



Enabling Grids for E-science



# Cyberinfrastructure for Medical Imaging in Oncology



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[www.eu-egee.org](http://www.eu-egee.org)

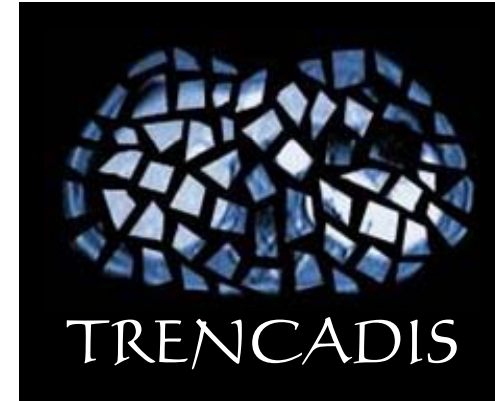


# Medical Image Challenges and HealthGrids

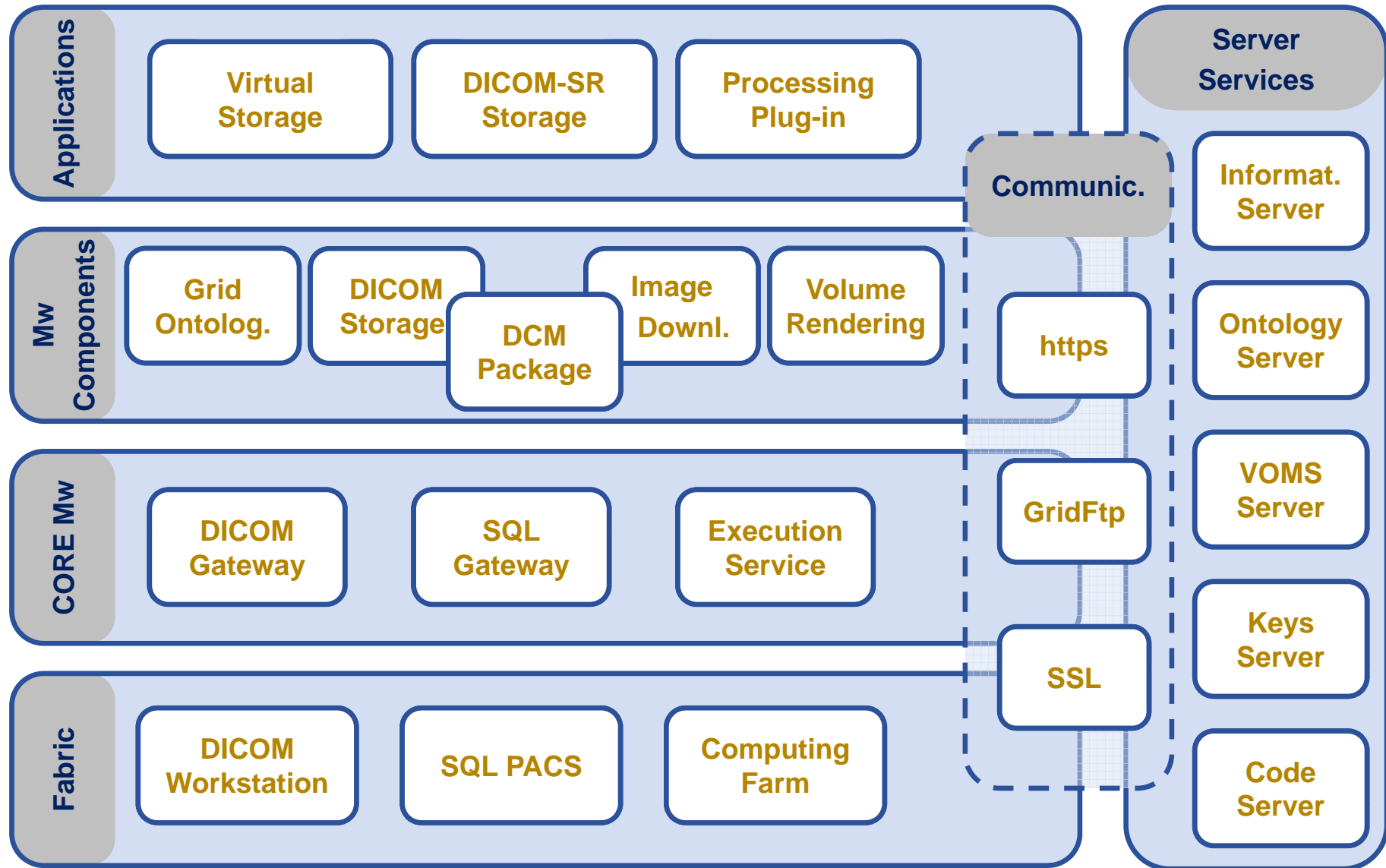
- **Why Sharing?**
  - Training is Mainly Based on Evidence.
  - Research on Rare Pathologies Require Collecting a Large Number of Cases.
  
- **Inter-Organisation Data Access**
  - Enable Access to Data from Different Federated Centres.
  - Preserve Privacy (Legal and Ethical Issues).
  - Organise Efficiently a Large Number of Cases.
  - Integrate with Existing Devices and Protocols.
    - Firewalls and Private Networks Integration.

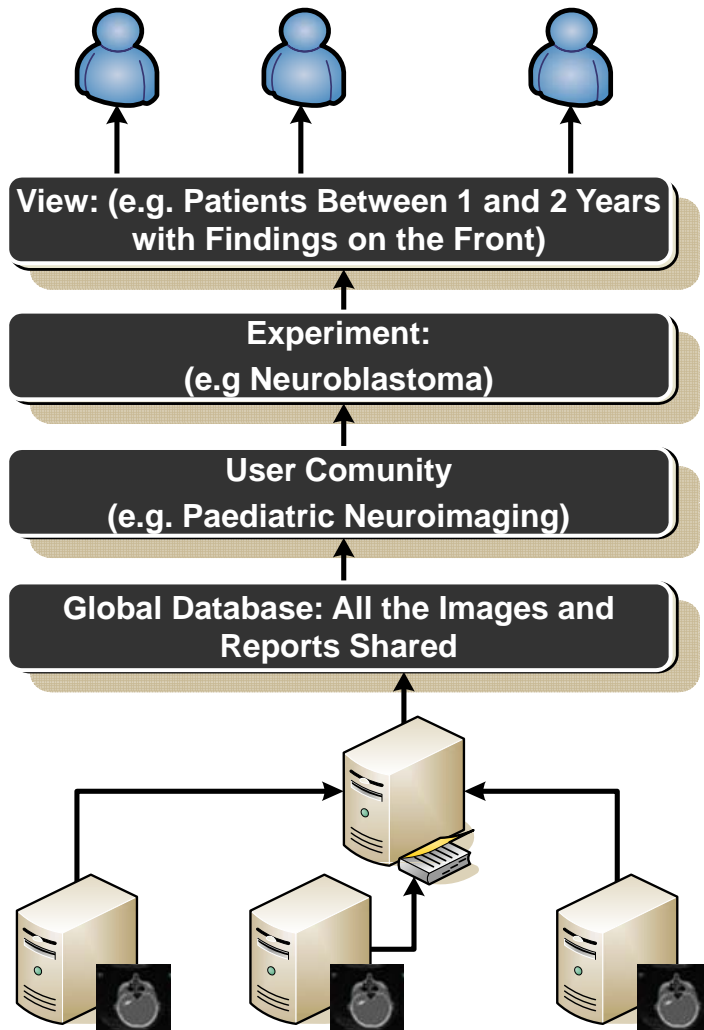


- **Towards a Grid Environment for Processing and Sharing DICOM Objects**
  - TRENCADIS Aims at the Development of a Middleware to Create Virtual Repositories of DICOM Images and Reports.
  - It Uses a Semantic Model to Organise the Data.
  - Data is Encrypted and Decrypted to Ensure Privacy Protection.
  - OGSA Architecture Totally Based on WSRF.
  
- **Objective: Creation of Virtual Shared Repositories of Medical Images.**
  - Complementary to PACS.
  - Intended Mainly for Research and Training.
  - Data to be Shared is Explicitly Selected.
  - Data is Pseudoanonimised Before Entering in the System.



# TRENCADIS Architecture





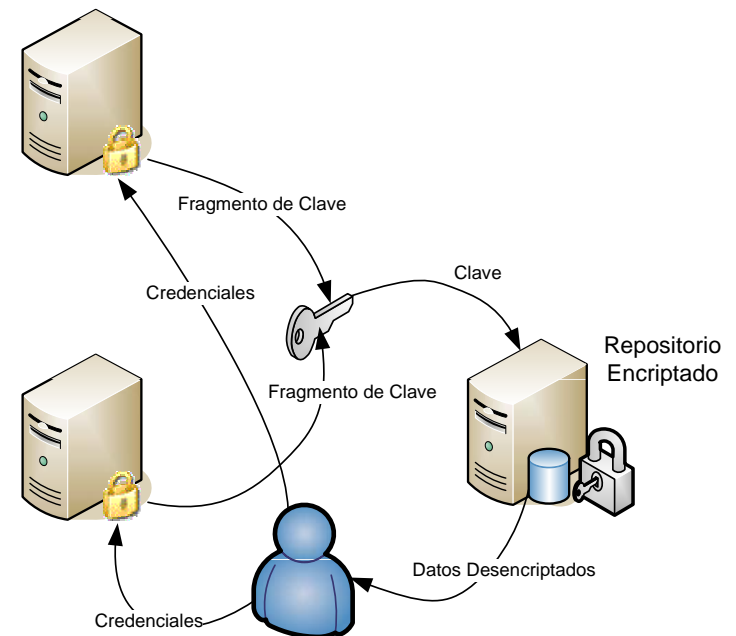
- **Semantic Organisation**

- Users Organise Themselves on VOs.
- From the Studies Available, Only Those Matching the Selection Criteria of the VO Profile are Accessible.
- From the Images Available to a Virtual Community, a User Can Create an Experiment with the Studies Matching a Set of Restrictions.
- From this Experiment, More Detailed Views can be Obtained.
- The Criteria for the Selection of the Relevant Information Relies on the DICOM Tags of the Image and the Structured Report.

- **Seven Templates Have Been Generated By the Experts**
  - Report for the Staging of Malignant Liver Neoplasia, Small and Non-Small Cell Lung Cancer and Intraaxial Tumours of Central Nervous System.
  - Follow-up Reports for Liver Metastasis, Lung Carcinoma and Intraaxial Tumours of Central Nervous System.
- **The Reports are Structured and Coded Using the Rules of DICOM-SR.**
- **Standard Coding (Mainly DICOM) Has Been Used When Possible, Following the DICOM-SR Rules To Introduce New Coding Schemas.**
- **The Reports Generate Automatically the TNM Staging Code (From the Radiological Information) in the Cases of Liver and Lung.**



- **Authentication and Authorisation**
  - Users are Authenticated Through X.509 Certificates in an “Single Sign-on” Procedure (Using Proxies).
  - Roles of the Users (And Through the Virtual Community and the Access Permissions) are Managed Through VOMS proxies.
- **Privacy**
  - All Transactions are Based on Secure Protocols.
  - Data is Encrypted on the Grid Storage to Avoid The Access of Users with Privileges.
  - Keys are Split and Shared Through the VO Group.





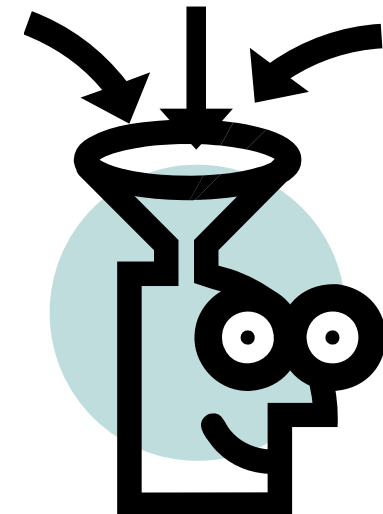
- Platform Developed in the Frame of the Project “Creation of a CyberInfrastructure for Learning, Research and Epidemiological Study of Cancer Through Medical Images”.
- Leded by the GRyCAP-UPV with the Participation of 5 Hospitals of the Valencian Community and British Telecom.
- The Platform Organises the Images Through Virtual Communities.
- It Enables Creating and Searching Studies Through Structured Reports and High Performance Postprocessing.



Hospital de la Ribera  
Hospital Dr. Peset  
Hospital La Fe



- **The Involvement of Users from the Very Beginning is a Key Issue, But Also Computer Department of Hospitals Must Be Considered.**
  - Users can be Motivated by Added-Value Tools.
- **Deployment is not Straightforward**
  - Firewalls and VPN Limitations are Incompatible with Many Grid Protocols (e.g. GridFTP).
- **Privacy Regulations are Difficult to Meet Even Dissociating Data.**
- **Focus on Pilots Rather than Aiming at a Wide Functionality.**



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