enables **hierarchical searches** using tree structures.

# CONTACT



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