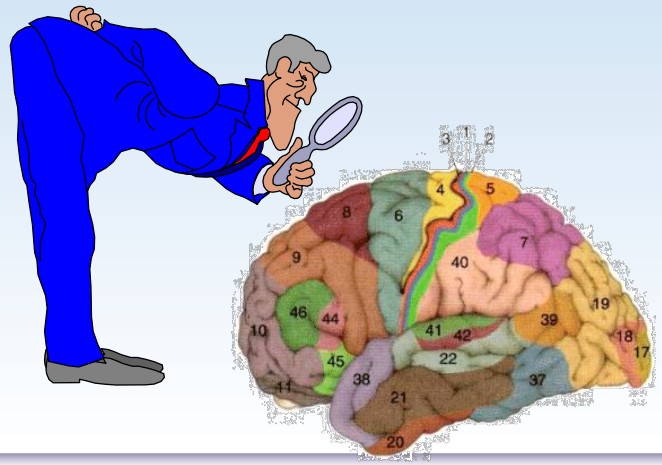
DECIDE

Diagnostic Enhancement of Confidence by an International Distributed Environment

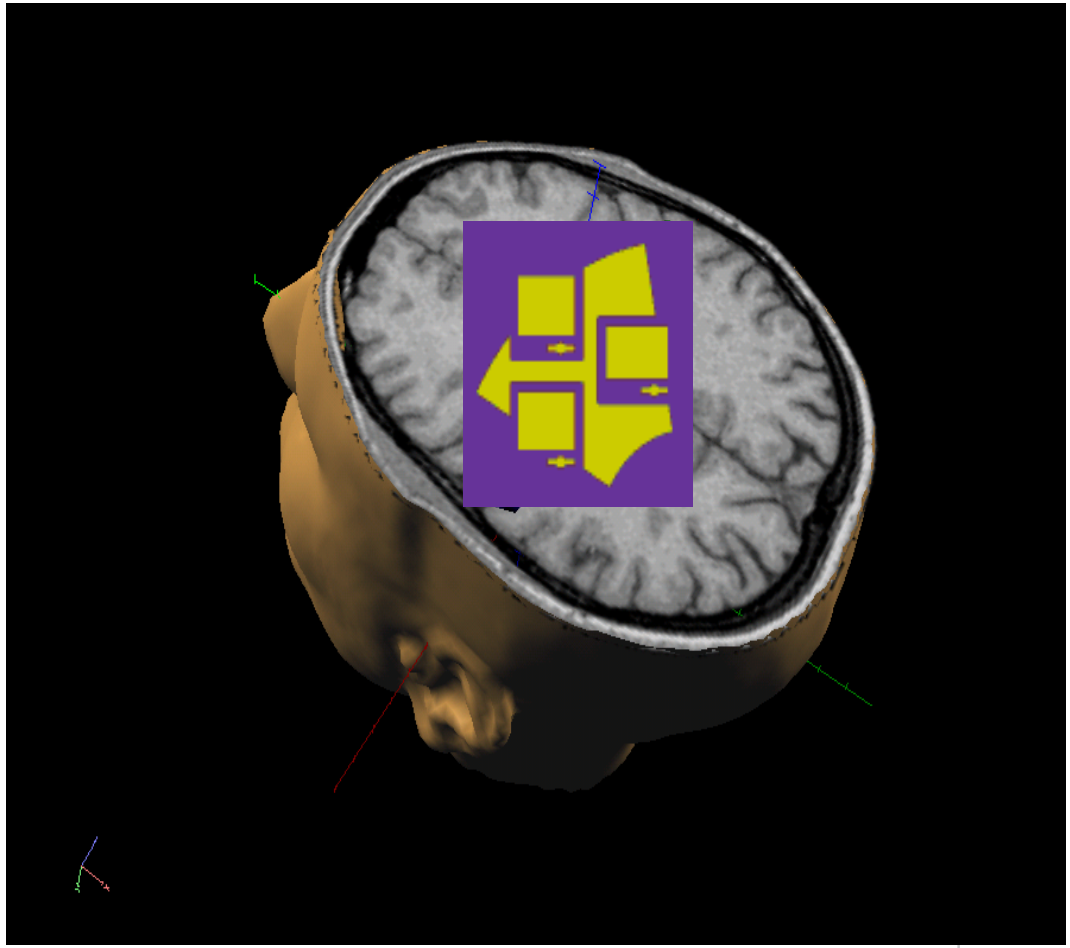
Networks of Cognition, People and Computers against Alzheimer's disease: an Italian idea from European to Regional scale (DECIDE)

Claudio Babiloni on behalf of DECIDE Consortium

IRCCS San Raffaele Pisana, Rome
University of Foggia



NETWORKS OF NEURONS FOR COGNITION. Higher brain functions depend upon the rapid creation and dissolution of ever changing synchronous thalamo-cortical cell assemblies (neural networks)



Stam CJ, de Bruin EA.Scale-free dynamics of global functional connectivity in the human brain. Hum Brain Mapp. 2004 Jun;22(2):97-109.

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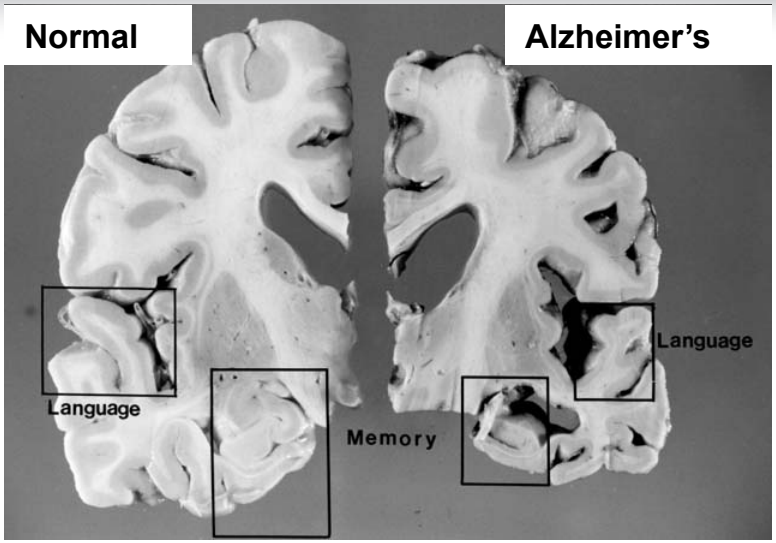
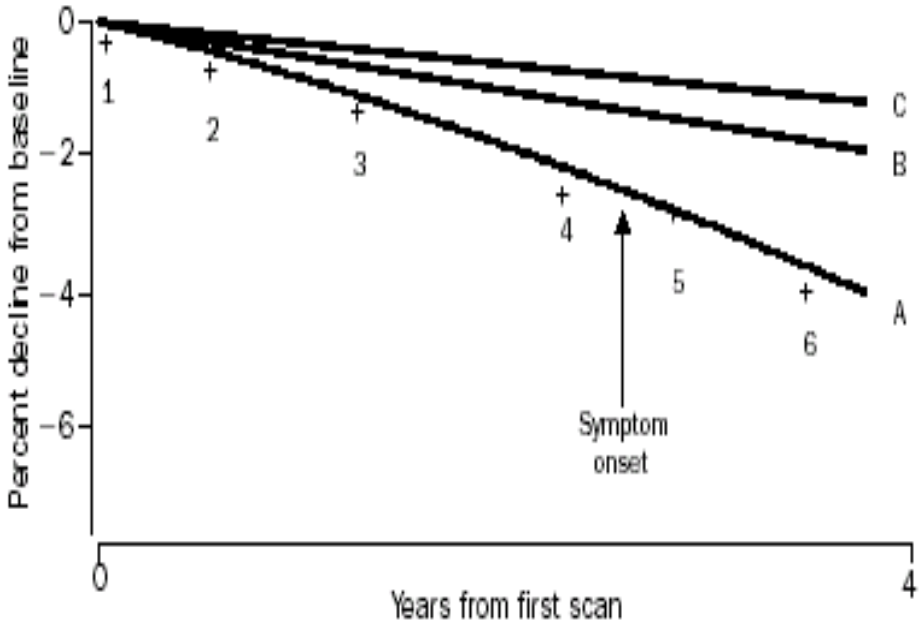
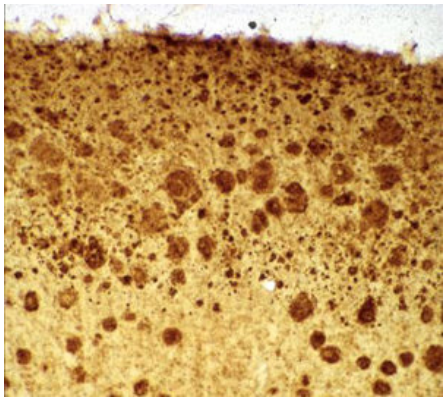
DISRUPTION OF NEURAL NETWORKS FOR COGNITION. In Alzheimer's disease, a lot of neutrons and synapses are lost, particularly in the entorhinal cortex and hippocampus which are involved in memory and language functions







Extracellular Aβ plaques

Intracellular tangles

Fox, Lancet (2004)

–Over 4 million Europeans (EU27) have Alzheimer's

- In EU27 the total cost of Alzheimer's disorders (2008) was estimated to more than 100 billion Euro

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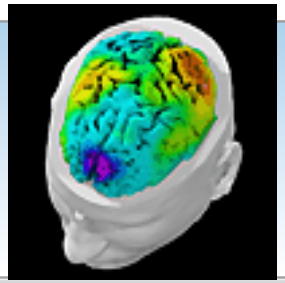
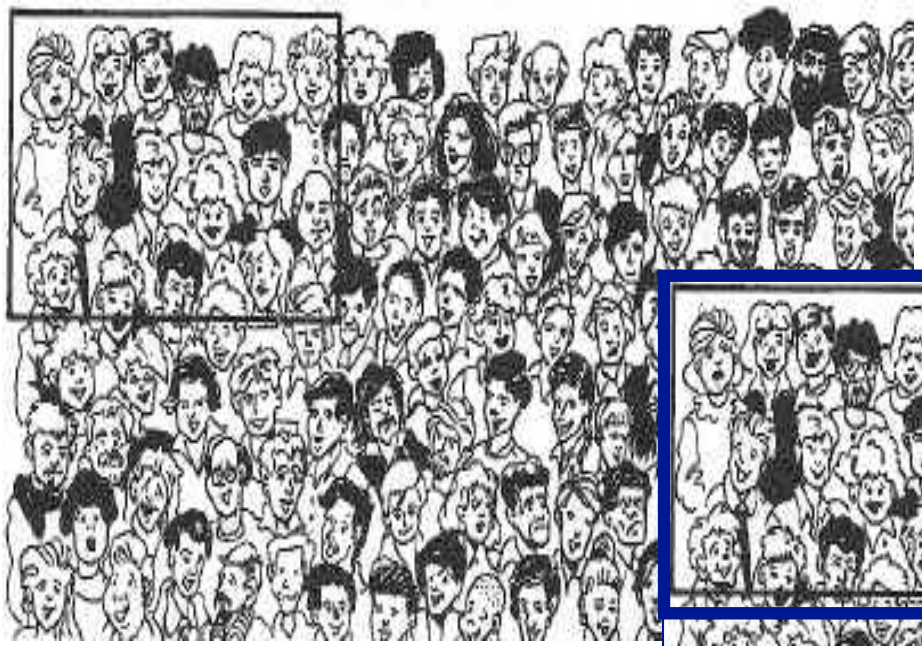
Which instrumental markers for early diagnosis of AD? The neuroimaging way



Normal elderly (Nold)



Mild cognitive impairment (MCI)

AD

An Italian idea goes to Europe:
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Public

Patient Group:
Alzheimer Europe

Academic Institutions:

- **GARR** (Co-coordinator), Rome
-University of Milan Vita-Salute San Raffaele, Italy
-- COMETA, Catania, Italy
- CNR of Milan, Italy
- **University of Foggia, Italy**
- University of Genova, Italy
- University of Warrsaw, Poland
- Imperial College, London UK
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"Neurodegenerative disorders"
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Coordinator: GARR
Total cost: € 2.4 M €

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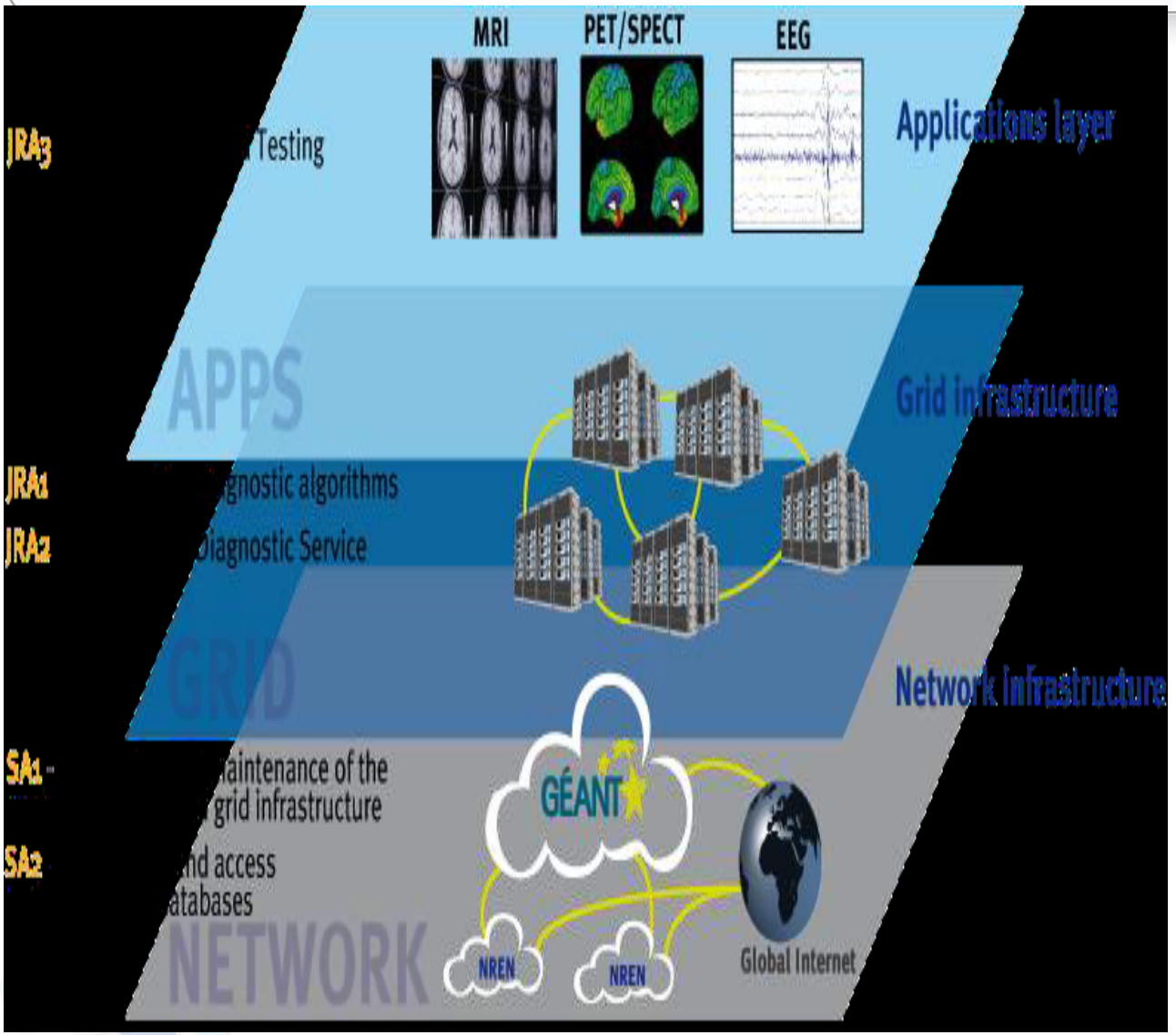
Grid-based DECIDE e-Infrastructure runs on the EGEE project G-Lite middleware and relies on the Pan-European backbone GÉANT and the National Research and Education Networks (NREN)



Applications for extracting **imaging markers** (structural MRI, resting state PET/SPECT, resting state EEG data)

High-level interface (Science gateway)

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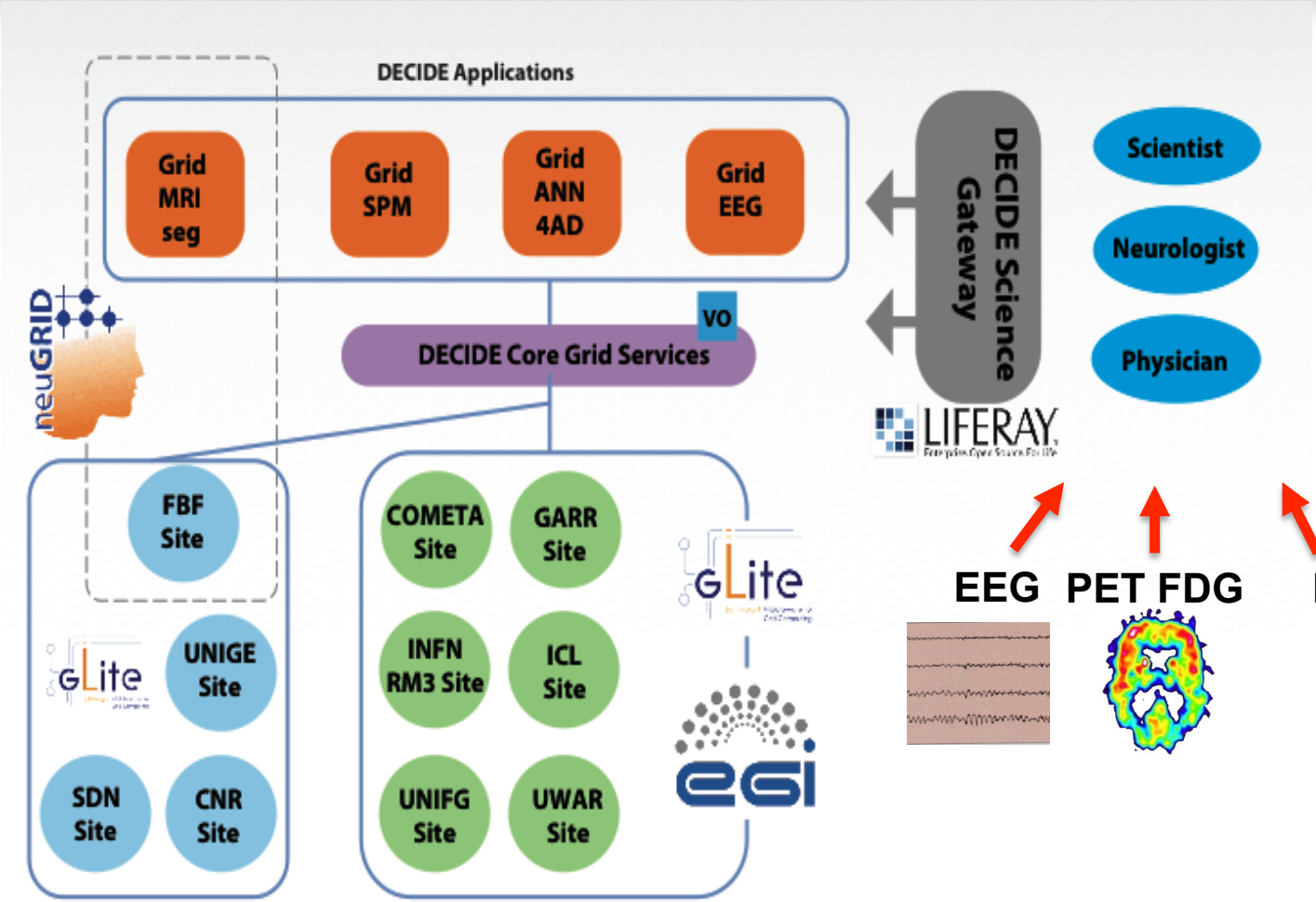
DECIDE partners maintaining infrastructure nodes are specified in the circles(FBF, UNIGE, COMETA, GARR, UNIFG, and UWAR)



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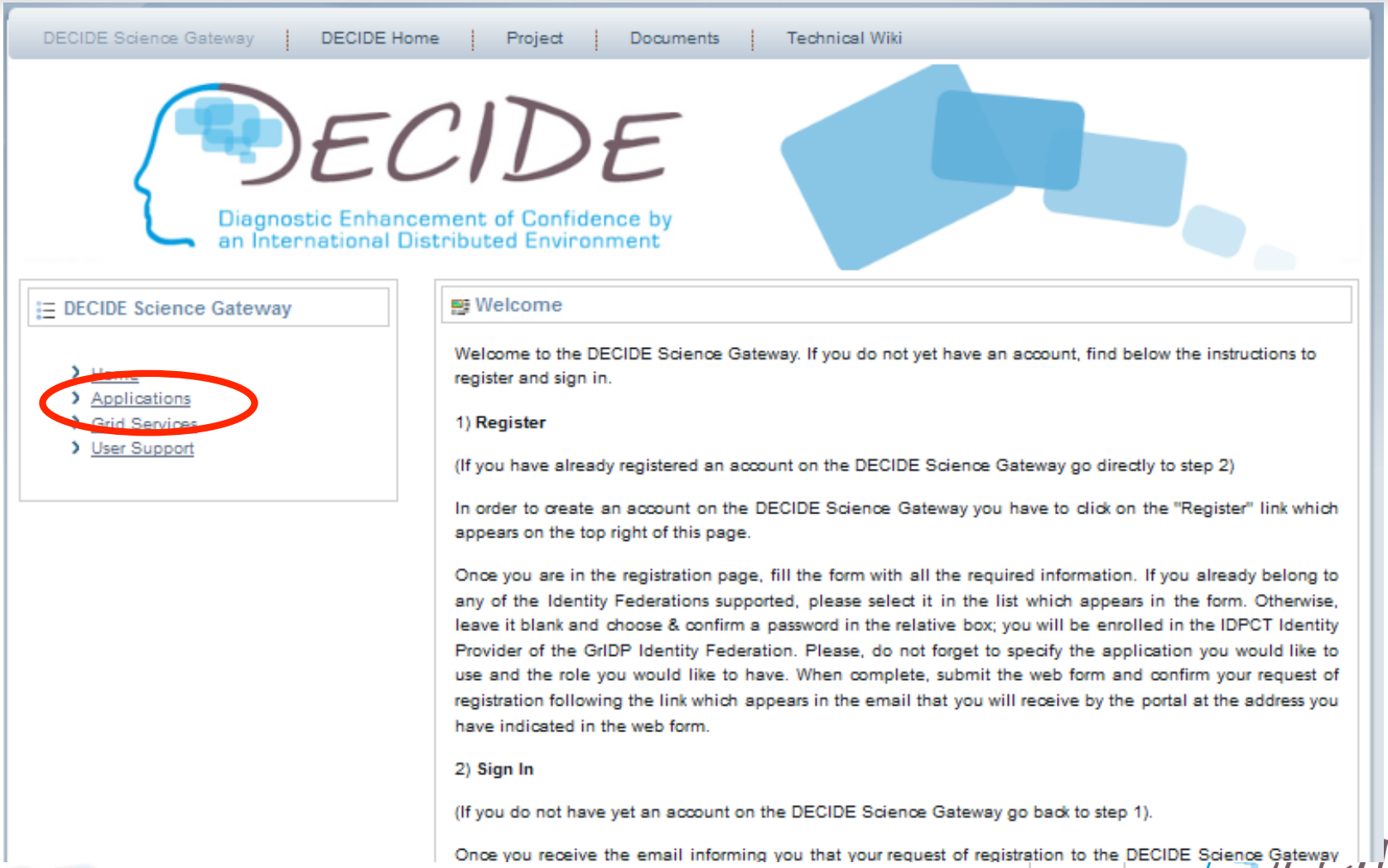
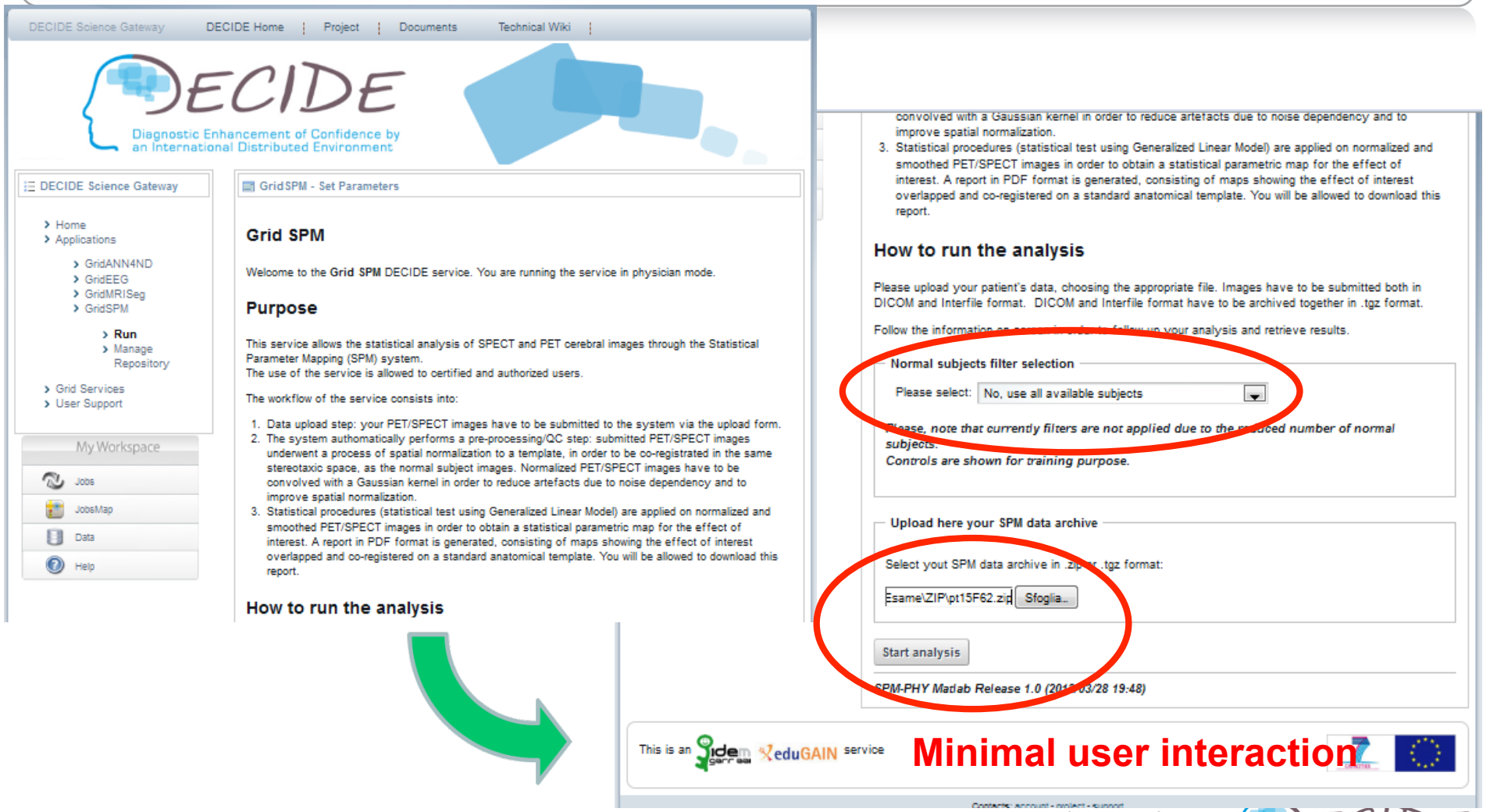
Science Gateway: login

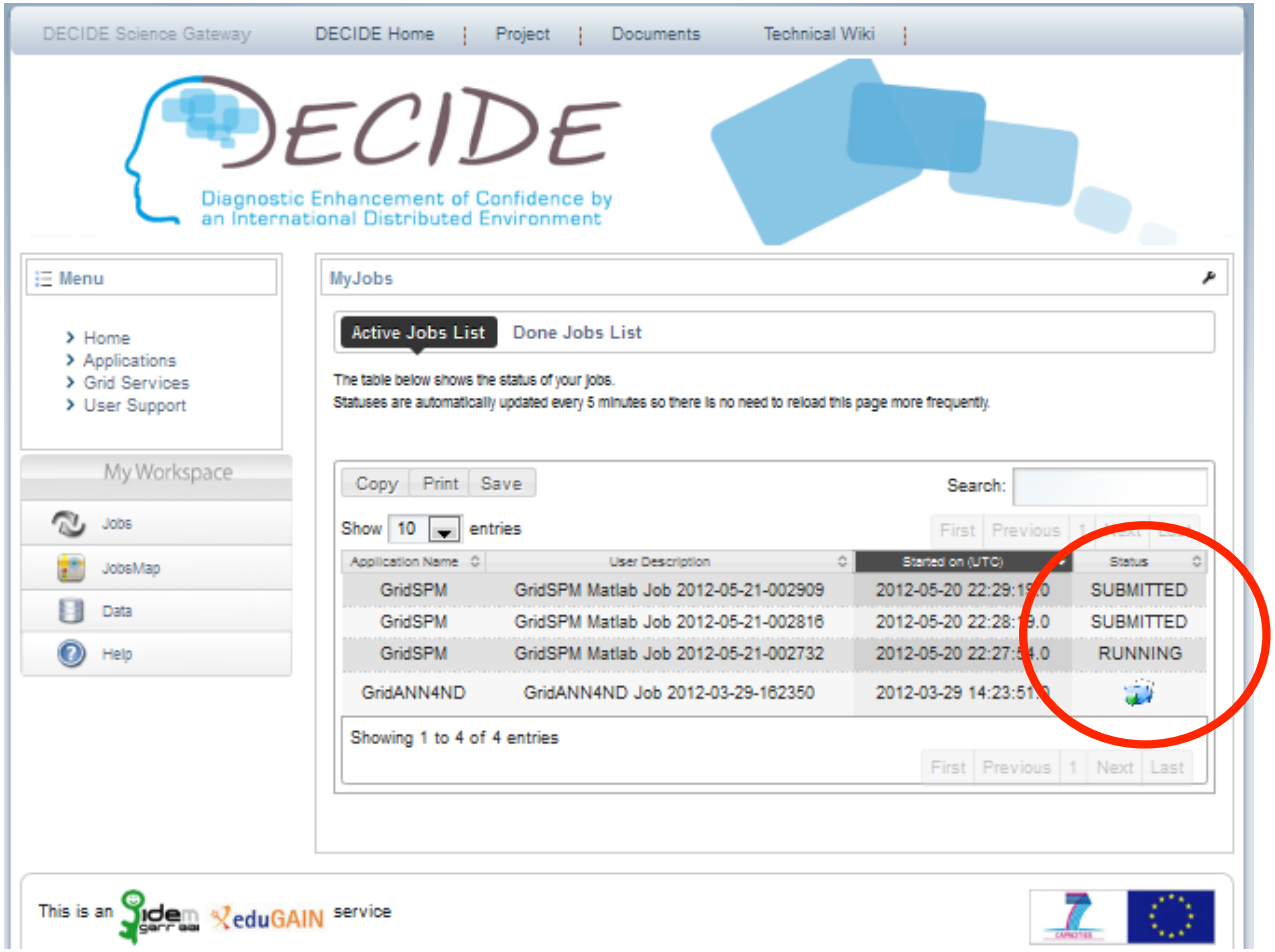


Science Gateway: applications



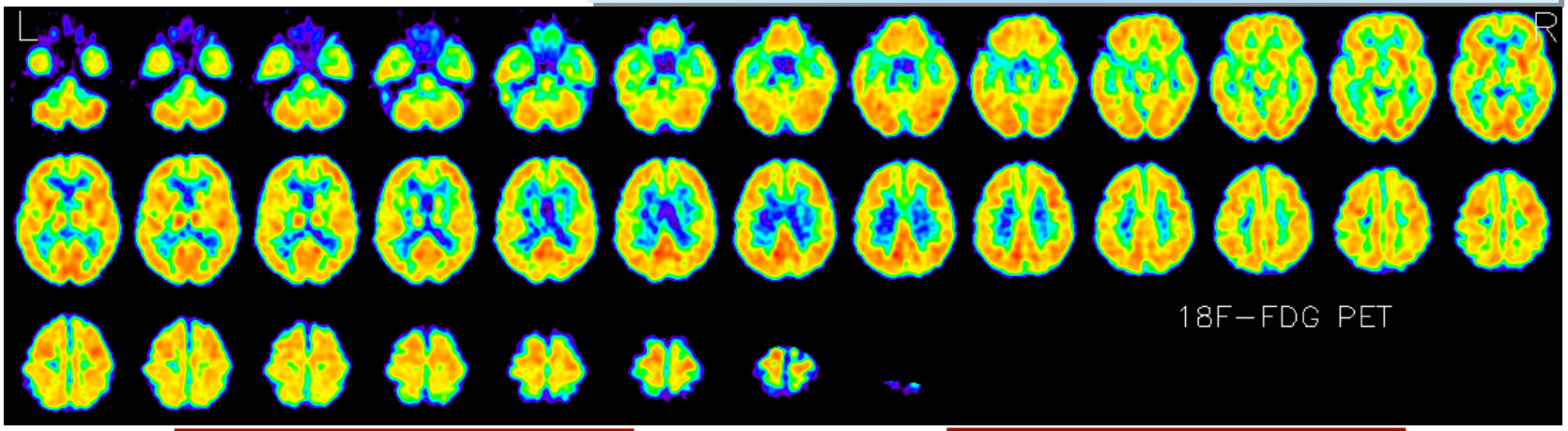
Science Gateway: job submit

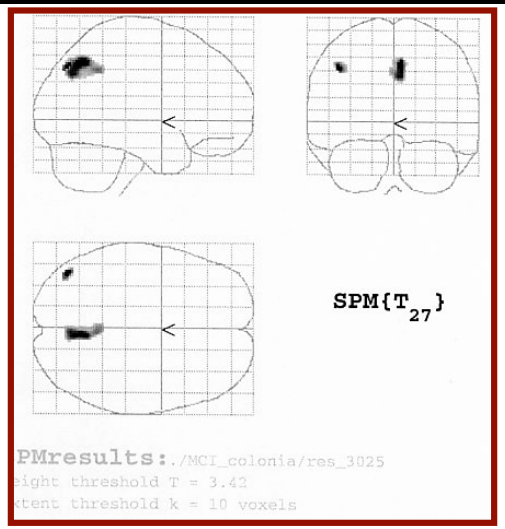
Science Gateway: job list



GridSPM application

aMCI ID: C03025 | Age: 82 | MMSE: 25 | CVLT: 4





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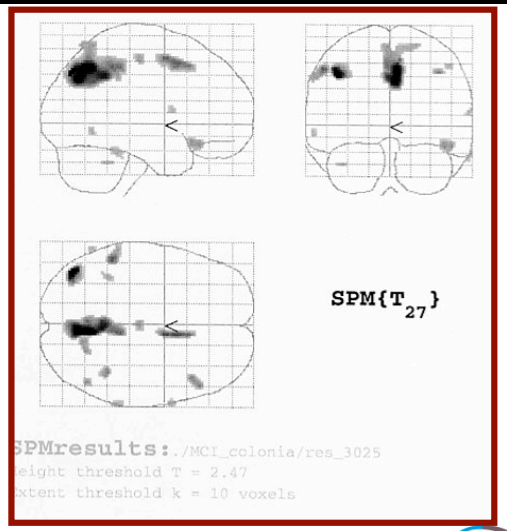

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D. Perani, Universita' Vita-Salute S. Raffaele, Milano

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GridMRISeg application

Physician & patient's info

Volumes (FslStats @ ICBM reference space) & Predictive Intervals

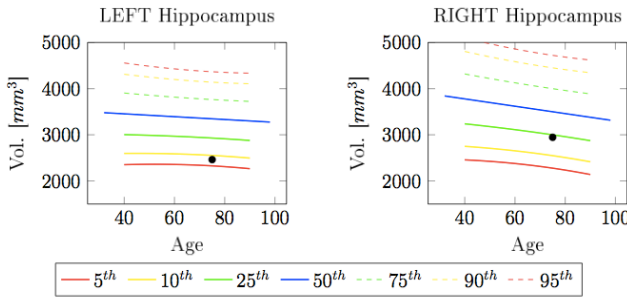
GridMRI Seg Report

General info

Date[1]: Thu Sep 6 14:36:20 CEST 2012
Physician: Girolamo Savonarola, MD
Patient ID: abbecedario
Age: 74 **Sex:** M

ACM-AdaBoost[1] **Results**

Model: DECIDE Standard Model[2]
Left Volume: 2462 mm^3 **Right Volume:** 2945 mm^3



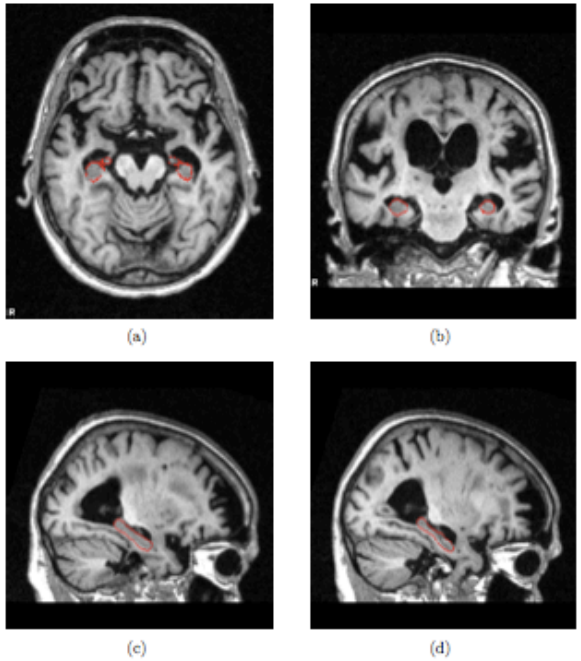


Figure 1: Segmentation of the brain scan registered to the ICBM-152 template. The letter "R" identifies the Right direction. (a) Axial view. (b) Coronal view. (c) Sagittal view centered on the Right Hippocampus. (d) Sagittal view centered on the Left Hippocampus.

Patient's Registration & Hippocampi segmentations

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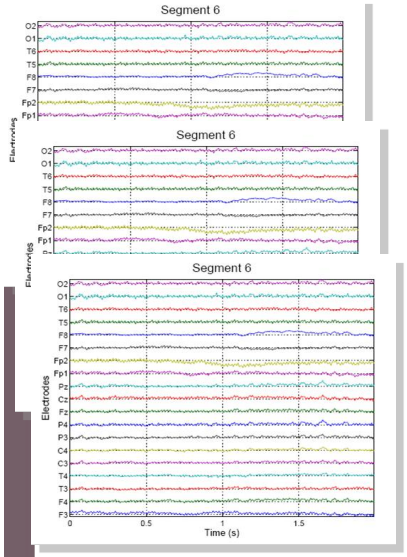
GridEEG application

GridDATALOAD



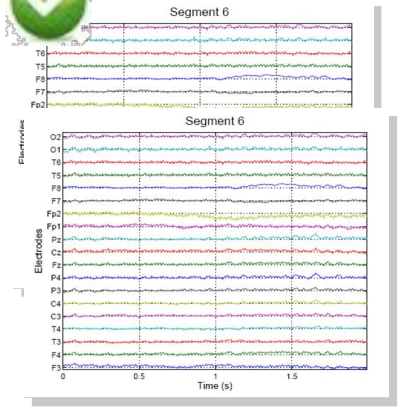
nameEEGtrials.txt

(2-sec EEG epochs in ASCII format)

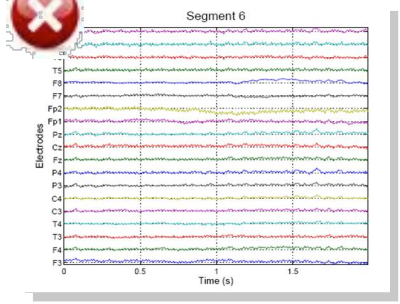
Data upload

GridEEGQUALITY

(accepting EEG epochs)



(rejecting EEG epochs)



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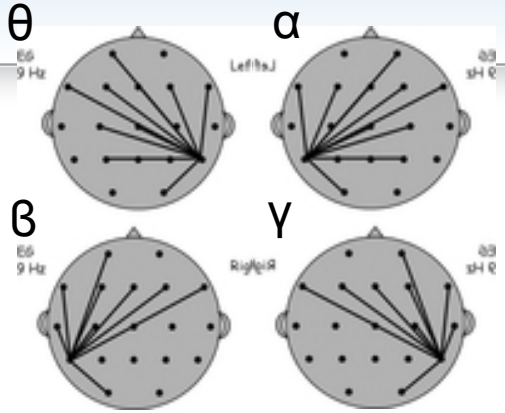
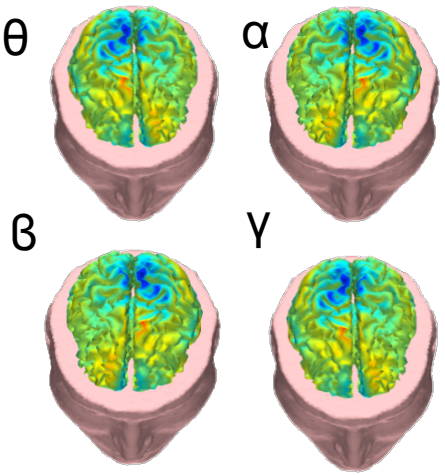


Model order, Frequency resolution

GRidEEGSOURCE

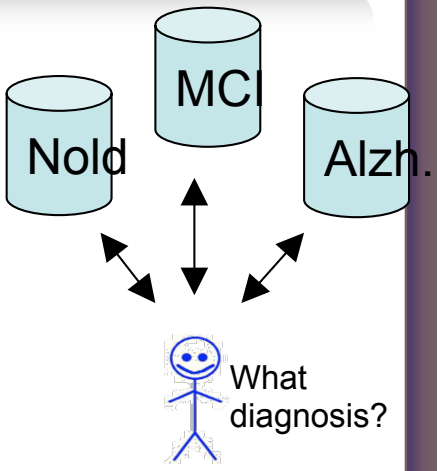


Window, Frequency resolution,…

Processing & markers

GridEEGSTAT

reference EEG databases



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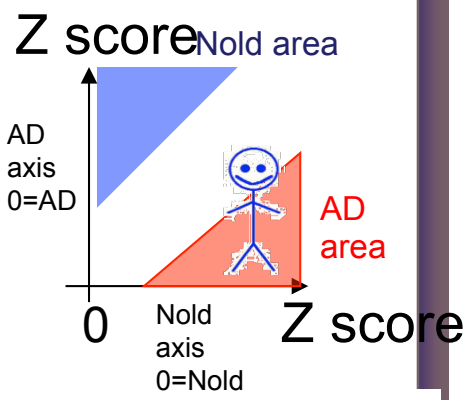


Statistics & send report

Overview of DECIDE diagnostic service

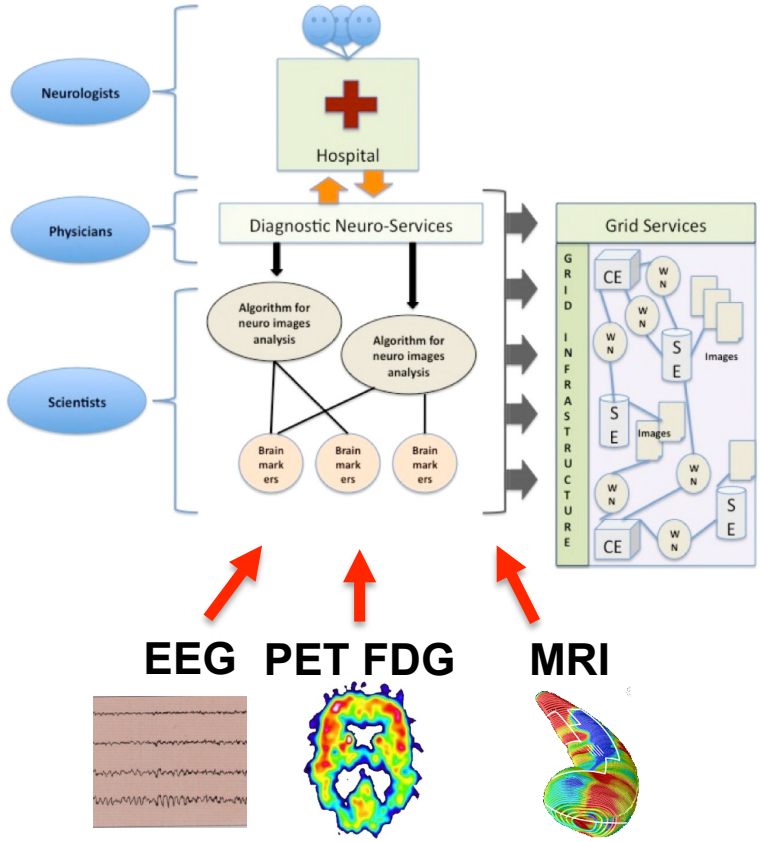
Provide the Neuroscientific and Medical community with a dedicated e-Infrastructure relying on GÉANT, EGI and NeuGrid

Deploy a secure and user-friendly service for the early diagnosis and research on dementia and other brain diseases linking large distributed DBs of multi-modal neuro-images

Validate the e-Infrastructure and the service with real patient cases

Propose a business model to ensure the sustainability of the infrastructure after the end of the project and facilitate its extension to new communities and pathologies

Disseminate the results and provide training programmes promoting the adoption of the DECIDE infrastructure and service



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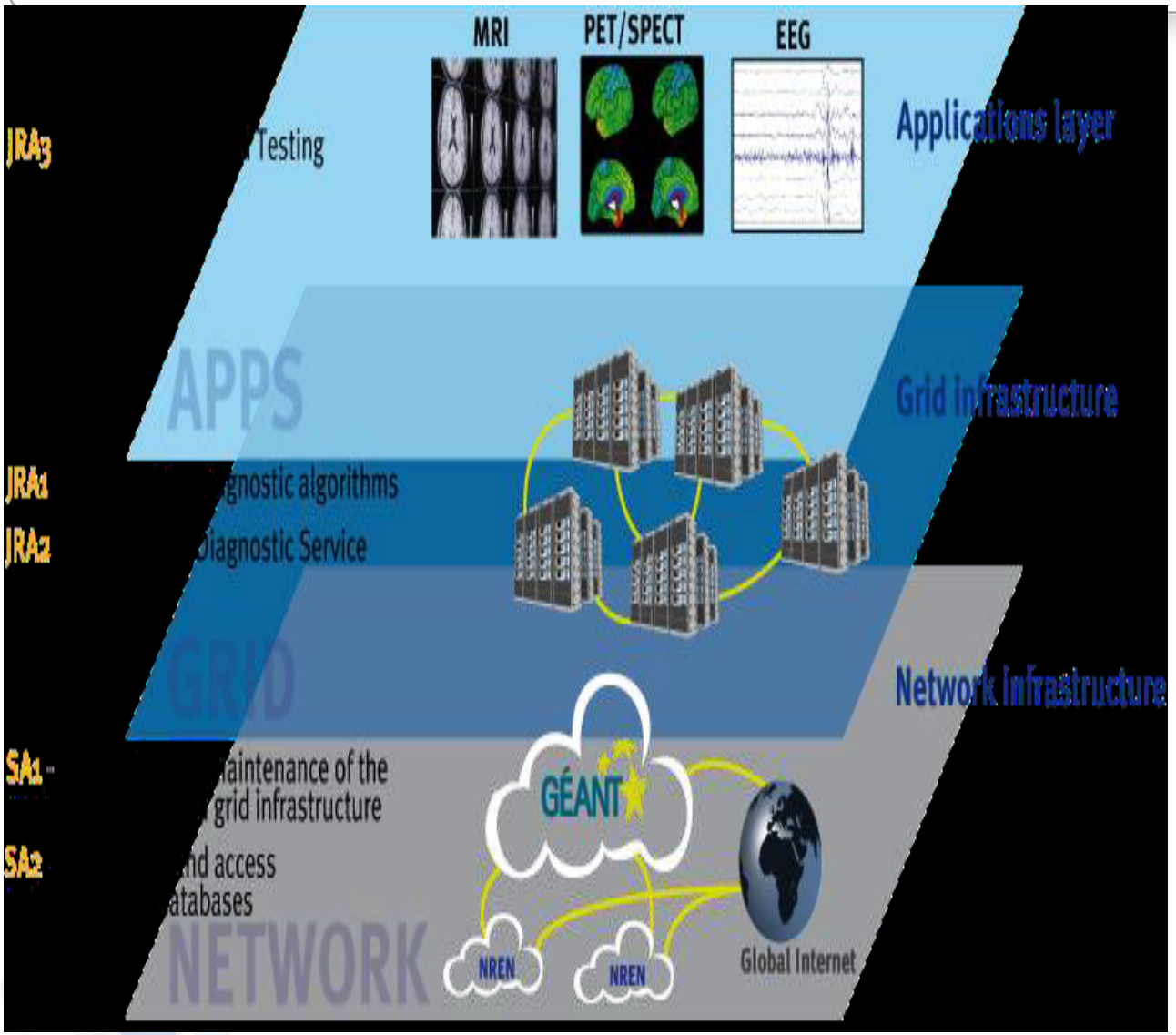

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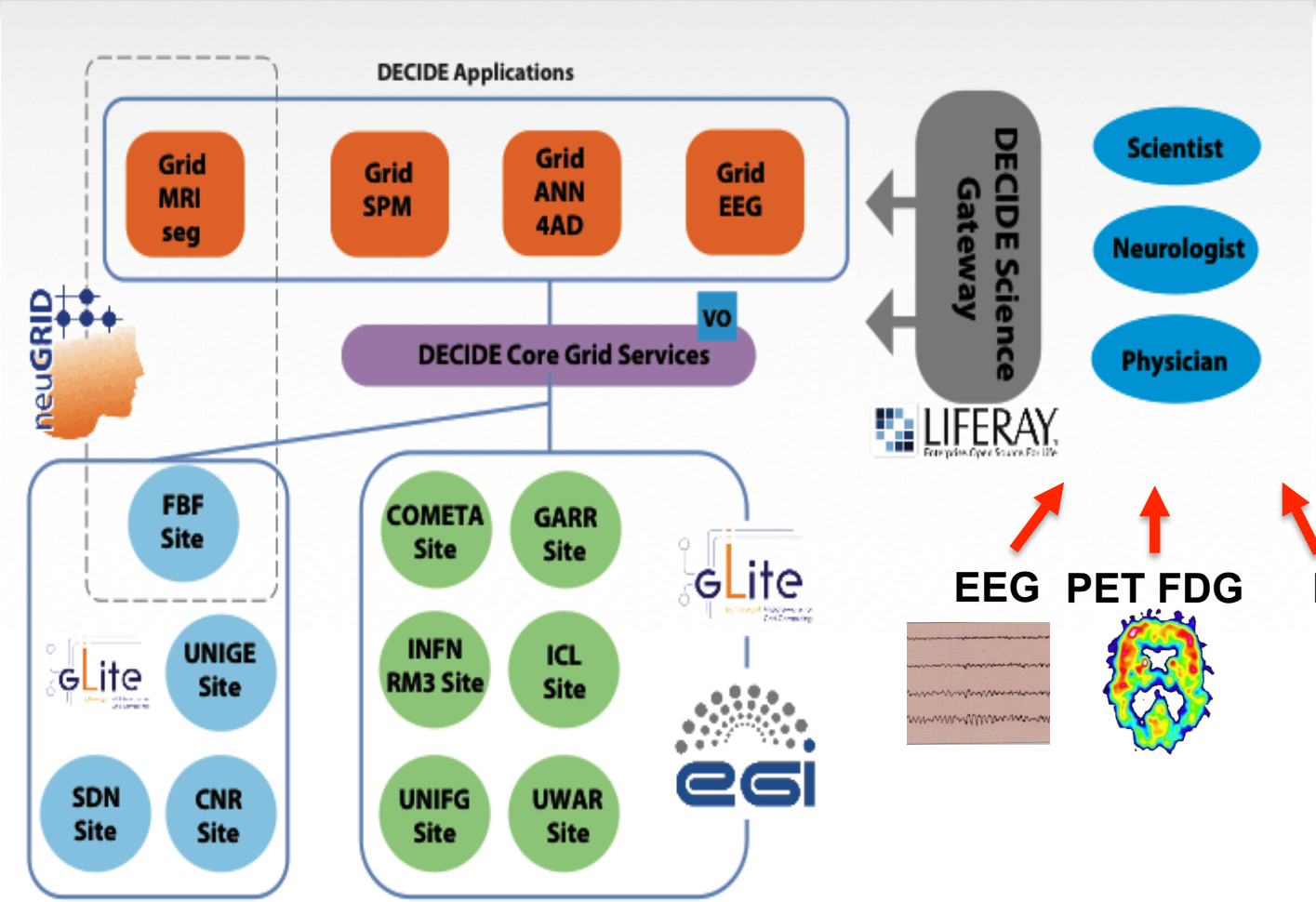

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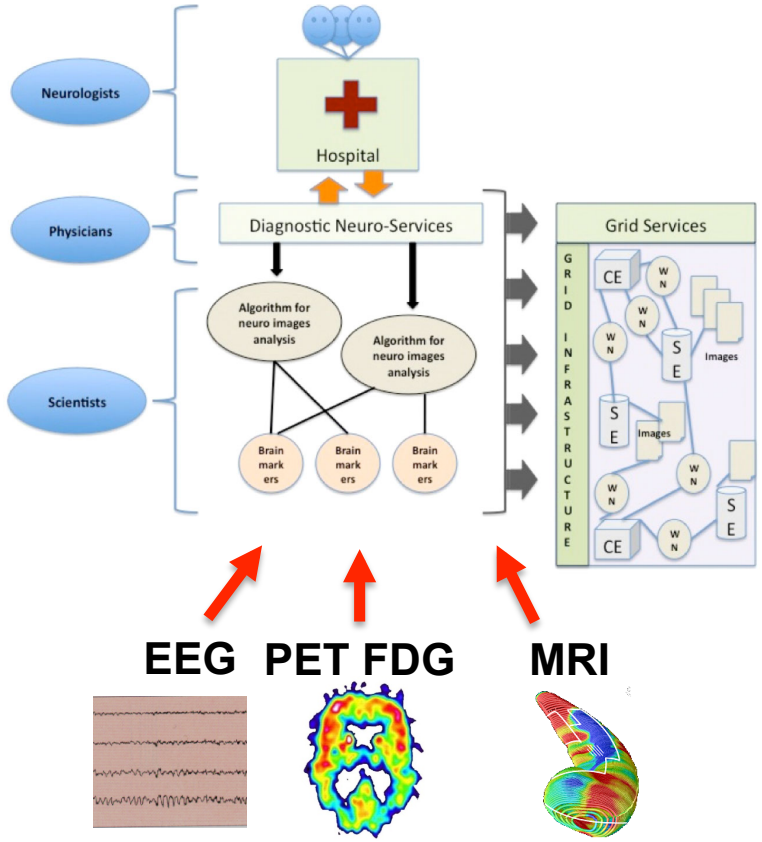

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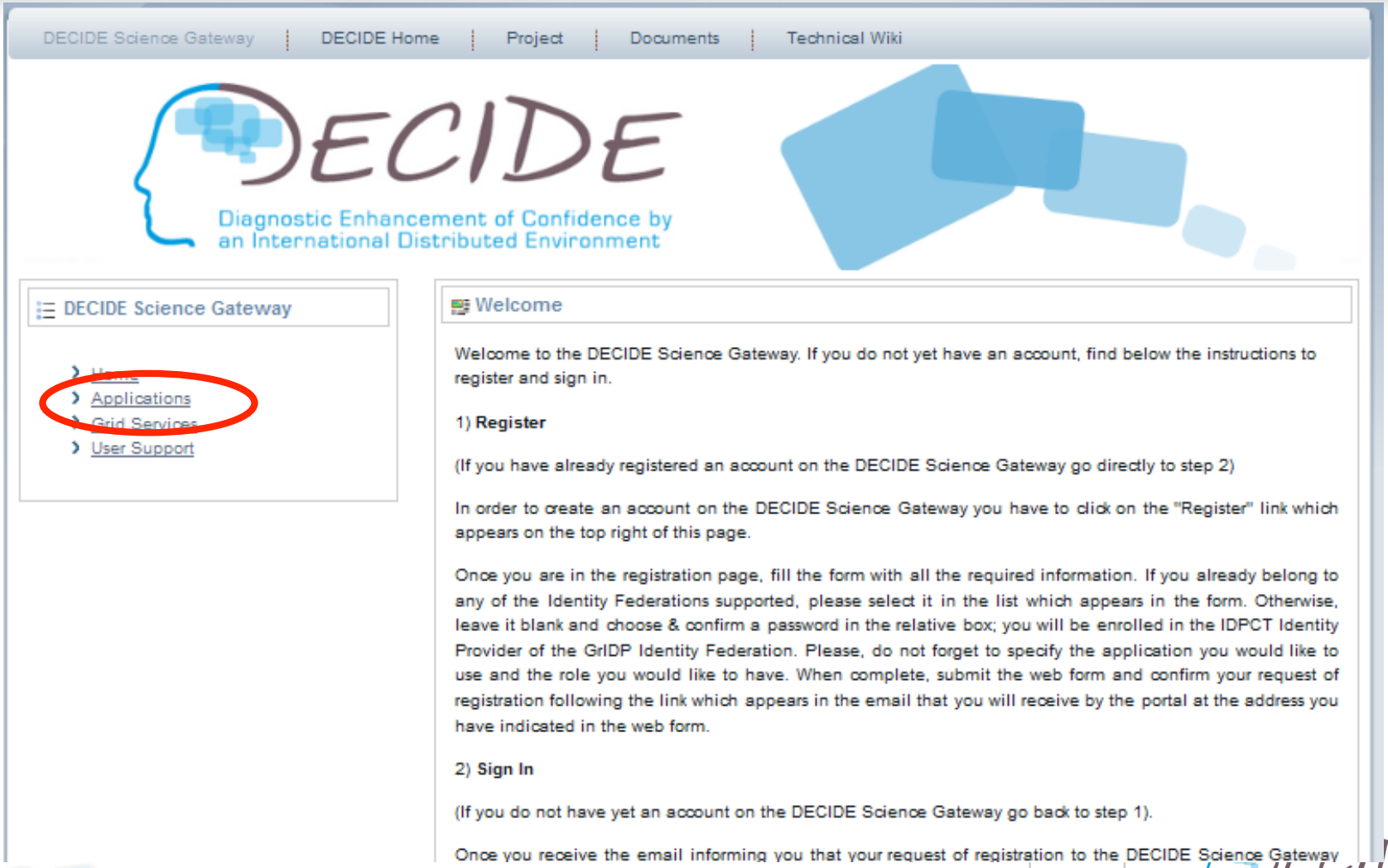

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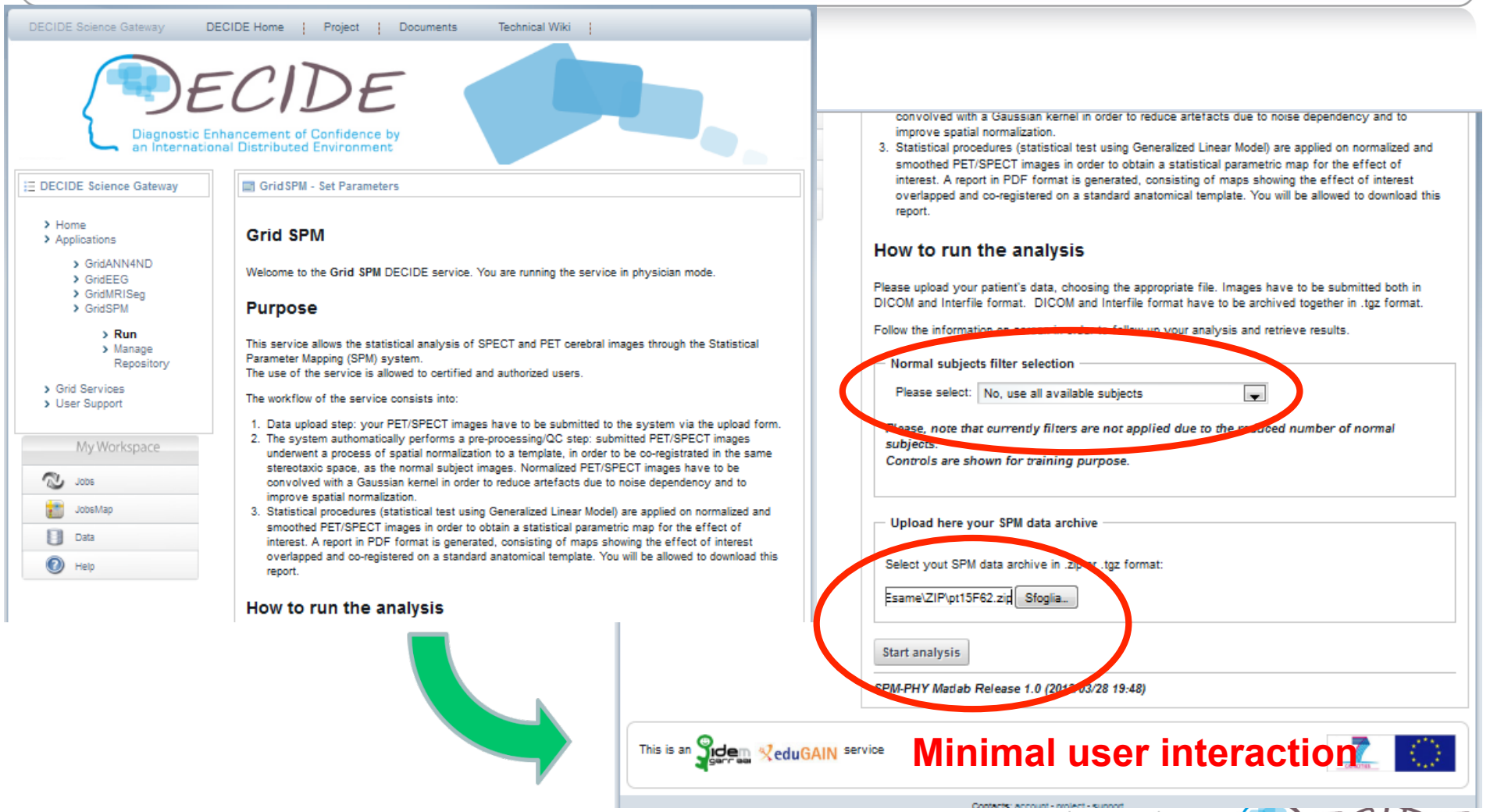

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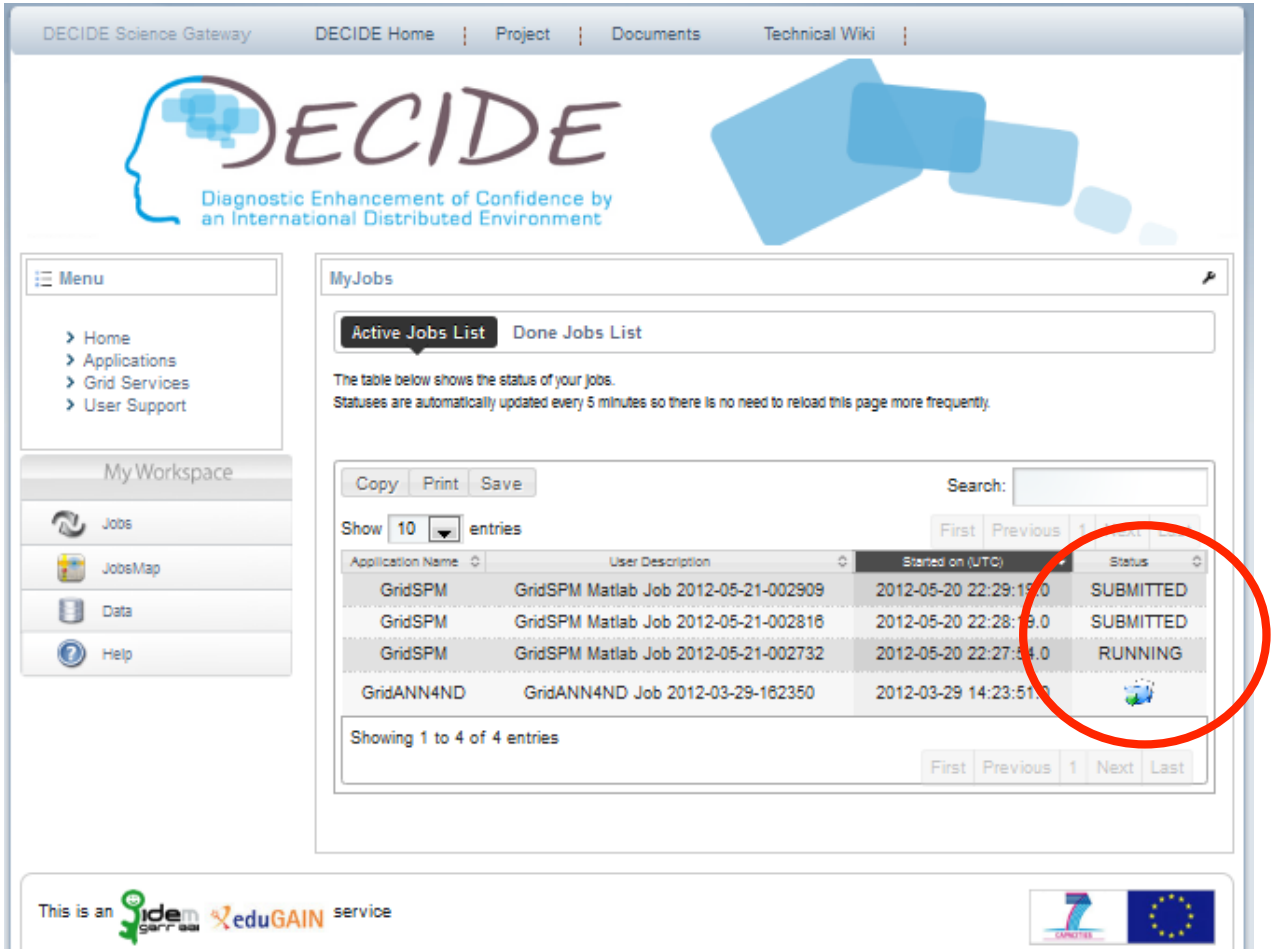

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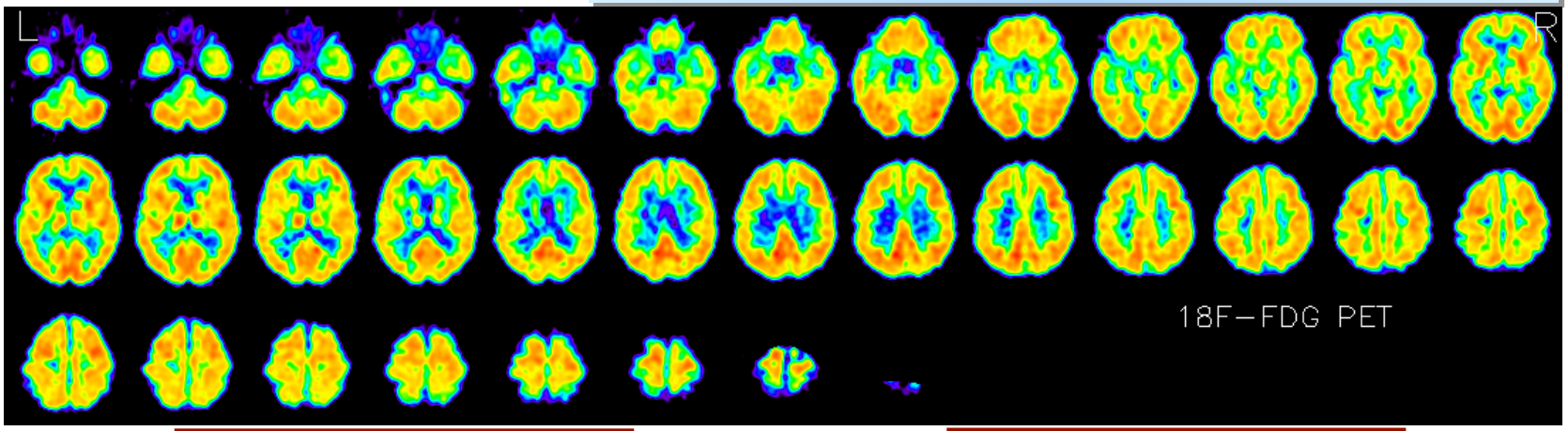

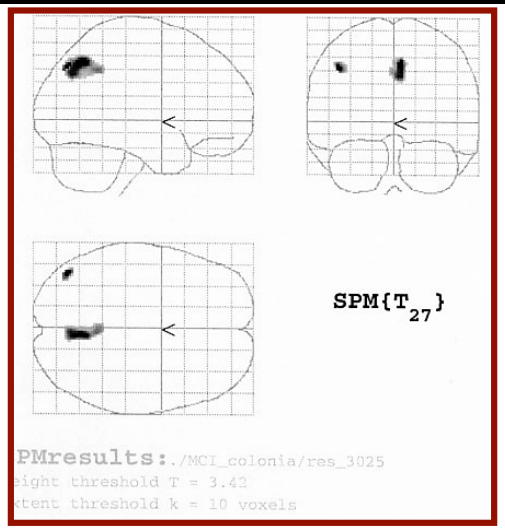

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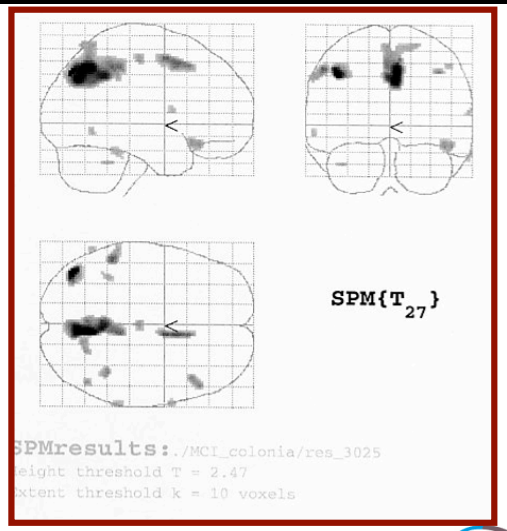

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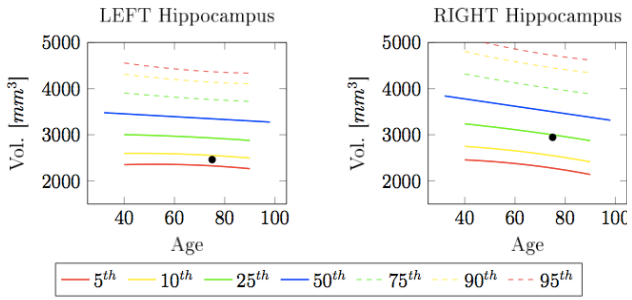

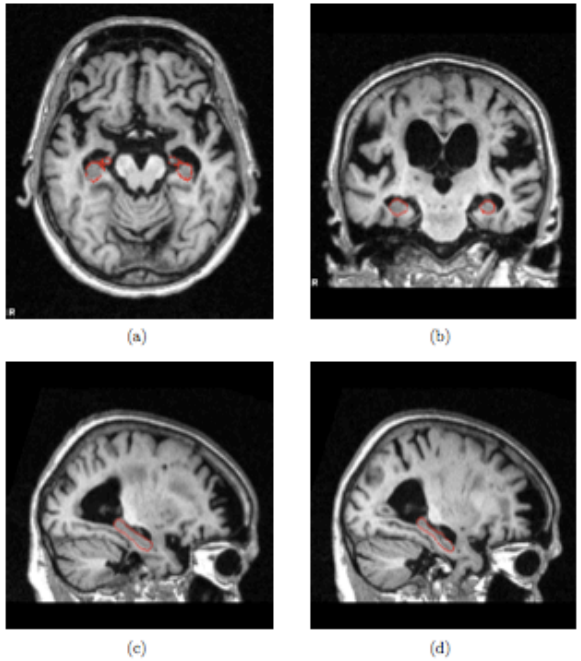

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Patient's Registration & Hippocampi segmentations

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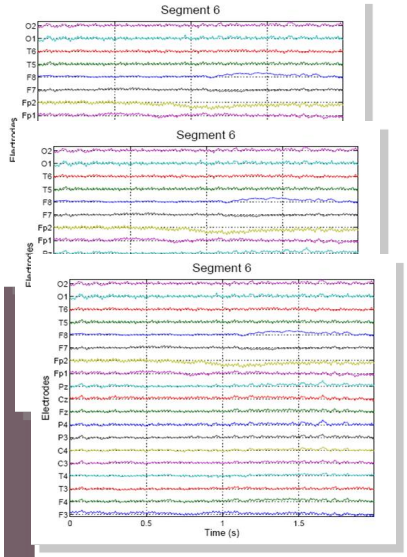
GridEEG application

GridDATALOAD



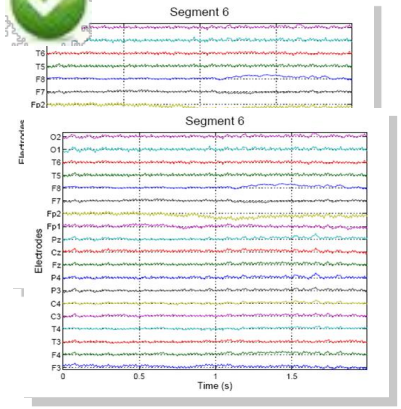
nameEEGtrials.txt

(2-sec EEG epochs in ASCII format)

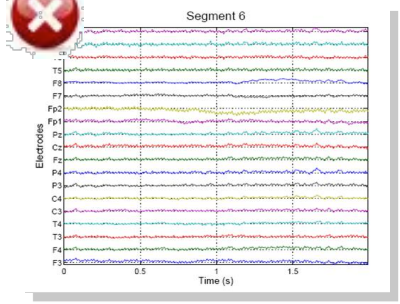
Data upload

GridEEGQUALITY

(accepting EEG epochs)



(rejecting EEG epochs)



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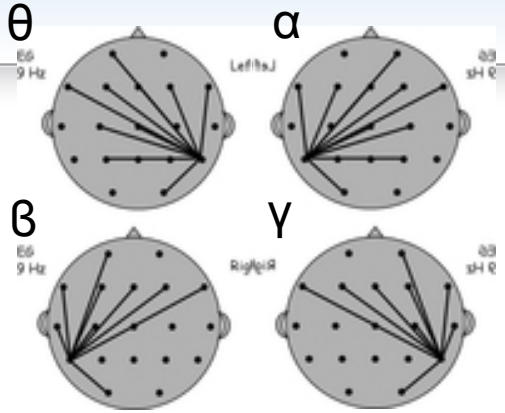
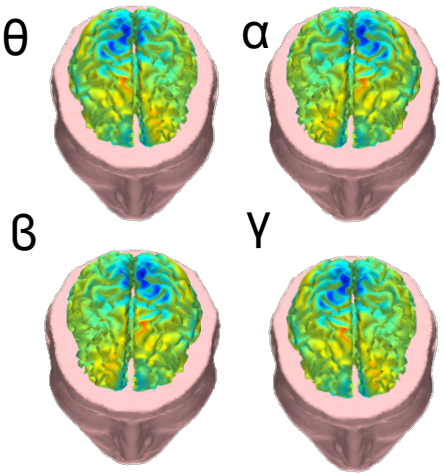


Model order, Frequency resolution

GRidEEGSOURCE

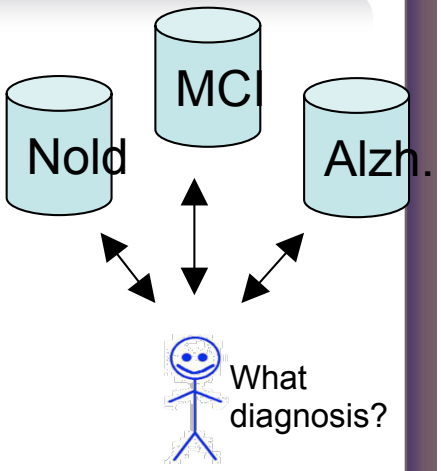


Window, Frequency resolution,…

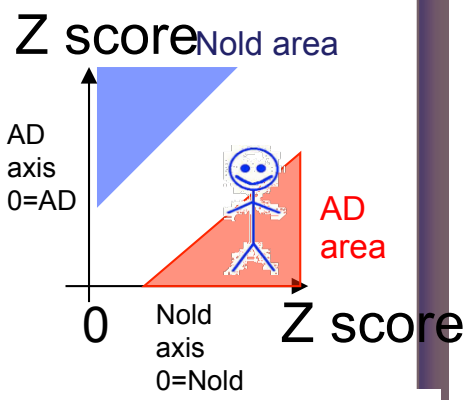
Processing & markers

GridEEGSTAT

reference EEG databases



nameEEGreport.pdf



Statistics & send report

The first expansion of DECIDE to Italian level: the project GRID-CORE for cognitive rehabilitation in AD and PD

Public

Academic Institutions:

- **GARR**, Rome
- University of Milan Vita-Salute San Raffaele, Italy
- - COMETA, Catania, Italy
- Catholic University of Rome Italy

Bando Ricerca Finalizzata: RF-2010-2319113
"GRID-based System for the Evaluation of the effects of Cognitive Rehabilitation in Patients with Alzheimer's Disease and Parkinson's Disease" 2010
Duration: 36 months (2013-2015)
Coordinator: IRCCS San Raffaele Pisana
Total cost: € 241.340 M €

Private

Small and Medium Enterprises (SMEs):

- **IRCCS San Raffaele Pisana**, Rome, Italy (Coordinator)

DECIDE
Diagnostic Enhancement of Confidence by an International Distributed Environment

The expansion of DECIDE to regional level (Puglia): the project SMART HEALTH for AD

Public

Academic Institutions:

1. Consiglio Nazionale delle Ricerche, Italia
2. IRCCS Istituto Tumori Giovanni Paolo II, Bari Italy
3. Università di Bari "Aldo Moro", Bari, Italy. Sub-contractor **Università degli Studi di Foggia**, (UNIFG),
4. Centro Regionale ICT, Italy

Bando Ricerca PON Smart Cities and Communities
"**Smart health**" 2012
Duration: 36 months (2013-2015)
Coordinator: IRCCS San Raffaele Pisana
Total cost: € 217.800,00 €

Private

Small and Medium Enterprises (SMEs):

1. Beta 8.0 Technology S.r.l., Italy
2. CeRICT S.c.r.t, Italy
3. Cooperativa EDP La Traccia, Italy
4. HC Hospital Consulting S.p.A., Italy
5. Noemalife S.p.A., Italy,
6. IRCCS SDN, Napoli, Italy
7. Telbios S.p.A., Italy
8. Telecom Italia, Italy

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Thank you

for your kind attention!

Find more about DECIDE at www.eu-decide.eu
or contact us for questions and collaboration opportunities at
info@eu-decide.eu

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