

neuGRID

A GRID-BASED e-INFRASTRUCTURE FOR DATA ARCHIVING/ COMMUNICATION AND COMPUTATIONALLY INTENSIVE APPLICATIONS IN THE MEDICAL SCIENCES

Giovanni B Frisoni (P.I.)¹, Christian Spenger², Alex Zijdenbos², Richard McClatchey³, **David Manset**⁴, Frederik Barkhof⁵, Lars-Olof Wahlund⁶, Tony Solomonides⁷, Carla Finocchiaro⁸

¹IRCCS Fatebenefratelli – Centro Nazionale per la Malattia di Alzheimer e le Malattie Psichiatriche, Brescia, Italy;

²Neuralyse Europe GmbH, Switzerland;

³University of the West of England, Bristol, UK;

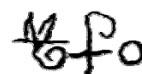
⁴Maat G Knowledge SL, Toledo, Spain;

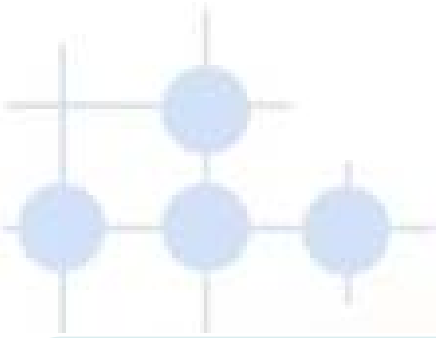
⁵VUmc - Vrije Universiteit Medical Center, Amsterdam, The Netherlands;

⁶Karolinska Institutet, Stockholm, Sweden;

⁷HealthGrid, France;

⁸CF consulting, Milano, Italy





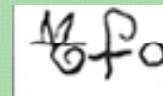
neuGRID

- European FP7 funded project (I3)
- Started Feb 2008 (3 years)
- ~3M€ total budget
- 8 European partners
- Builds on proven technologies:
 - MammoGrid (MAAT, UWE)
 - LORIS database infrastructure and CLASP Pipeline (McGill/MNI, Prodema Informatics)



neuGRID

Provincia Lombardo Veneta Fatebenefratelli, ITALY



Prodema Informatics, SWITZERLAND



University of the West of England, Bristol, UK



Maat Gknowledge, SPAIN



Vrije Universiteit Medical Centre, THE NETHERLANDS



Karolinska institutet, SWEDEN



**Karolinska
Institutet**

HealthGrid, FRANCE

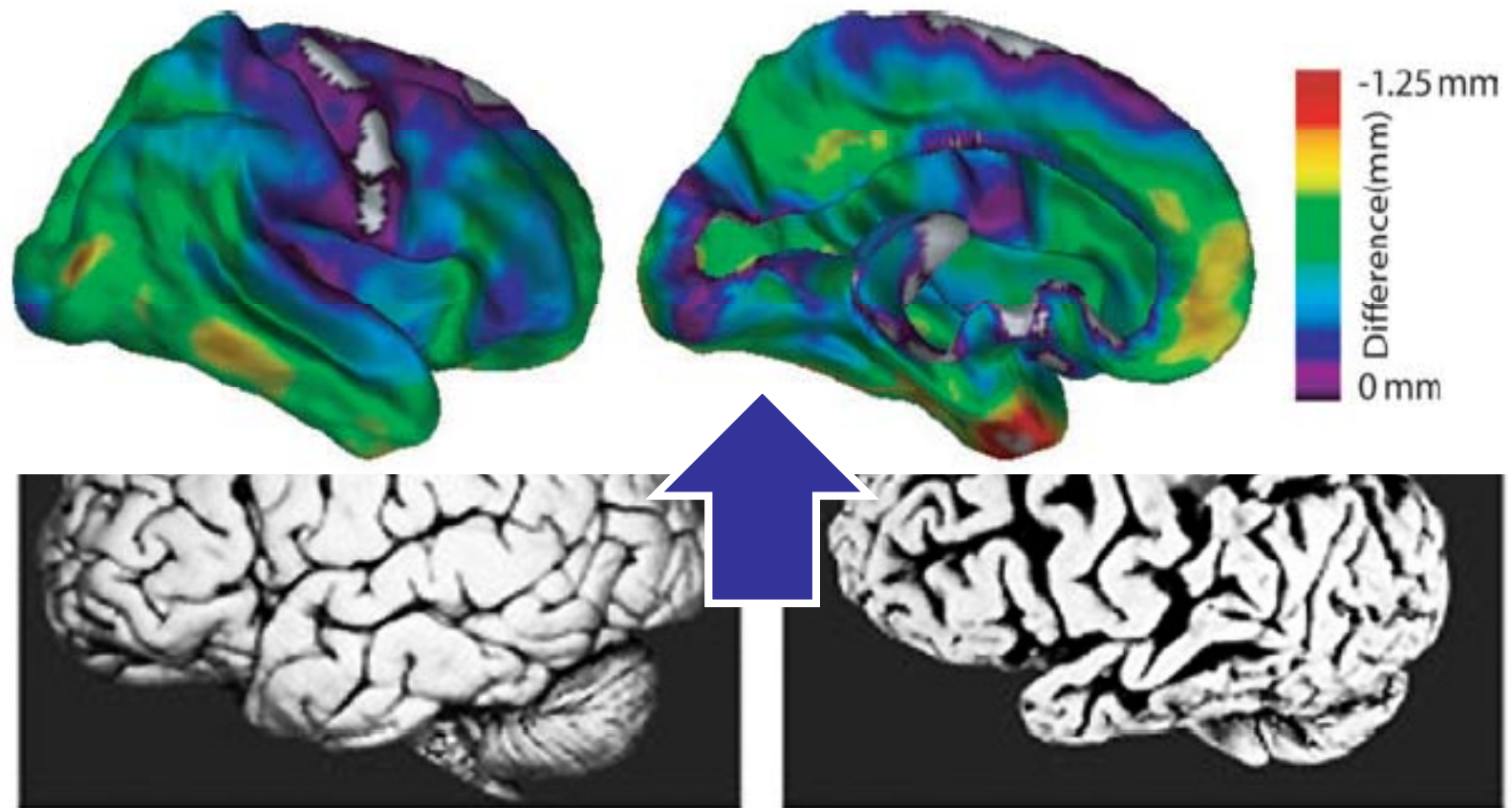


CF consulting s.r.l., ITALY



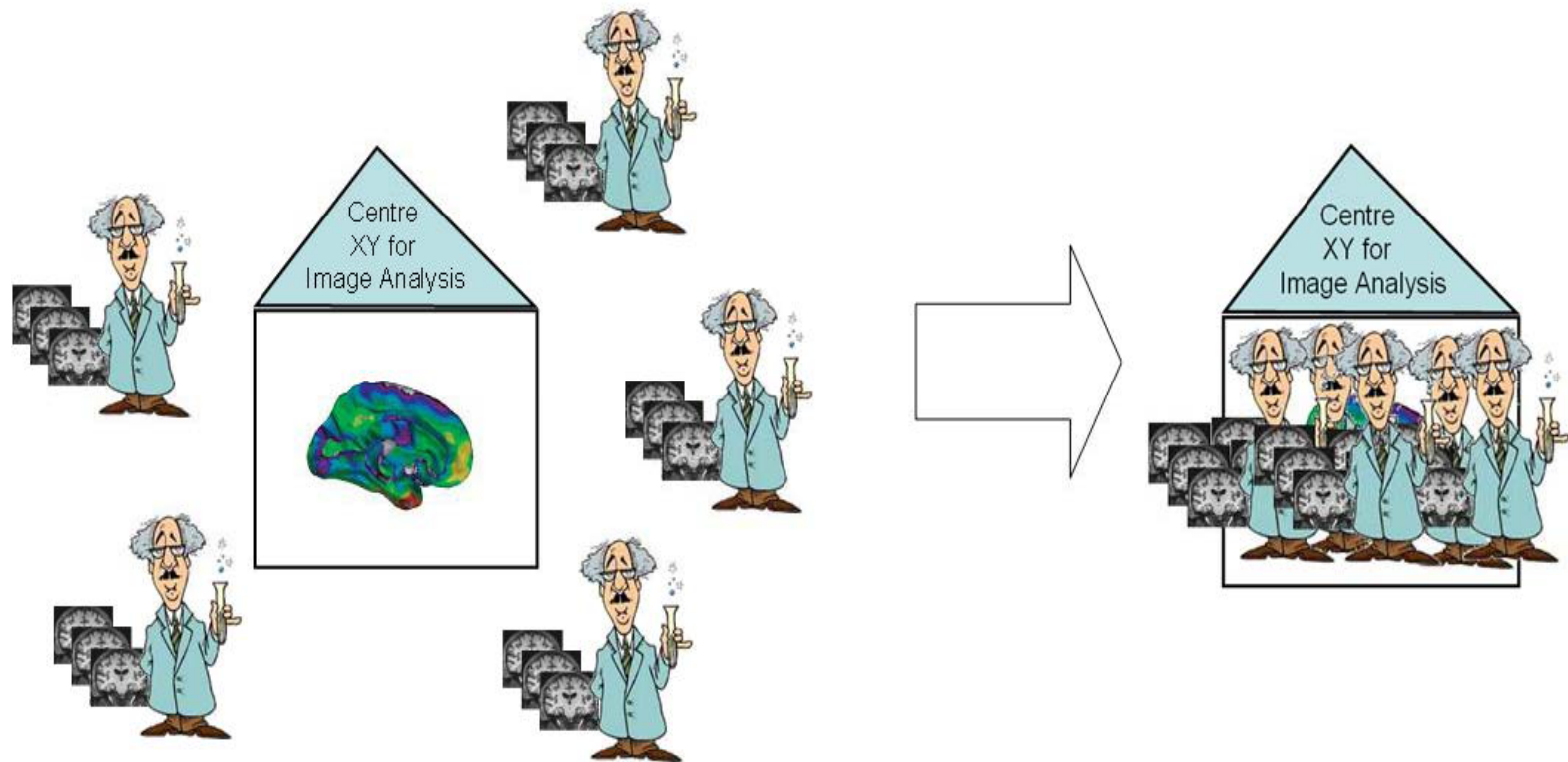
Question

Marker of Alzheimer's progression
(like PSA for prostate cancer)



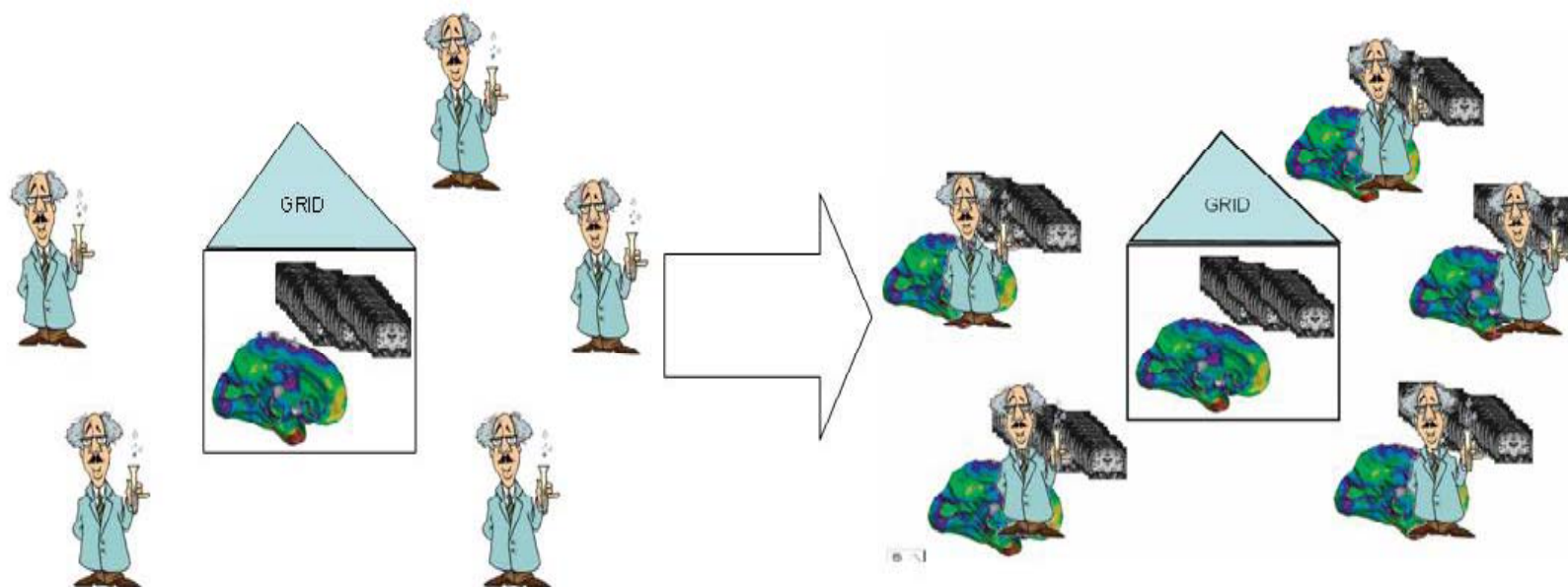
*Courtesy of *Provincia Lombardo Veneta Fatebenefratelli (FBF)*

Common Practice



- Technology and expertise exists at select centers
 - Researchers huddle together at those centers

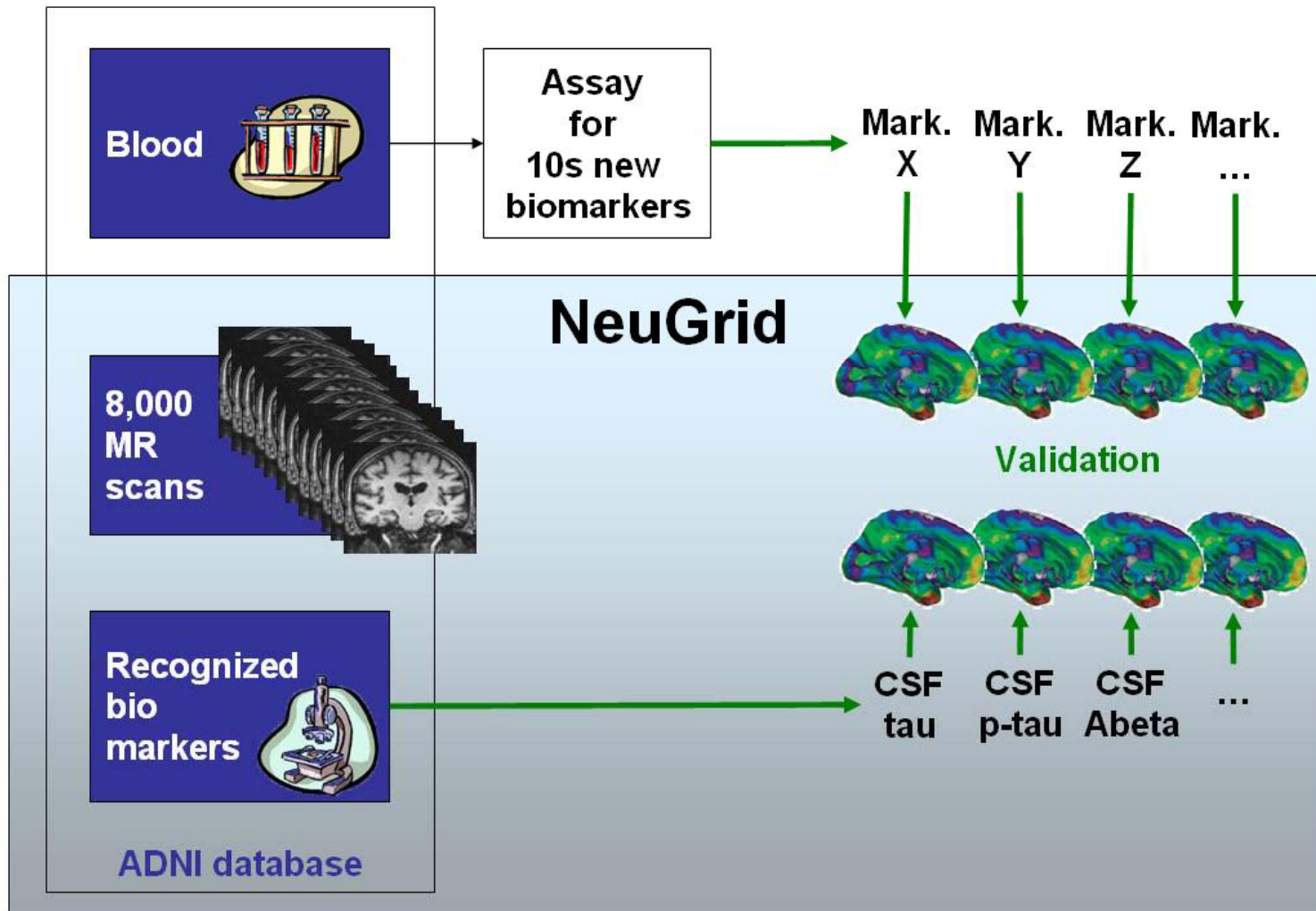
neuGRID Approach (1)



- Expertise and technology available on-line
 - Computational analyses distributed on a grid

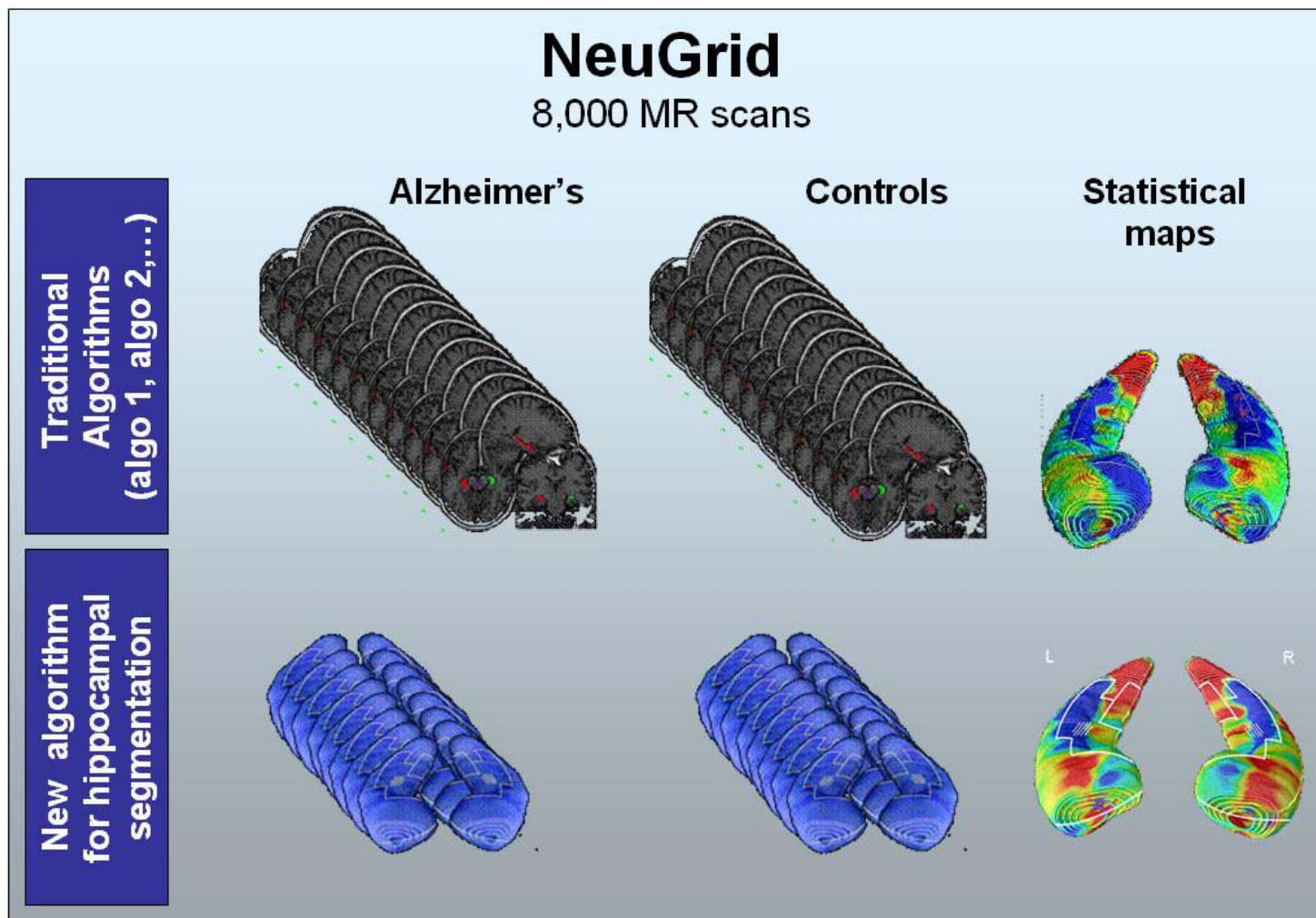
neuGRID Use Case (1)

Validation of new biomarkers for Alzheimer's using NeuGrid



neuGRID Use Case (2)

Validation of new computational neuroanatomy algorithms using NeuGrid





neuGRID Approach (2)

- Combination of LORIS & MammoGrid
- Grid as the technological glue
 - I.e. « gridification » of the LORIS solution « à la » MammoGrid
- Deployment of the Solution in relevant major centres accross Europe



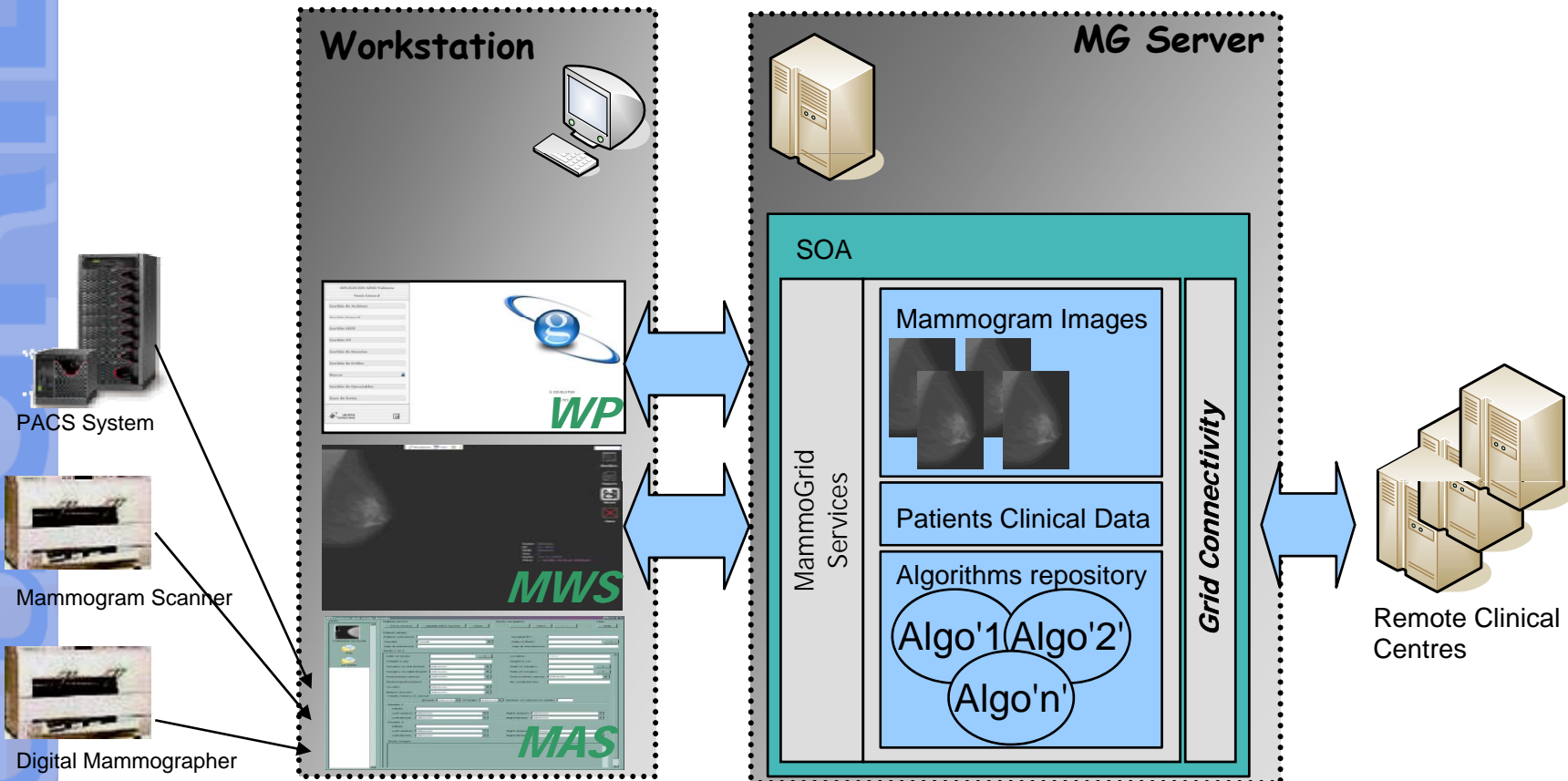
LORIS

Mam m oG id

neuGRID

MammoGrid

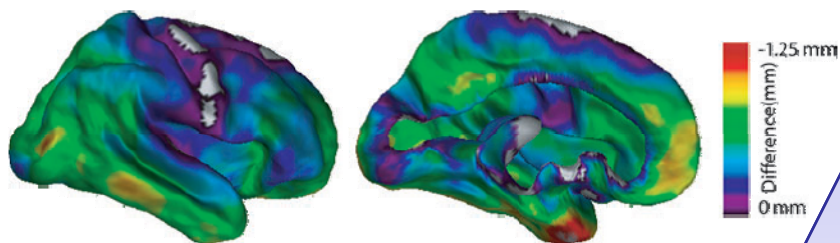
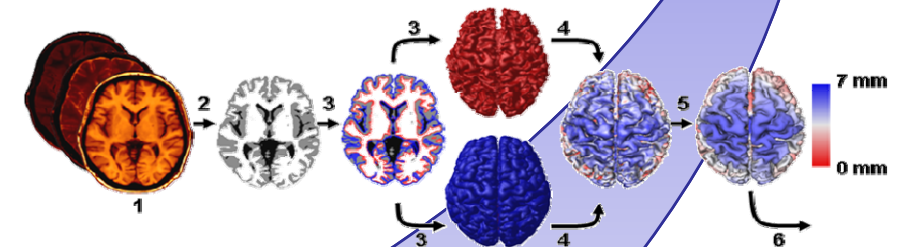
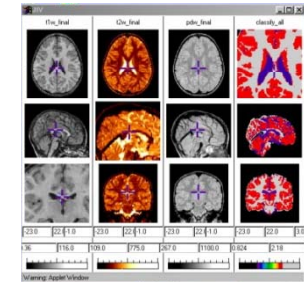
European FP5 Project



LORIS (1)

Solution Highlights

- Originally developed for the NIH-funded “MRI Study of Normal Brain Development”
- Centralised Solution
 - Centralised database + local cluster
 - Web-based solution for uploading imaging data
- Brain image processing algorithm toolbox
 - E.g. Cortical Thickness Measurement
- User-facing services
 - Data acquisition and quality control
 - Query graphical user-interface
- Open Standards



*Courtesy of **Prodema Informatics**

LORIS (2)

Solution Highlights

Patient Data Management

InnoMed database
 User: Sebastian Site: KYS RADIOLOGIA Date: May 27 2007

[New Profile](#)
[Access Profile](#)
[My Preferences](#)
[Log Out](#)

Links
[DICOM archive](#)
[MRI Browser](#)
[Mantis](#)
[DB statistics](#)

Access Profile
 DCC-ID: PSC-ID: [Open Profile](#)
 Selection Filter
 Site: DCC-ID: PSC-ID:
 Gender: Date of Birth:

MRI browser - InnoMed database
 User: Sebastian Site: KYS RADIOLOGIA Date: May 27 2007

List of Profiles

No.	PSC	DCCID
1	KYS RADIOLOGIA	980424
2	KYS RADIOLOGIA	946162
3	KYS RADIOLOGIA	937042
4	KYS RADIOLOGIA	928337
5	KYS RADIOLOGIA	923977
6	KYS RADIOLOGIA	919934
7	KYS RADIOLOGIA	892265
8	KYS RADIOLOGIA	891739

Navigation
[Back to list](#)
[Prev](#)
[Next](#)
[Mantis](#)

3-D with combined **3-D**

QC Status	Pass	PSCID	scanner	Site	Az Ospedaliera Perugia
QC Pending	No	DCCID	325022	Visit Label	PRGPHA002_PRG_1
DOB		Gender		Output Type	native
Scanner	GE MEDICAL SYSTEMS GENESIS_SIGNA 000000C5123605	Subproject	InnoMed	EDC	

[Link to visit-level feedback](#) [Save](#)

7 file(s) displayed.

Image Browser

innoMed_325022_PRGPHA002_PRG_1_t2_2.mnc
 innoMed_325022_PRGPHA002_PRG_1_t2.mnc ↔ innoMed_325022_PRGPHA002_PRG_1_t1_1.mnc
 innoMed_325022_PRGPHA002_PRG_1_t1_1.mnc

Protocol	t2
Space	native
Clis Alg	
Acq Date	Sep 20, 2006
Inserted	Jan 19, 2007
Ser Desc	FSE PD/T2
Ser Num	6
Echo Time	101.84 ms
Rep Time	3,000.00 ms
Slice Thick	3.00 mm

Protocol	t1
Space	native
Clis Alg	
Acq Date	Sep 20, 2006
Inserted	Jan 19, 2007
Ser Desc	MP-RAGE
Ser Num	2
Echo Time	4.09 ms
Rep Time	10.40 ms
Slice Thick	1.20 mm

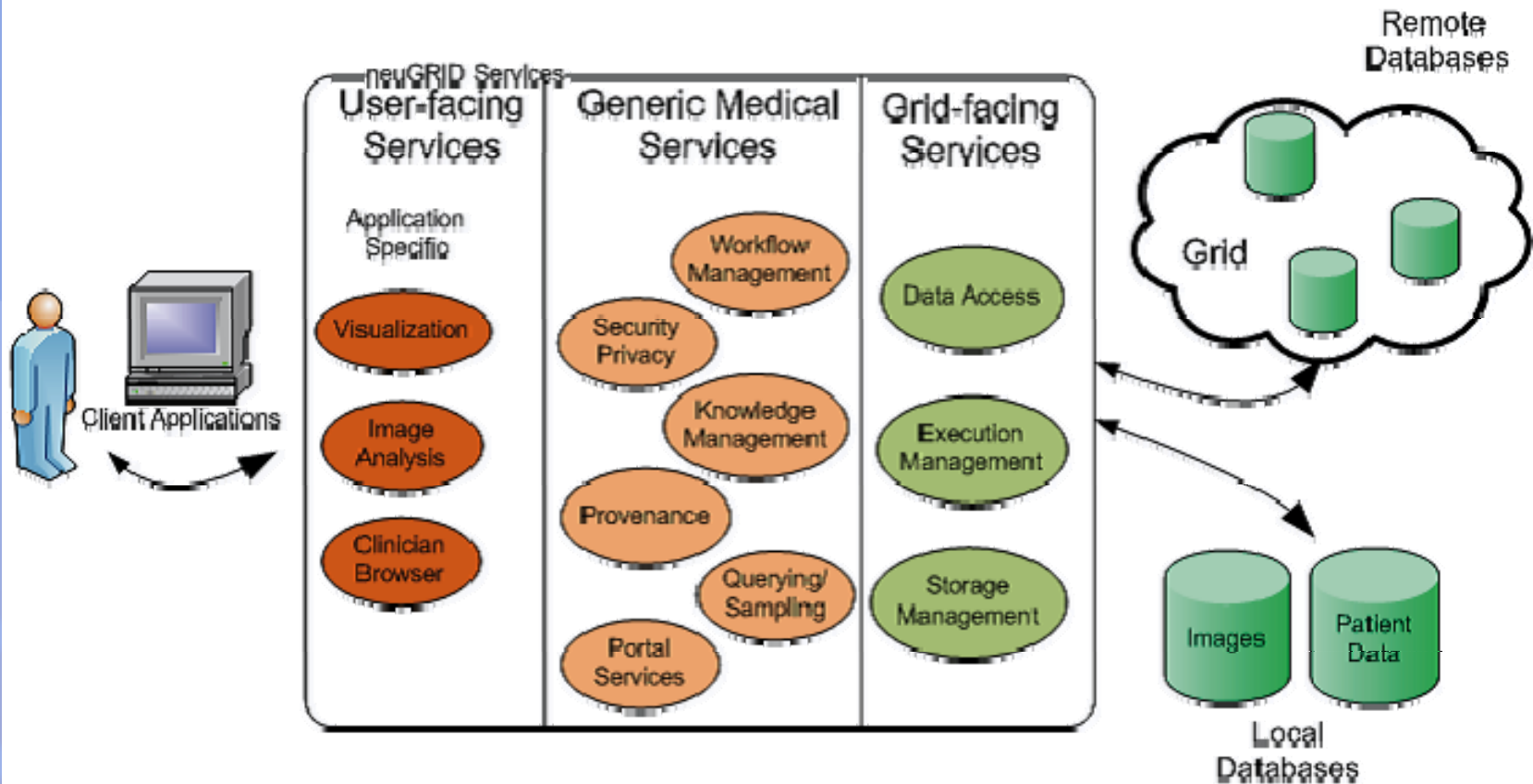
Color coding: grey, hotmetal, spectral, red, green, blue, MNI labels
 "Under" color, "Over" color, Tie colormap sliders, Coordinates type, Sync all cursors, Help, Out

JAVA-based 3D Image Overlay

*Courtesy of **Prodema Informatics**

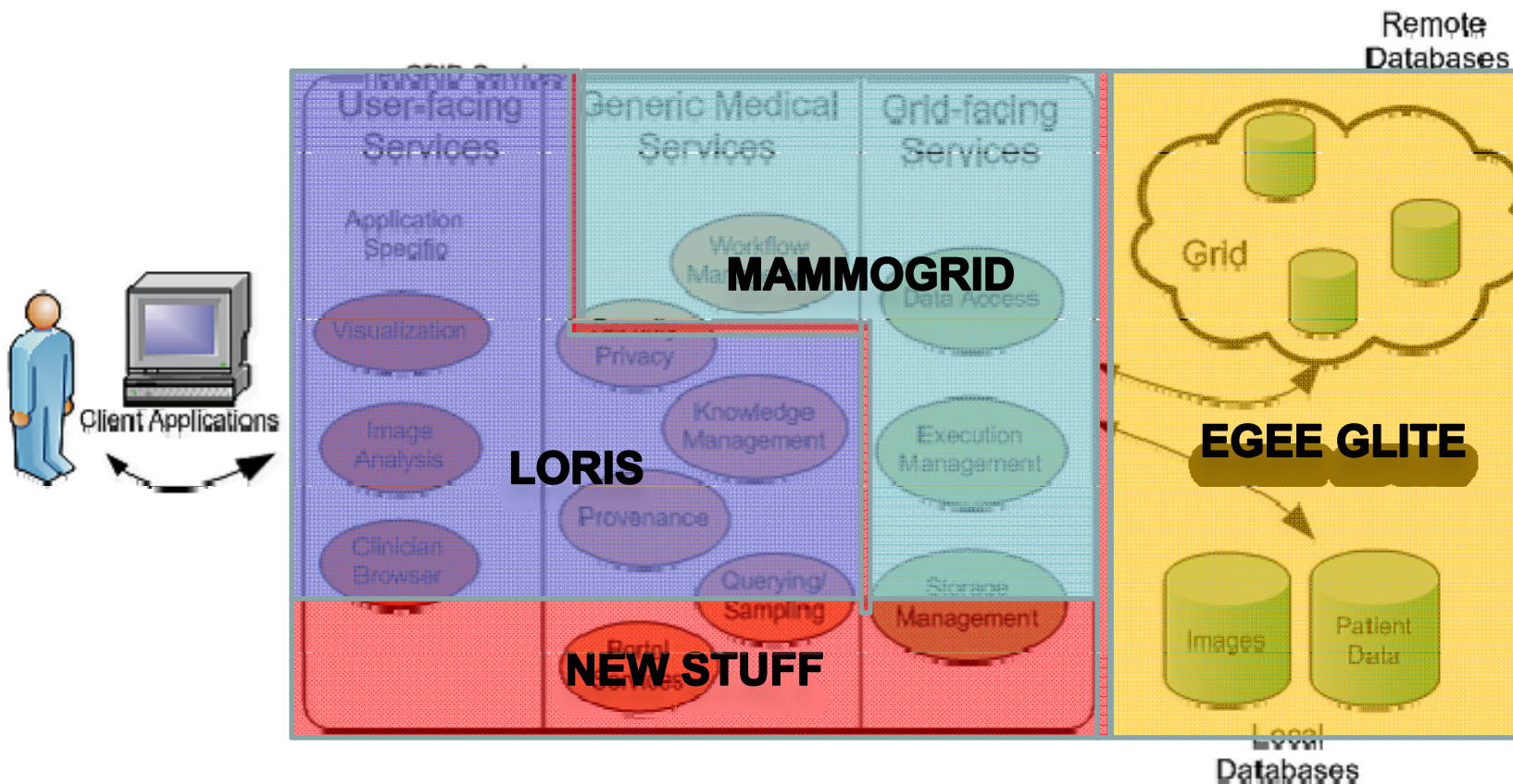
neuGRID Architecture (1)

Service-Oriented Architecture



neuGRID Architecture (2)

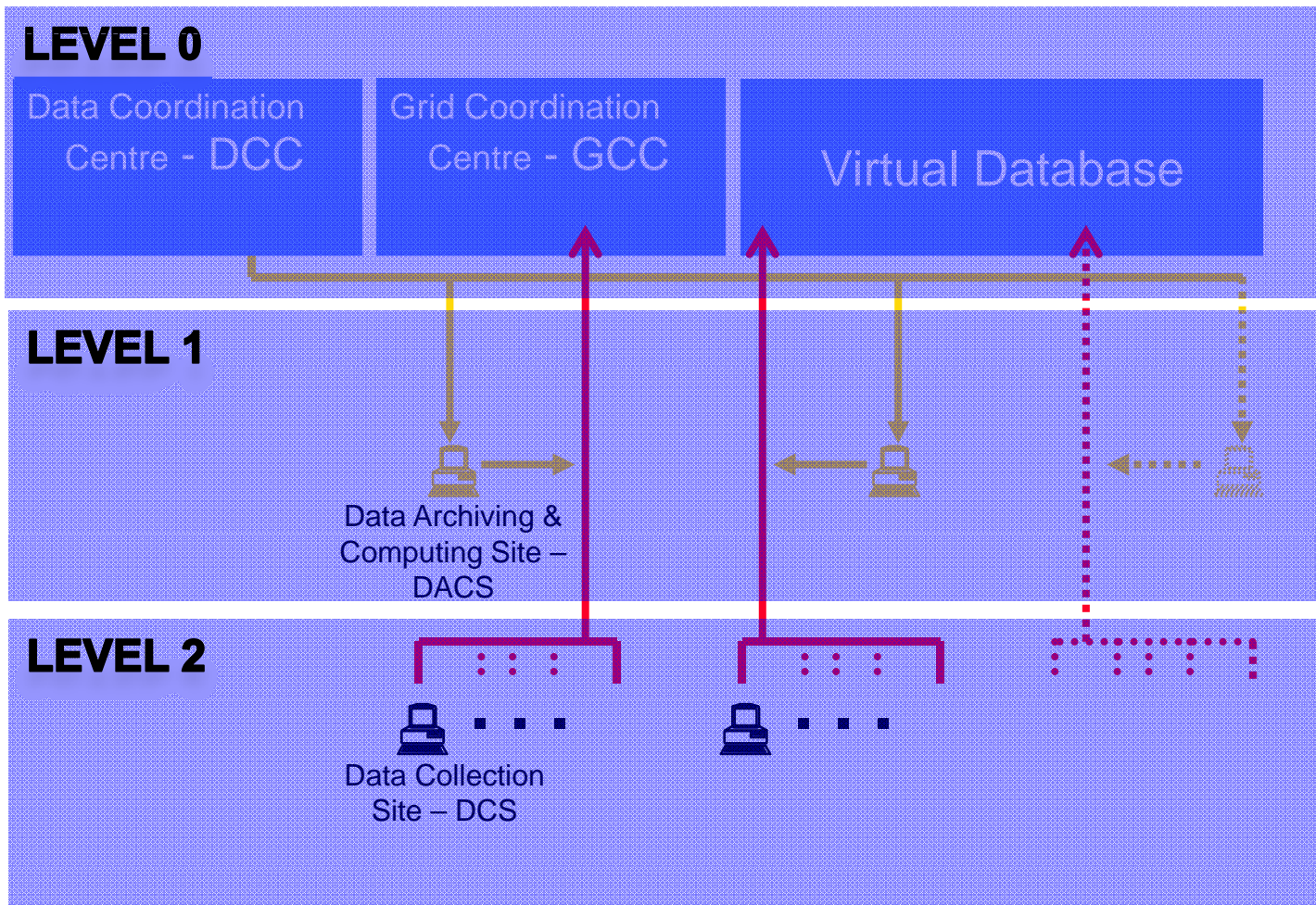
Service-Oriented Architecture





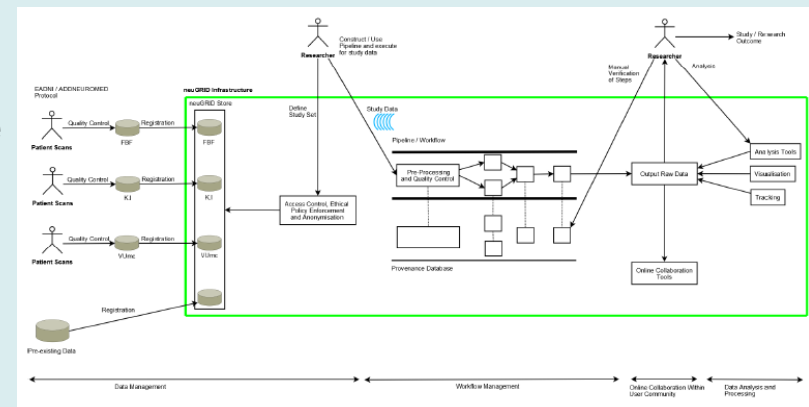
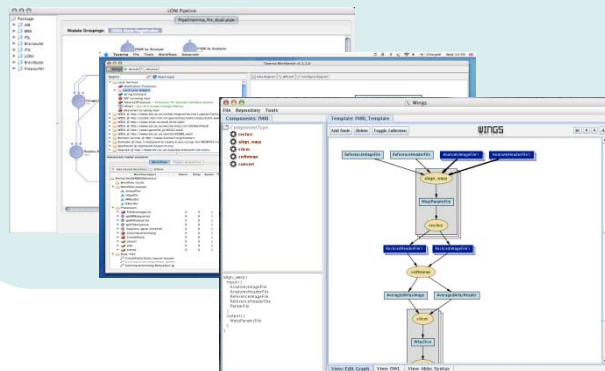
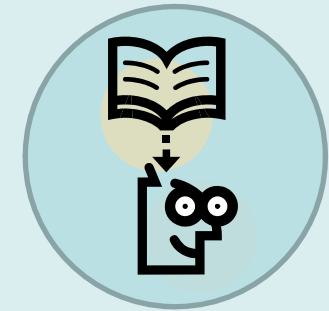
neuGRID Infrastructure

A Layered Infrastructure



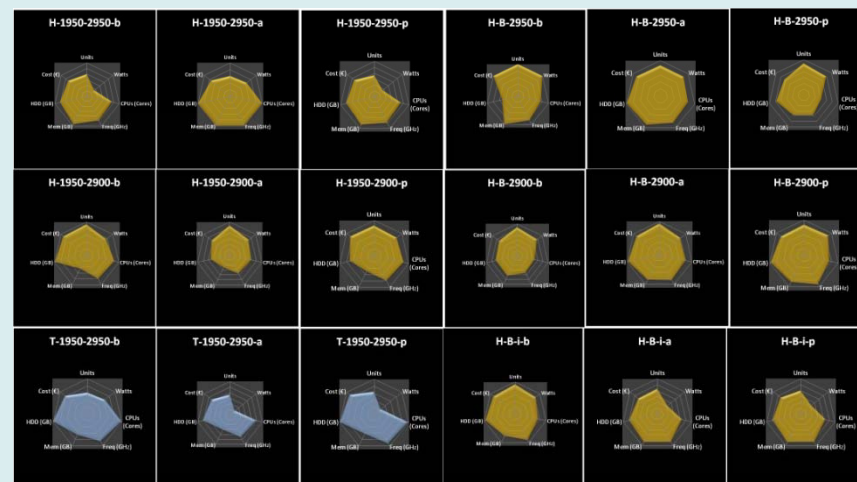
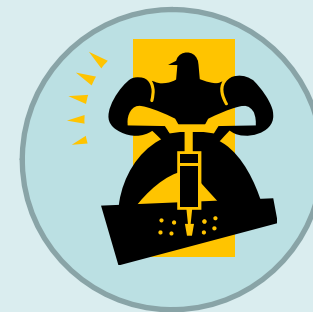
The work has started... (1)

- Requirements gathering and analysis
 - Visited the 3 clinical sites to fetch requirements
 - Functional requirements formalisation
 - Use-cases specifications
- Technical brainstorming and specifications
 - State-of-the-art review
 - Prototyping ongoing
 - Gluing Service
 - Workflow authoring
 - Data Provenance Service



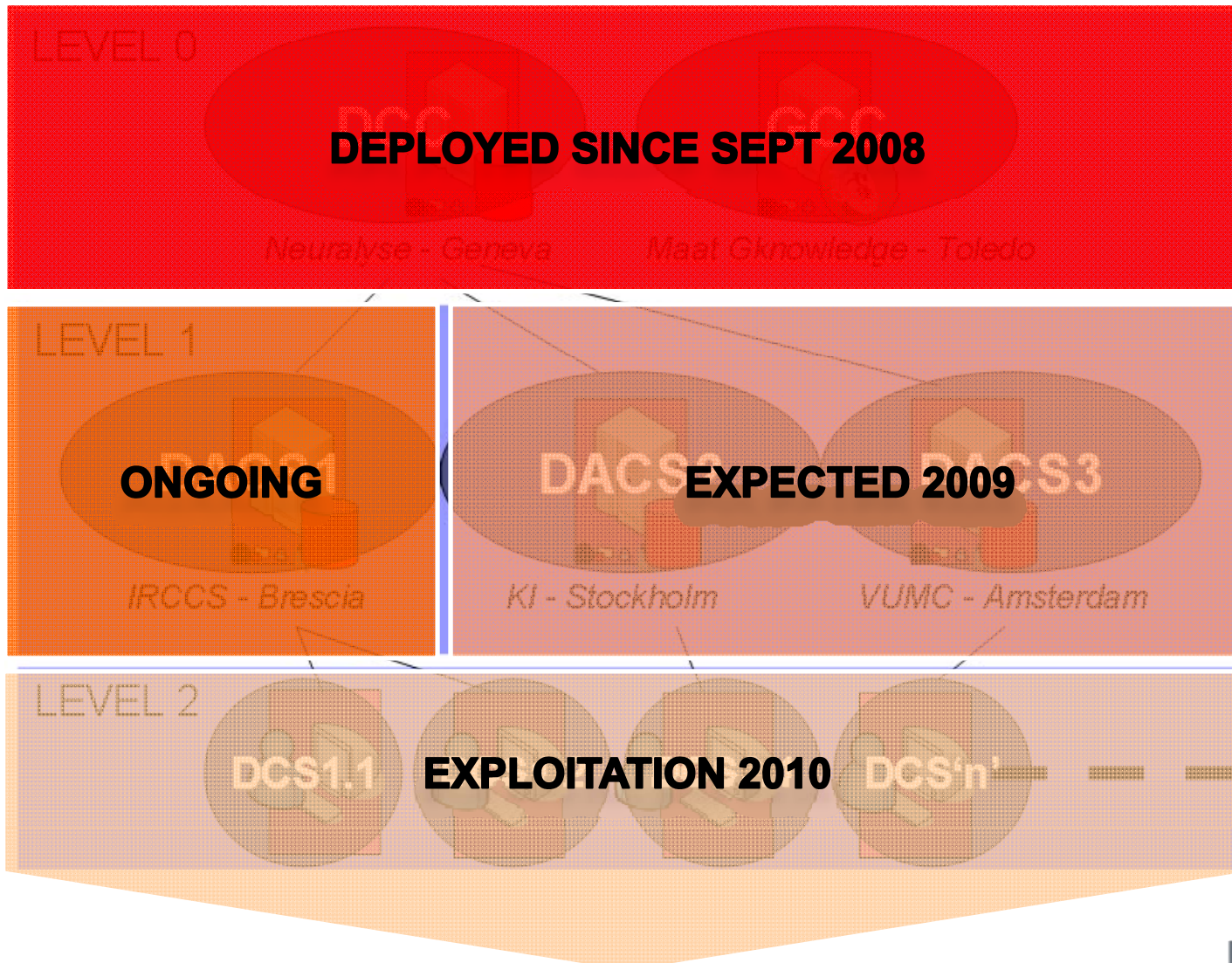
The work has started... (2)

- Deployment logistics preparation
 - Designed not less than 18 hardware specifications for access points
 - Considered different types of hardware from regular rack-mountable servers to blades
- Setup development environment (neuGRID PoC)
 - Certificate Authority
 - Virtual Organisation
 - Grid Information System
 - File Catalogue



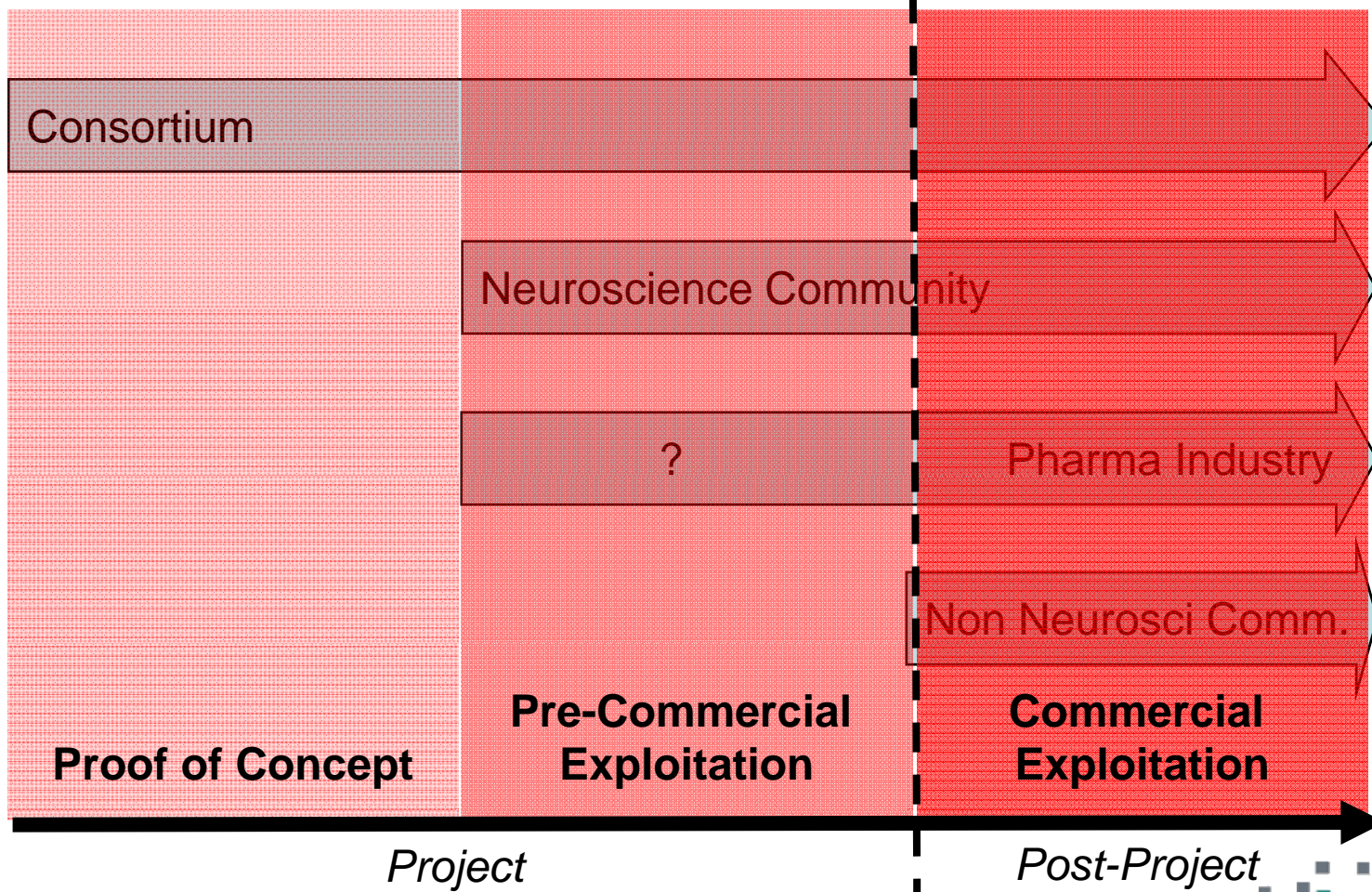
neuGRID Infrastructure

A Layered Infrastructure



neuGRID Exploitation

Exploitation & Business Plan



New Related Initiatives

- CBRAIN - Canadian Brain Imaging Research Network
 - Recently funded by CANARIE (Canadian Advanced Network and Research for Industry and Education)
- NeuroLOG
 - Funded by the French ANR



A Super Neurosciences Grid-enabled Network?

Conclusions

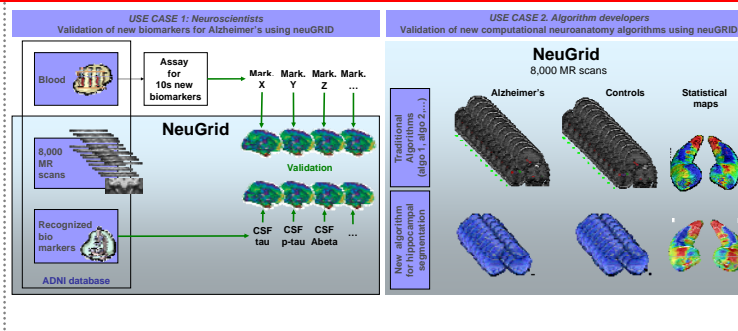
- neuGRID aims to bring sophisticated neuro-imaging analyses “home”
- neuGRID consortium has strong ties to international neuro-scientific, grid, and clinical communities
- Partners have complementary expertise
- Technology based on established, proven software solutions
- Deployment has started – DCC and GCC in place
 - 1st DACS at FBF will be ready in coming month
- neuGRID prototype being developed with objective to demo mid October 2008

neuGRID

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THANK YOU FOR YOUR ATTENTION
Visit our Booth!



Phase 1 - Project Foundation by Month 12
 Phase 2 - Project Deployment by Month 24
 Phase 3 - Project Final Phases by Month 36

International issues Collaborative arrangements include the European Alzheimer's Disease Consortium (EADC), Alzheimer's Disease Neuroimaging Initiatives (ADNI), the Montreal Neurological Institute, EC InnoMed/AddNeuroMed project, EC NeuroLog, EC NeuroGrid, the Alzheimer's Association, the LoNI in Los Angeles, the FIL in London, the French IFRAD, the FMRIB in Oxford, and the EFNS.



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