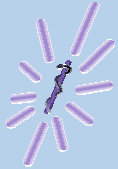




MediGRID – Grid Computing for Medicine and Life Sciences

Anette Weisbecker, Fraunhofer IAO, Stuttgart
Otto Rienhoff, Georg-August-Universität, Göttingen

International Symposium on Grid Computing –
Taipei, 28th March 2007

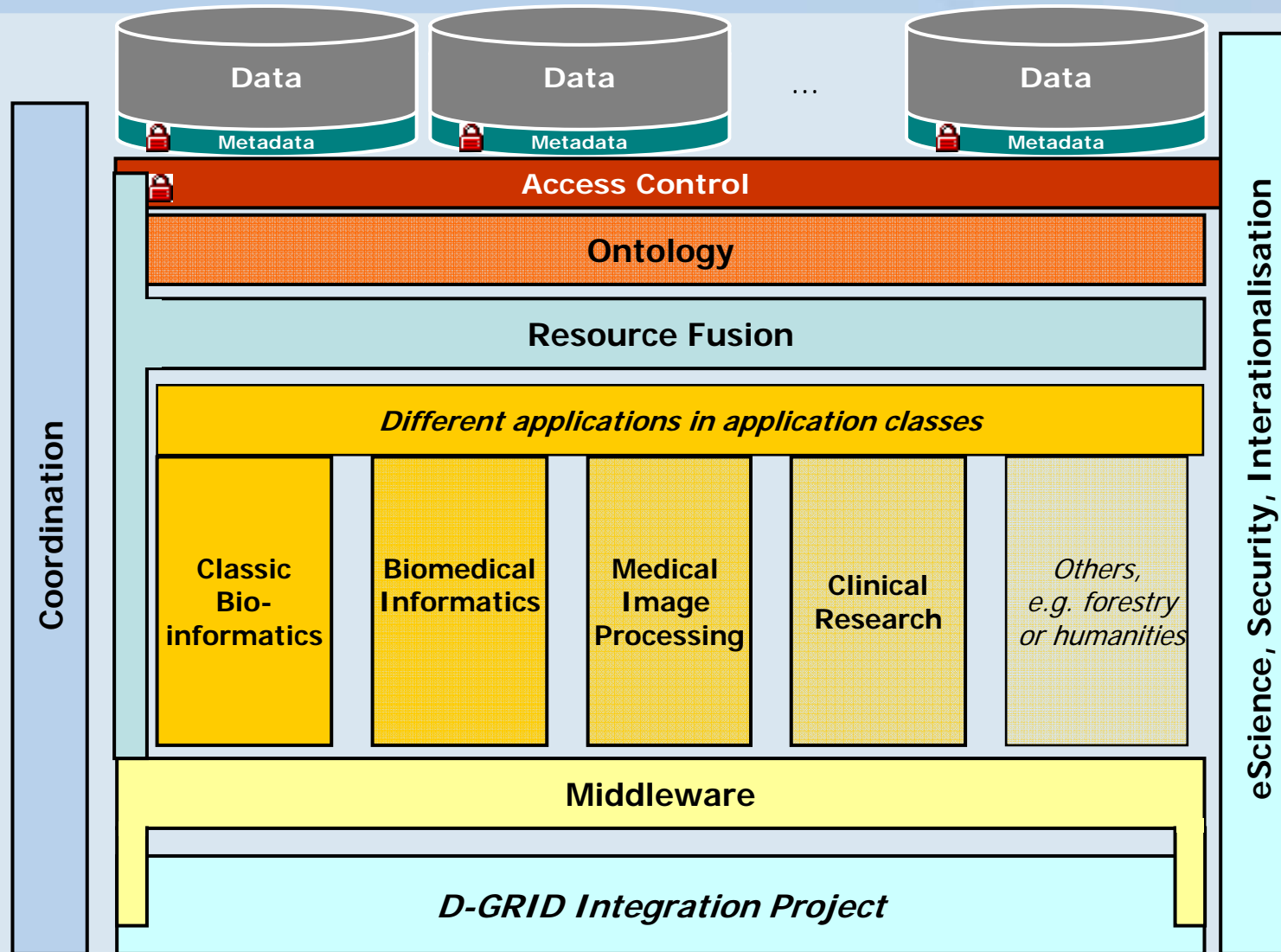


Overview

- MediGRID Structure and Partners
- Architecture and Middleware
- Data Access
- Portal
- Application Classes and Applications
- Further Steps



Structure of MediGRID





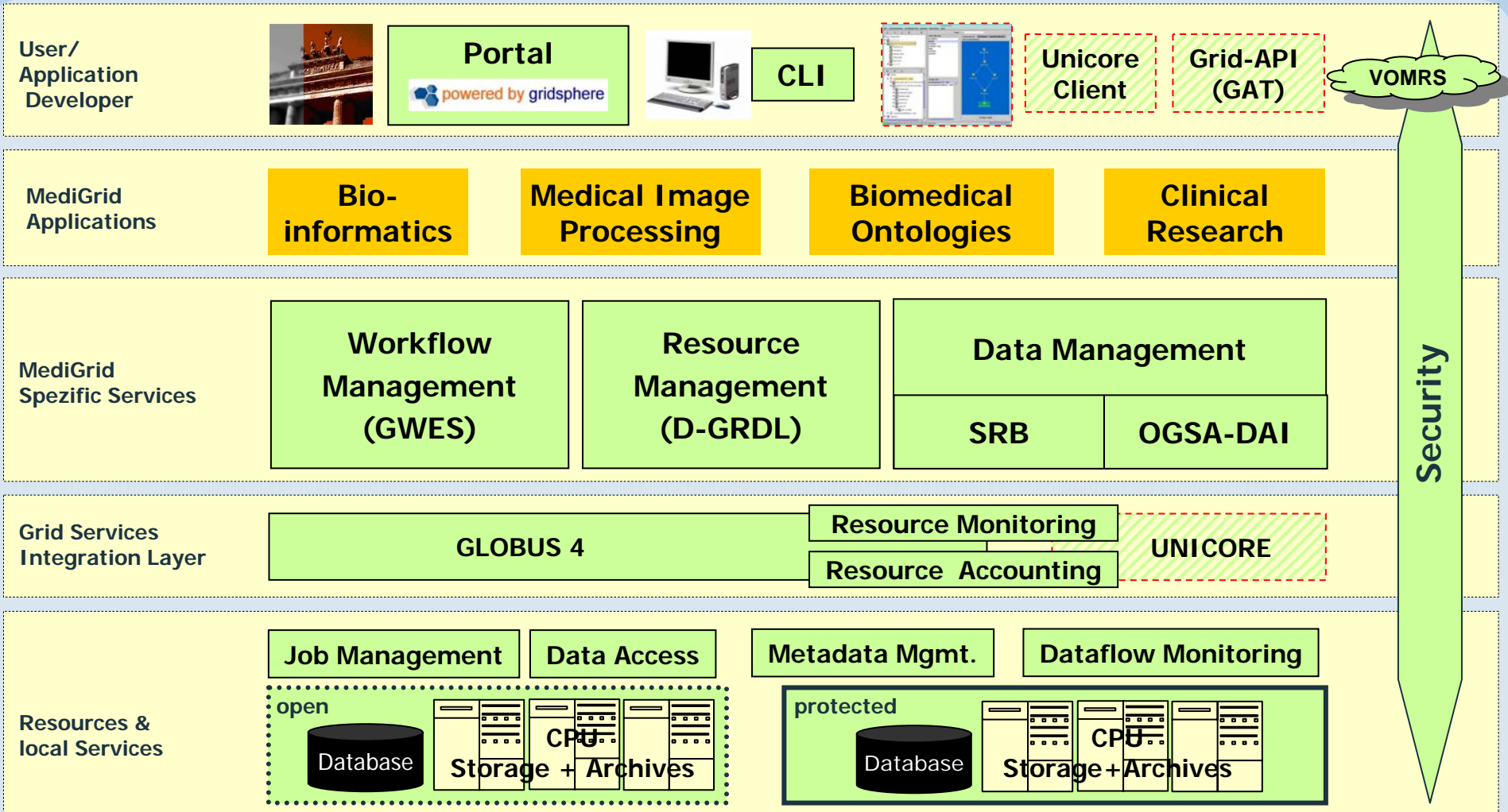
MediGRID - Partners

- **Prof. Dr. Otto Rienhoff** (Spokesman of Consortium)
Universität Göttingen, Abteilung Medizinische Informatik
- **Telematikplattform für Medizinische Forschungsnetze e.V.**, Berlin, Sebastian C. Semler
- **Universität Göttingen, Abteilung Medizinische Informatik**, Prof. Ulrich Sax
- **Charité, Universitätsmedizin Berlin, Institut für Medizinische Informatik, Biometrie und Epidemiologie**, Prof. Thomas Tolxdorff, Dr. Dagmar Krefting
- **Universitätsklinikum Schleswig-Holstein, Institut für Klinische Molekularbiologie**, Dr. Jochen Hampe
- **Universität Marburg, Klinik für Innere Medizin mit Schwerpunkt Pneumologie**, Prof. Thomas Penzel
- **Universität Leipzig, Institut für Medizinische Informatik, Statistik und Epidemiologie; Institut für Informatik**, Prof. Markus Löffler, Prof. Erhard Rahm
- **Fraunhofer-Gesellschaft**; Fraunhofer IAO, Fraunhofer FIRS, Priv.-Doz. Dr.-Ing. Anette Weisbecker
- **Konrad-Zuse-Zentrum für Informationstechnik**, Dr. Thomas Steinke





Software Architecture



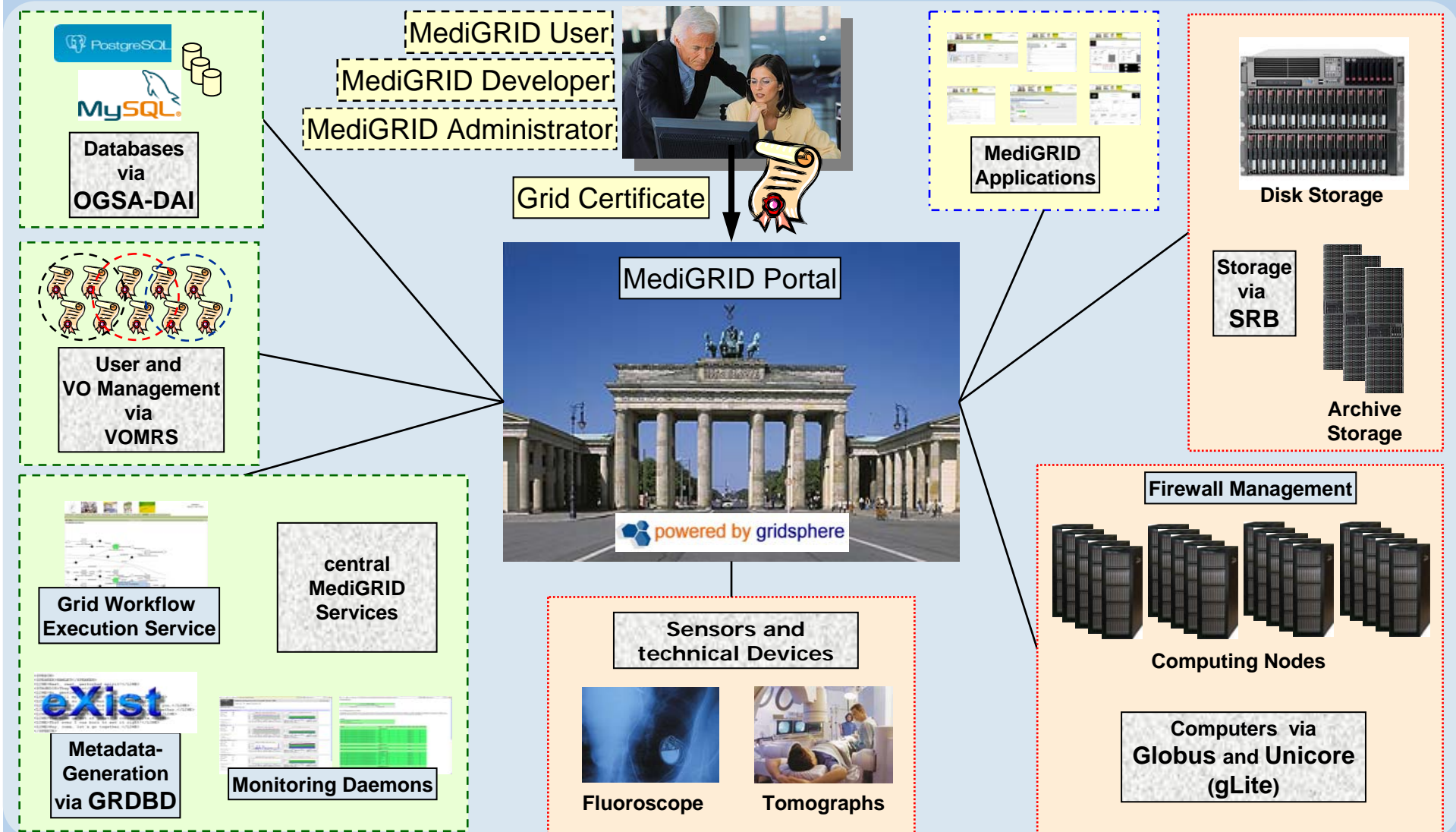
MediGRID Middleware
 MediGRID Applications
 optional

MediGRID Grid Computing for Medicine and Life Sciences





MediGRID Resources and Grid Services

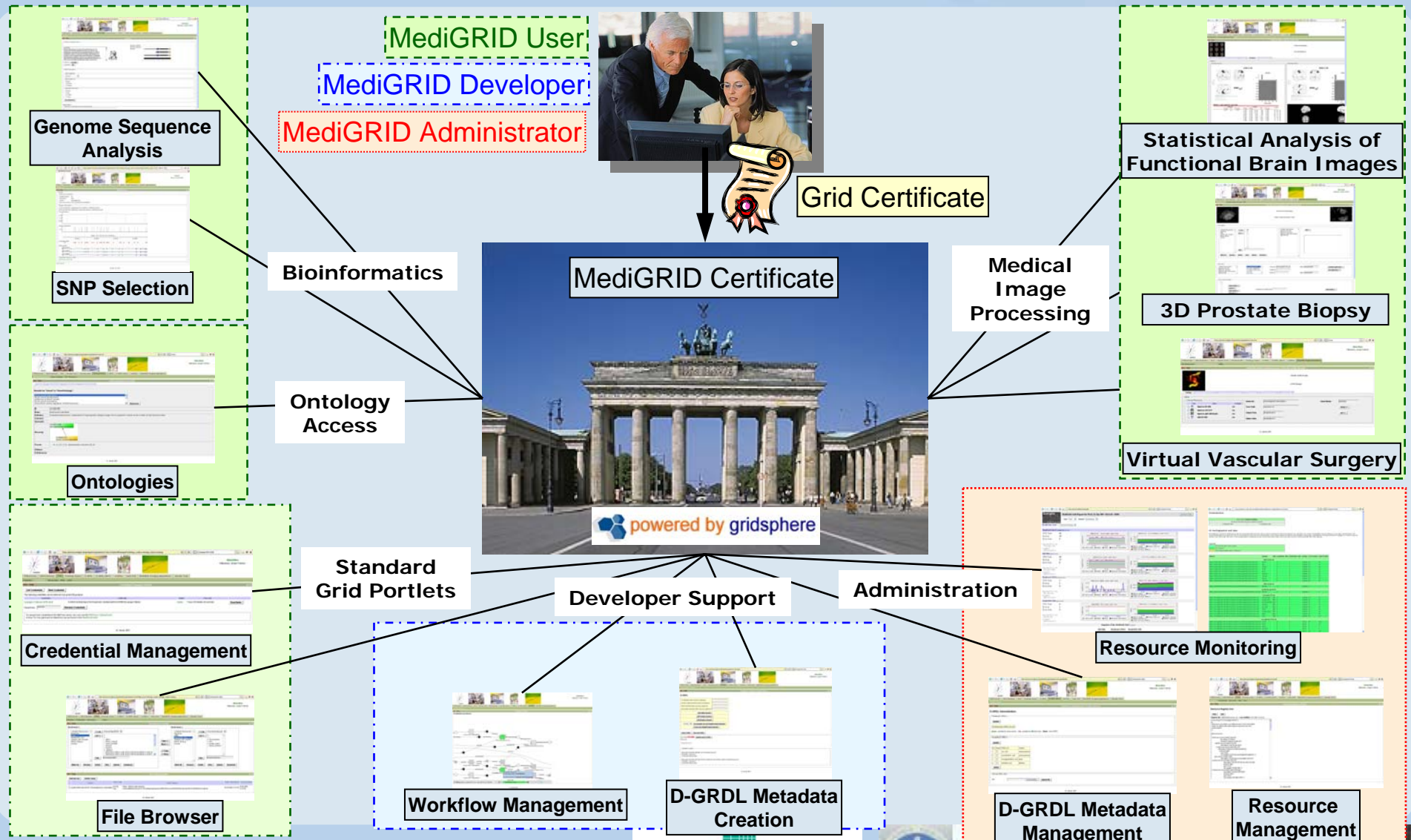


MediGRID Grid Computing for Medicine and Life Sciences





Portal based Access to MediGRID



MediGRID Grid Computing for Medicine and Life Sciences

Fraunhofer Institut
Arbeitswirtschaft und
Organisation



Abteilung Medizinische Informatik



Grid Workflows and Virtualisation



Result

Requirements:

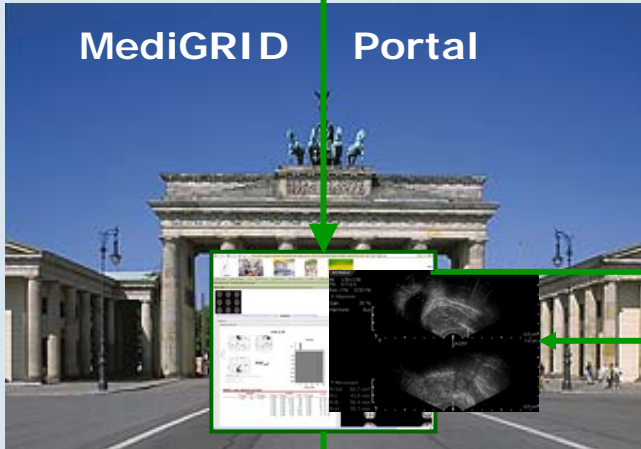
- D-GRDL Resource Metadata Management (D-Grid)
- D-GRDL Management (D-Grid)
- GRDB Daemon (InstantGrid)
- Monitoring Data (Globus MDS + Ganglia)

Input Parameter for Applications

Job-Initialisation

MediGRID

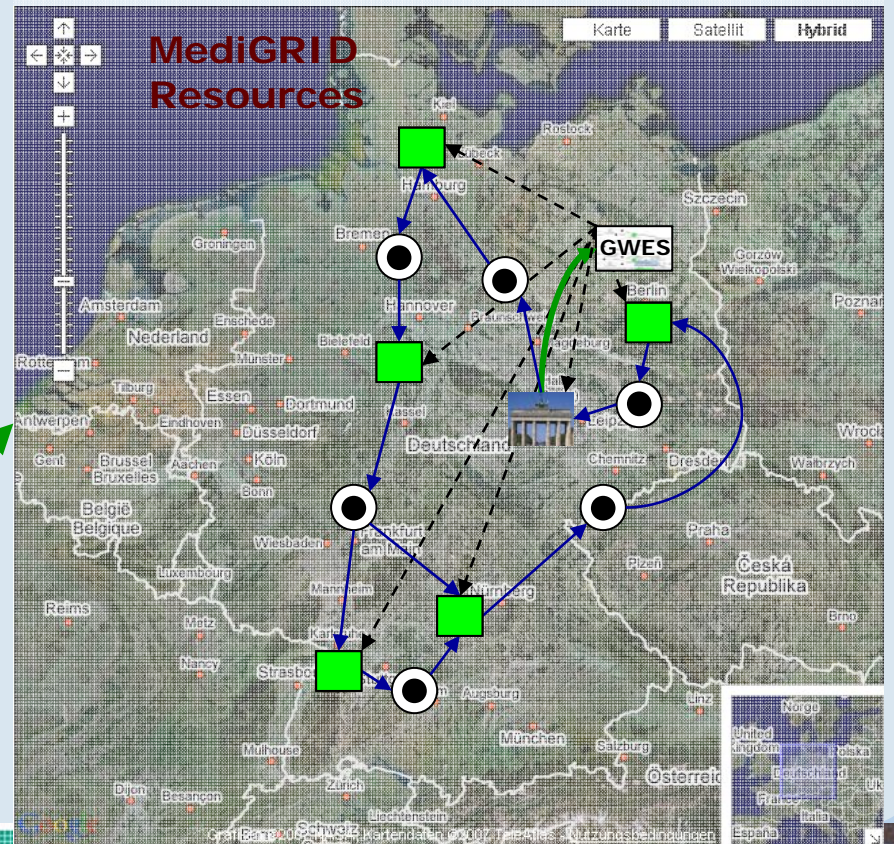
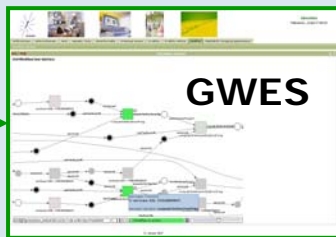
Portal



Automatic Resource Selection

Workflow Initialisation

Job Submission



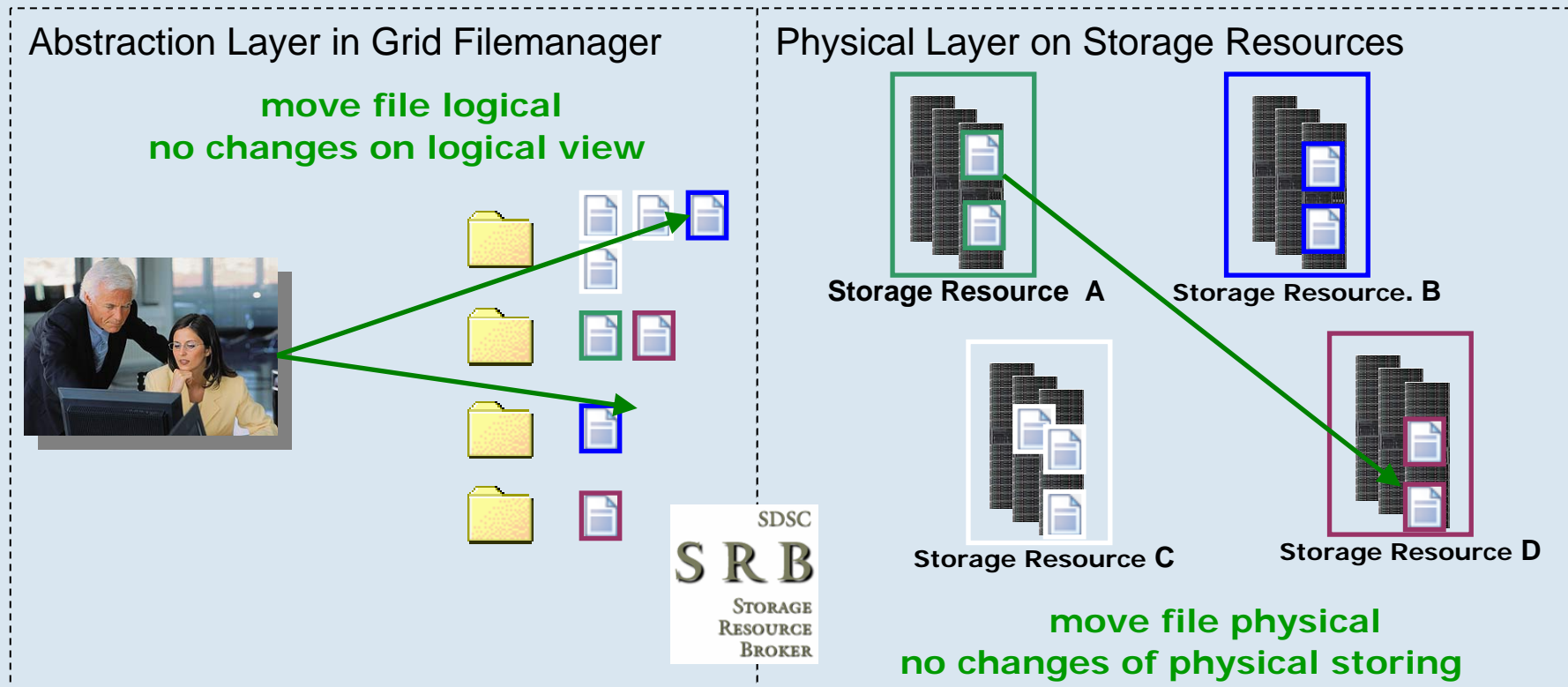
Grid Workflow Execution Service

MediGRID Grid Computing for Medicine and Life Sciences



Data Virtualisation with Storage Resource Broker (SRB)

Data Management and Data Virtualisation with in the Grid



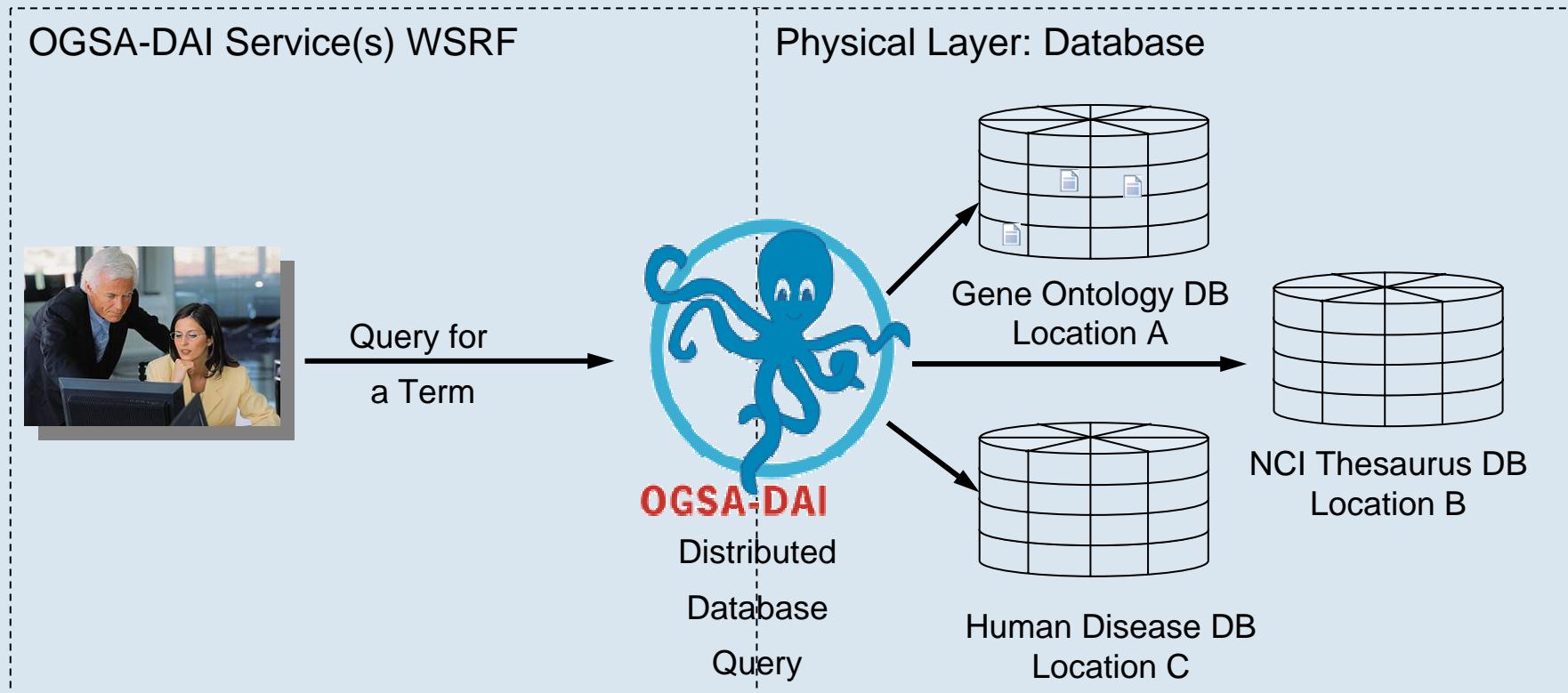
Requirements: Global IDs for Data in the Grid, Metadata Management,...

Solution: Storage Resource Broker



Database Access via OGSA-DAI

Database Connection and Database Access within the Grid

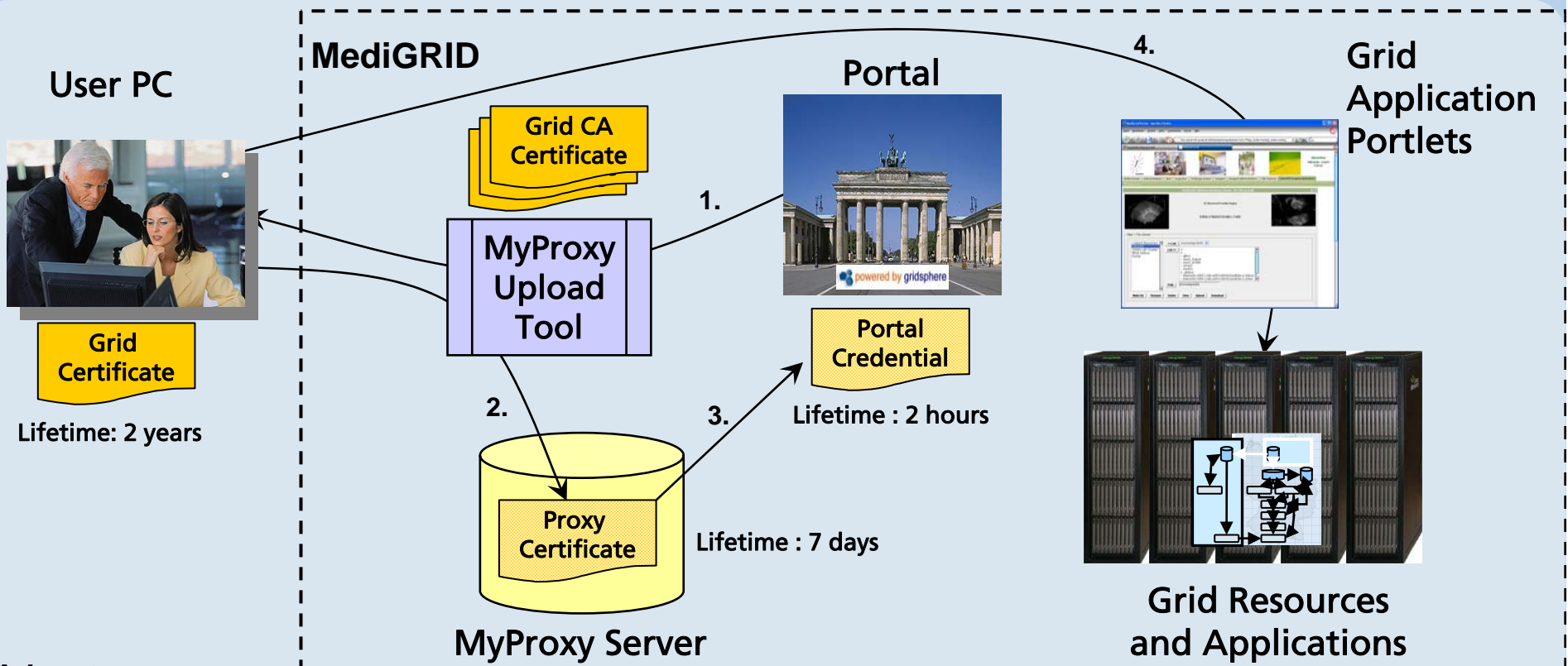


Database Queries independent from Storage Location

Solution: OGSA-DAI Service



Certificate based Usage via MediGRID Portal



Advantage:

Grid User do not need a Grid Computer / no Middleware Installation

1. Login at the portal and download the MPU tools via java webstart
2. Creation of a proxy certificate and Upload on the MyProxy Server
3. Creation of Credentials via the MediGRID portal
4. Usage of portal applications, which need credentials



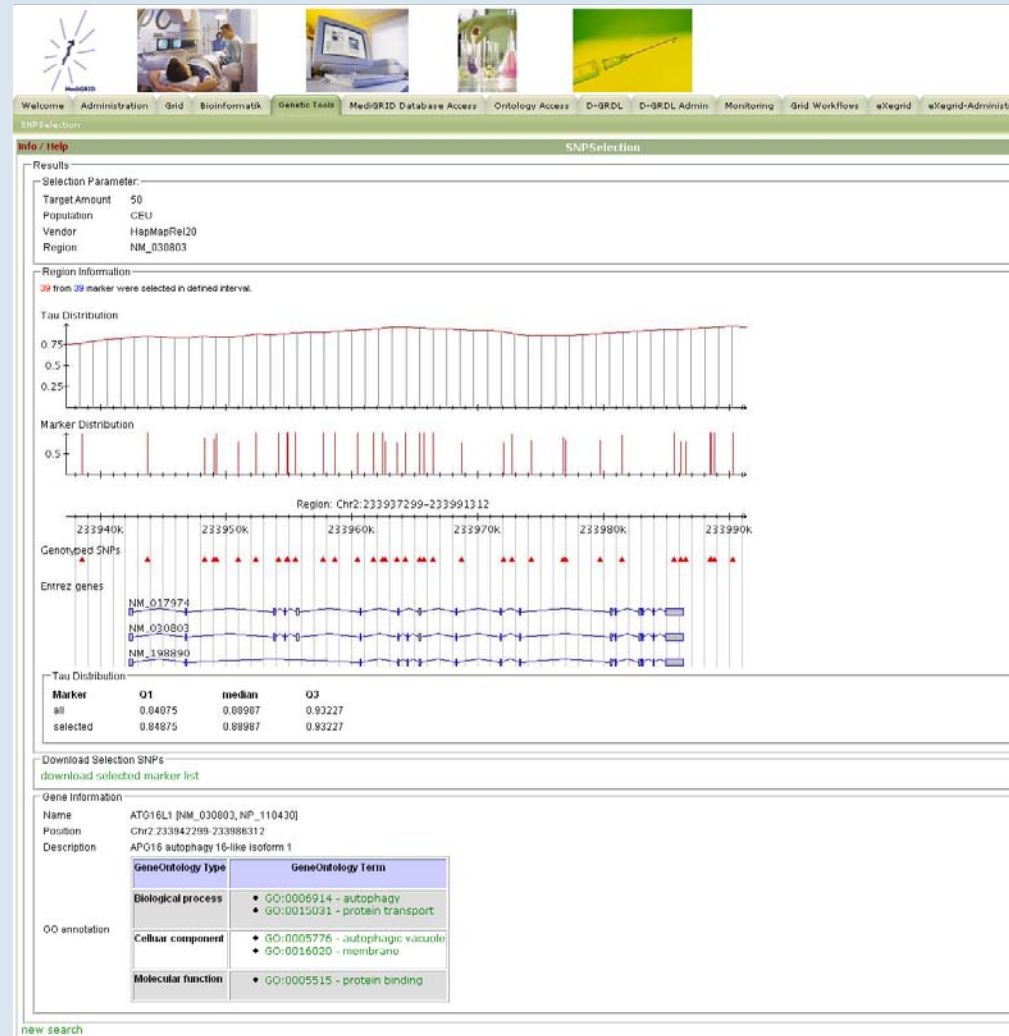
MediGRID Portal

MediGRID Portal is the central access to the applications for the user

- GridSphere
- GridPortlets
- Certificates for secure access

Integration of medical applications

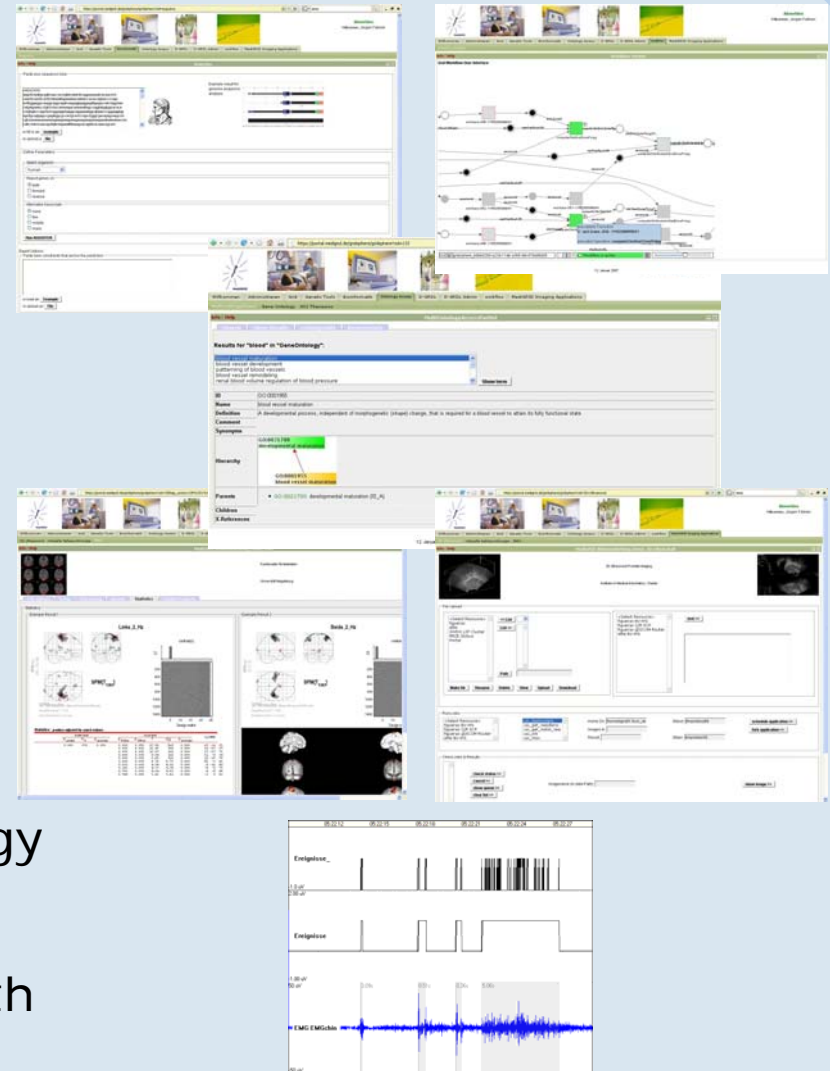
- Applications are callable as web services (Wrapper)
- Global identifier for transparent data access
- OGSA-DAI for connection of distributed databases
- Petri net based workflows for application processes





MediGRID Application Classes with their Applications

- **Bioinformatics**
 - **Genome Sequence Analysis**
 - **SNPSelection:** Single nucleotide polymorphisms selection
 - *RNAi: ribonucleic acid interference screening*
 - *Sequorr: Sequence correlation*
- **Medical Image Processing**
 - **3D Prostate Biopsy**
 - **Statistical Analysis of Functional Brain Images**
 - **Virtual Vascular Surgery**
- **Clinical Research**
 - Analysis of clinical studies in neurology
- **Ontologies**
 - Integration of different ontologies with heterogeneous formats





Further Steps

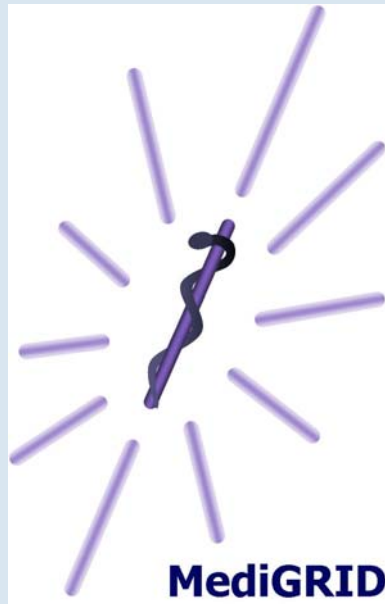
- Additional Applications and Application classes
- Enhanced and very enhanced security
 - Auditability, Trackability, Access rights and Access control, Trust and Trust Delegation, Safety
 - Anonymized Data, pseudonymized Data, identifying Data
- eHealth Services
 - Service Engineering for identification and definition of services
 - Accounting and Billing
 - Business Models
- International cooperations



Contact

**Thank you for
your attention !**

Questions ?



www.medigrid.de

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