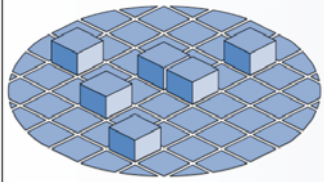


UniGrids

Unicore-UniGrids: Activities and strategies for Open Source Grids

GridCoord Workshop
October 13th 2005, Sophia Antipolis

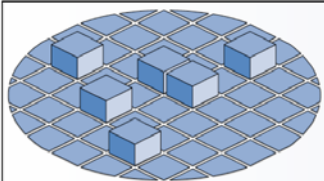




- ❖ Architecture and usability of pre-OGSA Unicore
- ❖ UniGrids: Unicore adapts to the OGSA architecture
- ❖ Interoperability and layering in UniGrids.
- ❖ Brokering and virtual organisations
- ❖ Contribution to standards
- ❖ Influence and outreach

CAVEAT: I will present only those features of Unicore and UniGrids that relate to the topic of this talk. There are a rich collection of scientific and industrial applications that use this architecture and models for exploitation in commercial use.

<http://www.unigrids.org> <http://www.unicore.org>



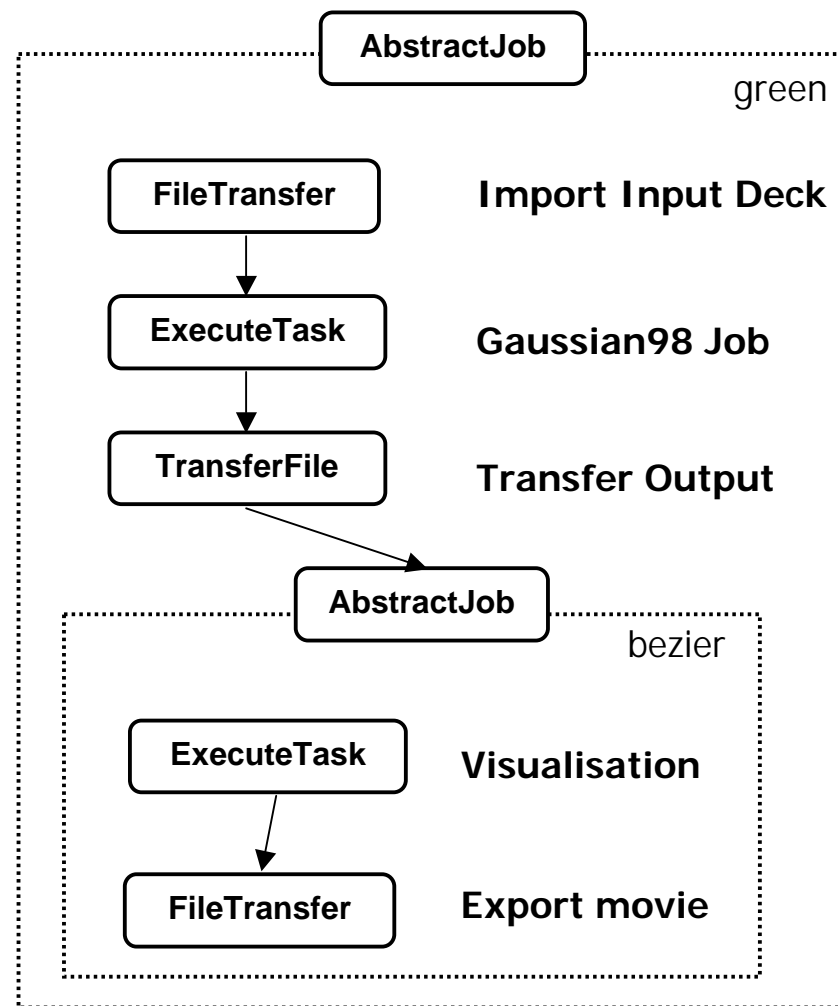
Simple for the user to construct complex tasks

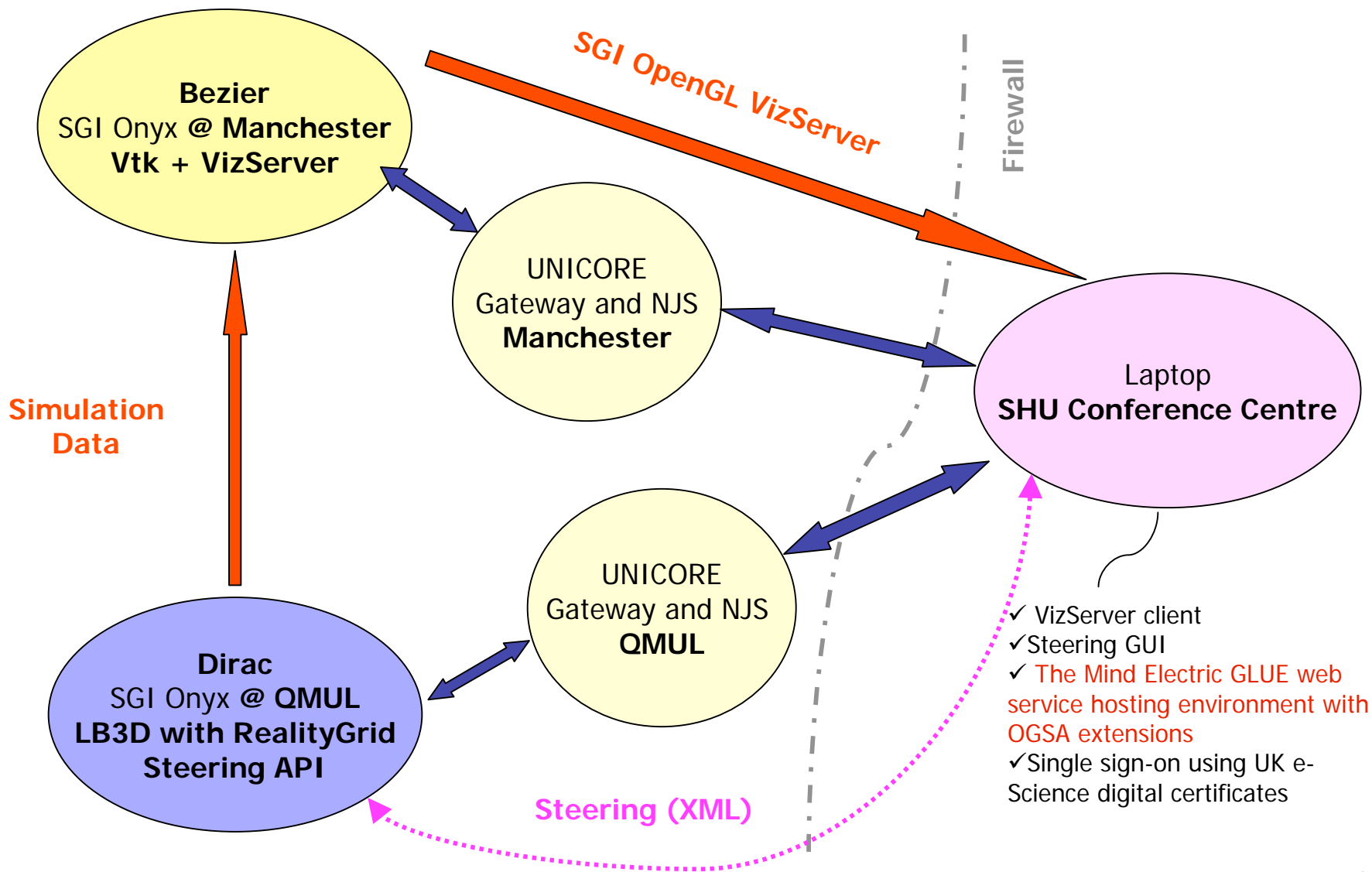
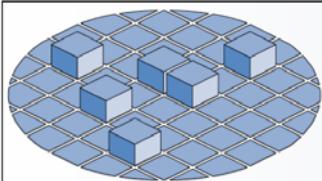
Workflow built-in

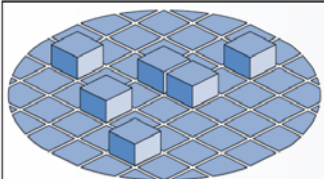
Simple to find out where the job can run

User never needs to know details such as:

- Where applications are installed
- What hardware resources are being used
- What operating system and queuing software is being used

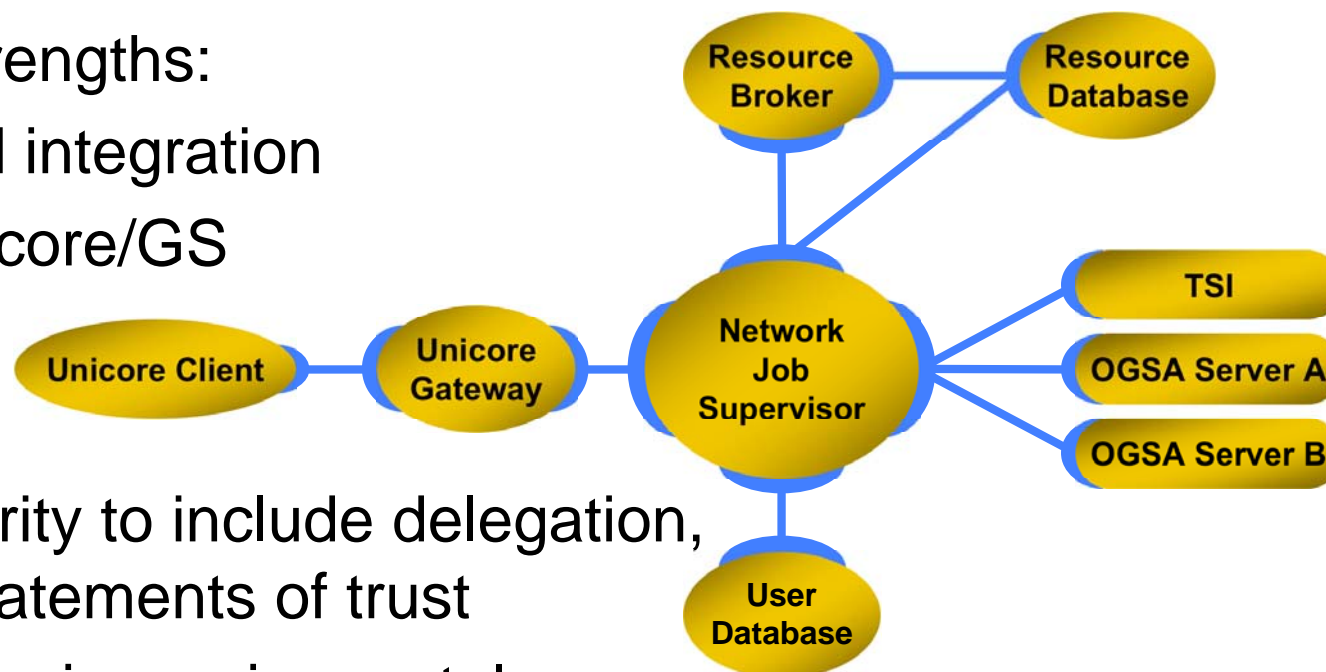




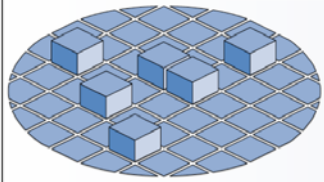


Technology Foundations

- Unicore's strengths: abstraction and integration
- Develop Unicore/GS



- Extend security to include delegation, by explicit statements of trust
- Develop generic service portal
- Provide lightweight certification authority and virtual organization management



Web Services Resource Framework

- WS-ResourceLifetime: Lifecycle management.
- WS-ResourceProperties: Access to stateful resources as properties.
- WS-ServiceGroup: A collection of Web services
- WS-BaseFaults: Standard for hierarchical faults.

Web Services Notification

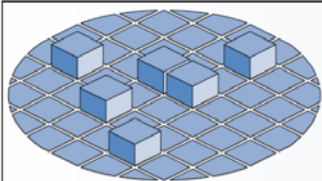
- BaseNotification: Standard Web services approach to notification.

Web Services Addressing

- Support for advanced access to web services

Interop Fest

- Fujitsu, IBM, University of Virginia, HP, Intel, FZJ

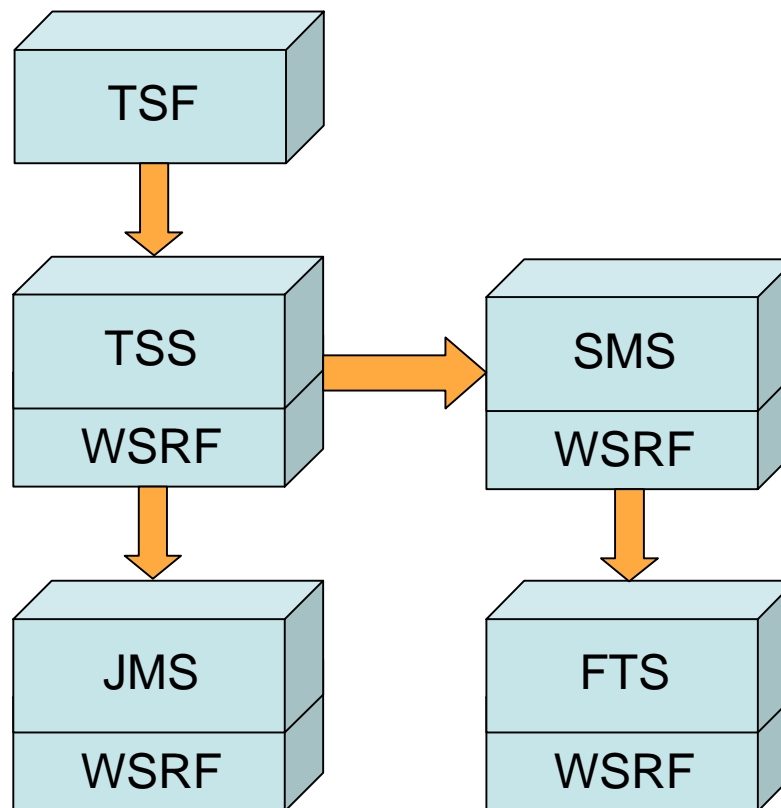


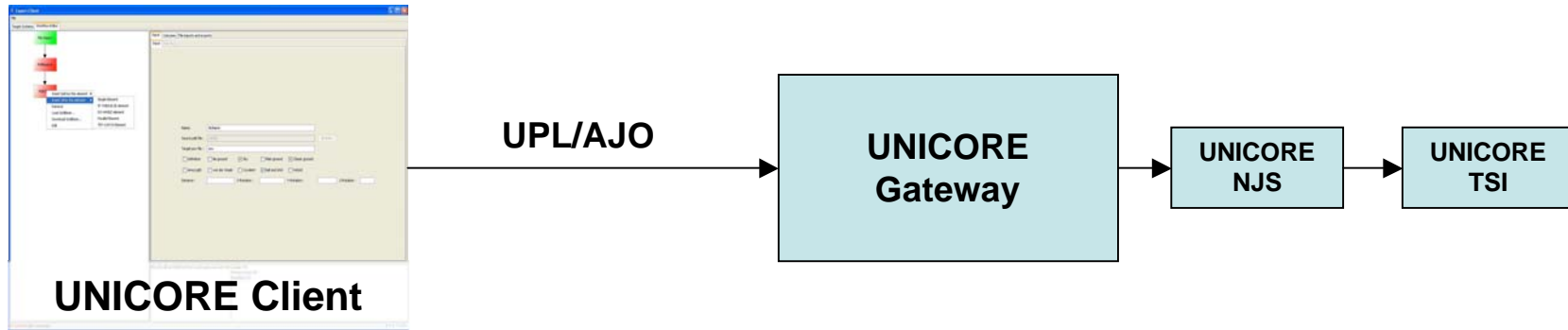
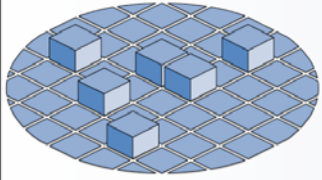
Unicore basic functions

- Site Management (TSF/TSS)
 - ◆ Compute Resource Factory
 - ◆ Submit, Resource Information
- Job Management (JMS)
 - ◆ Start, Hold, Abort, Resume.
- Storage Management (SMS)
 - ◆ List directory, Copy, Make directory, Rename, Remove.
- File Transfer (FTS)
 - ◆ File import, file export

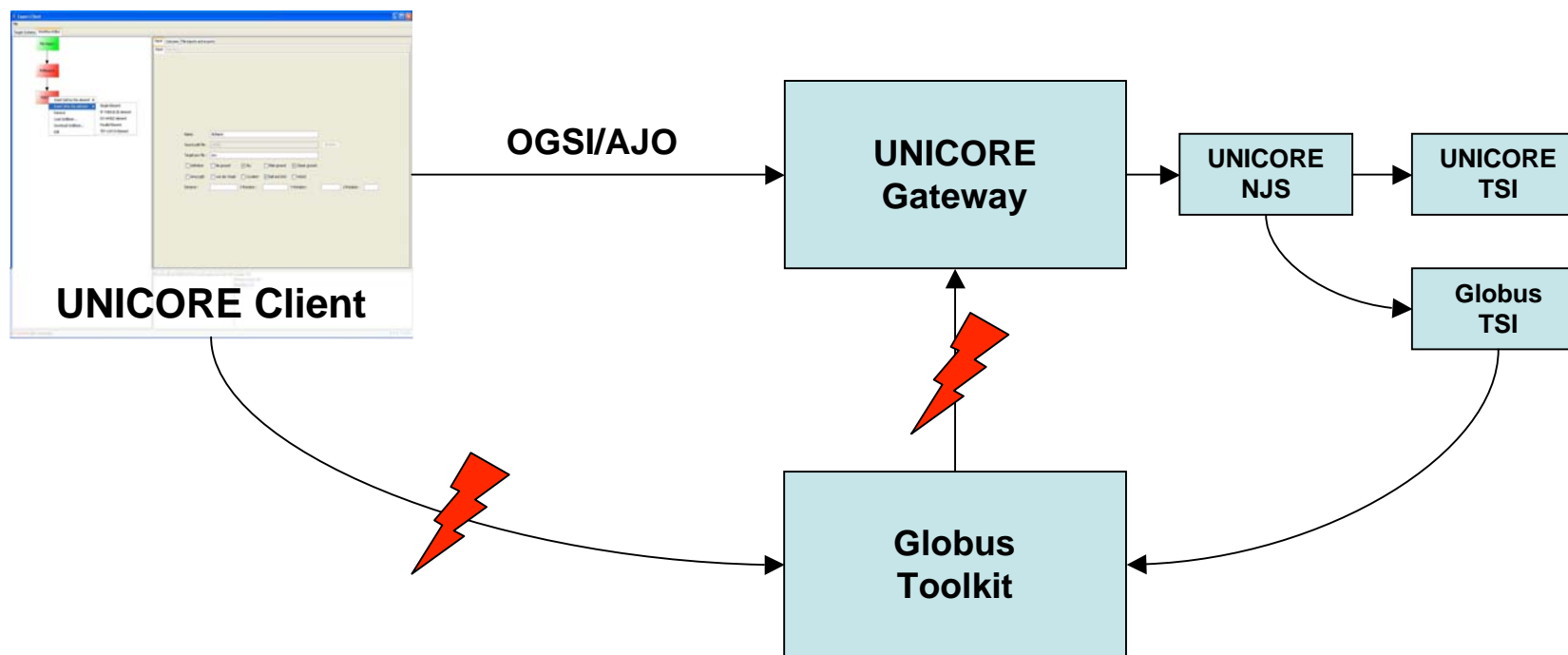
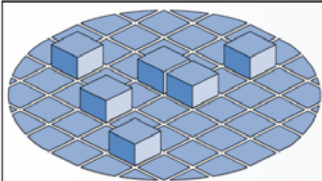
Standardization


- JSDL WG UniGrids and NAREGI collaborated with RealityGrid
- Atomic Services are input to the OGSA-BES WG

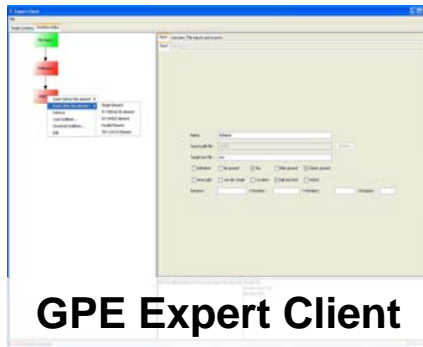
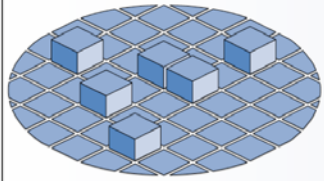




-  Stable, working solution
-  No interoperability

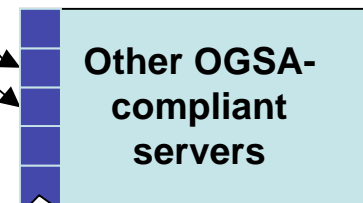
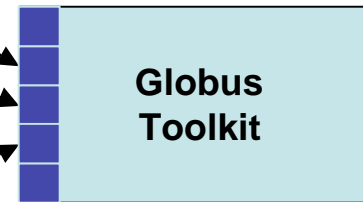
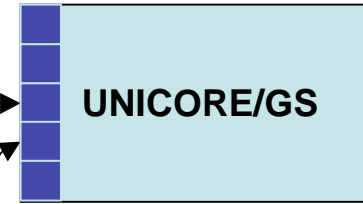


 New web service and Grid standards will allow better ways of interoperability



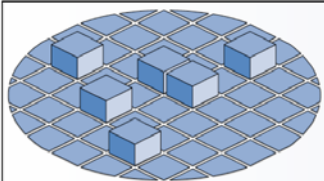
GPE Expert Client

SOAP, WSDL, WSRF, WS-Addressing, WS-Security, JSDL and other standards

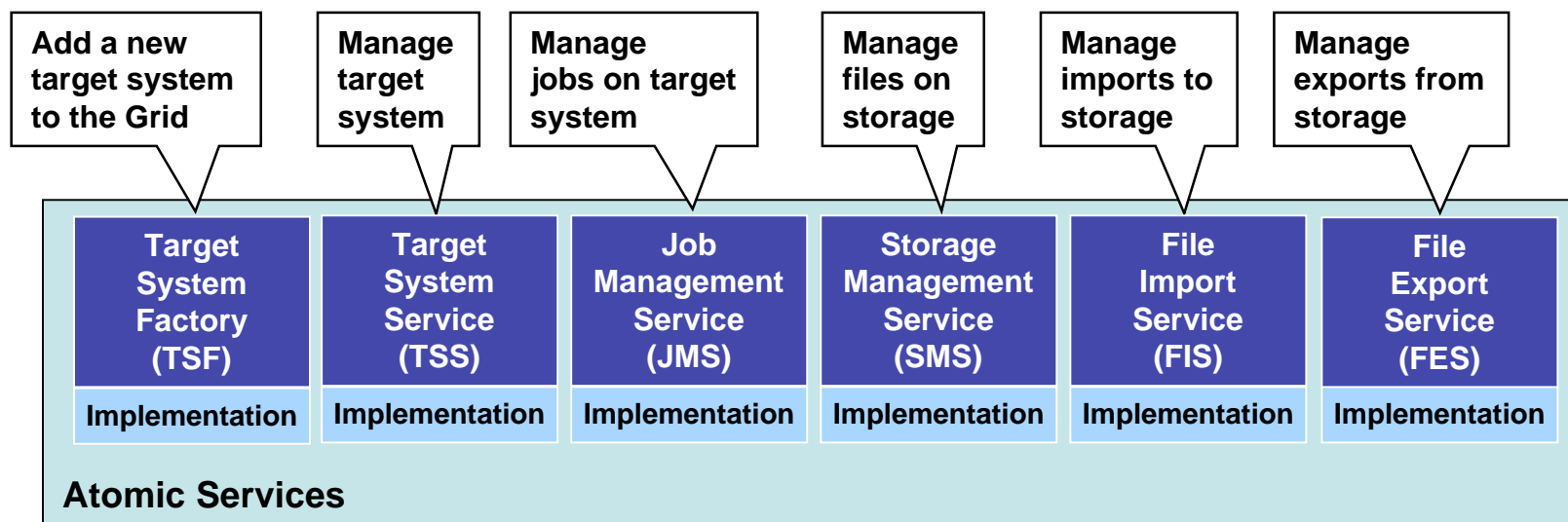


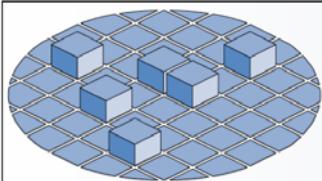
Atomic Services

- ⚙️ Atomic service interfaces define mandatory functionality for system, file and job management
- ⚙️ Different protocols and description languages are announced via resource properties



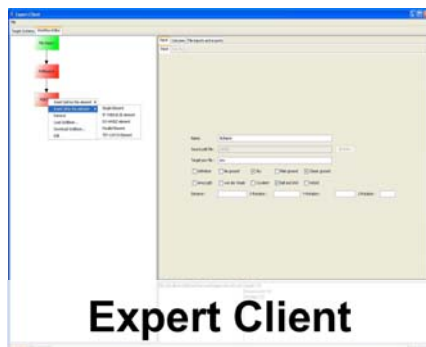
- ⚙️ Atomic service interfaces define basic set of operations and properties that have to be available on a Grid
- ⚙️ Different implementations of interfaces for different infrastructures





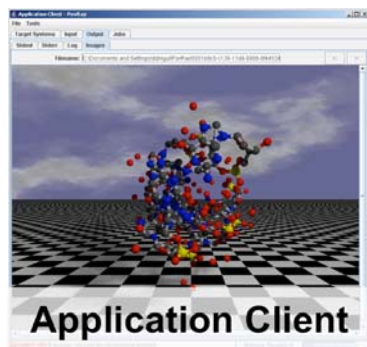
UniGrids

GPE: Interoperable Client Framework



Expert Client

- Full access to Grid for expert users and administrators
- Workflow Editor, supports multiple applications and user identities
- Based on the UNICORE Client implementation



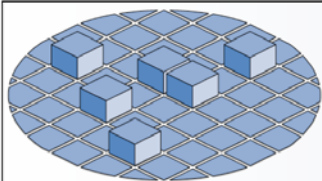
Application Client

- Light-weight Java application running on mobile devices
- Simple application specific interface
- Based on portable client implementation in Eurogrid (UoM)



Portal Client

- JSR-168 compliant application portlets that can be integrated into existing portals like UPortal, Jetspeed or GridSphere
- Based on initial work from WP5 (ICM)



UniGrids

Implement portable applications with GridBeans

GridBean

GridBean

GridBean

Expert Client

GridBean

Application Client

GridBean

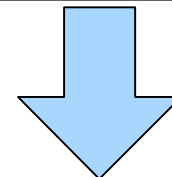
GridBean

GridBean

Portal Client

GridBean SDK

Atomic Service Client
API, libraries and tools

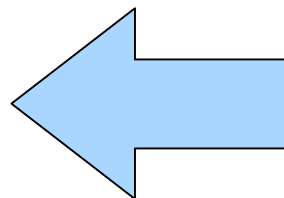



GridBean Service

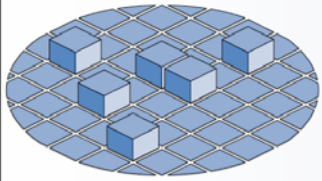
GridBean

GridBean

GridBean

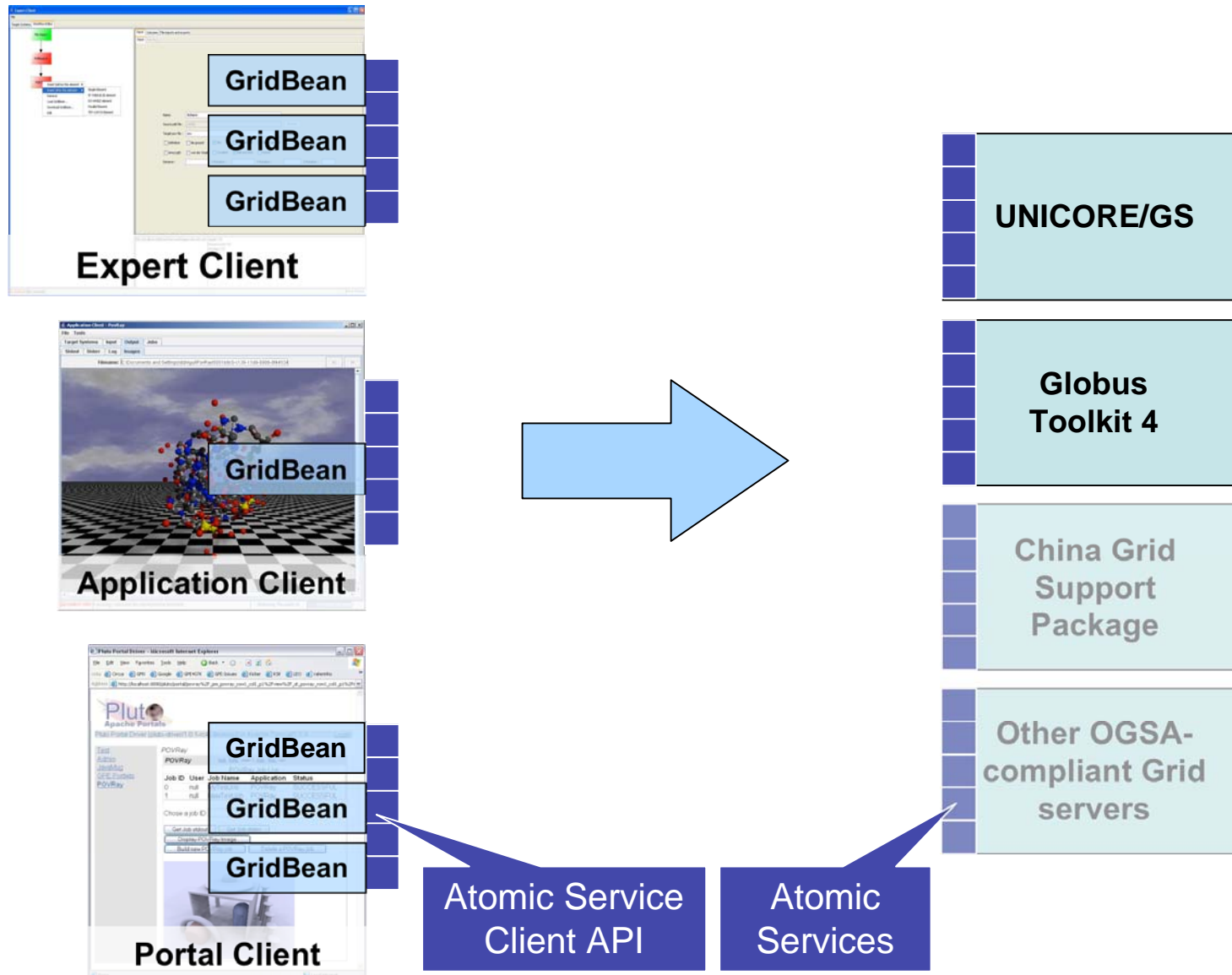


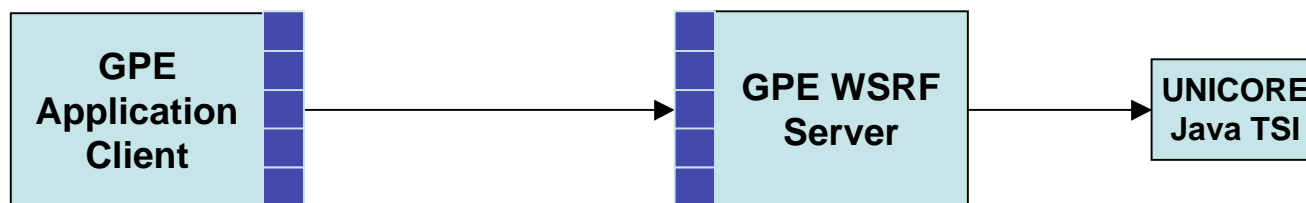
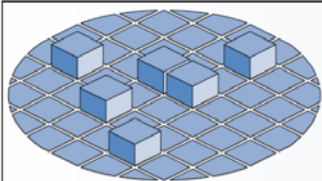
 GridBeans are the interoperable successors of UNICORE Client plug-ins



UniGrids

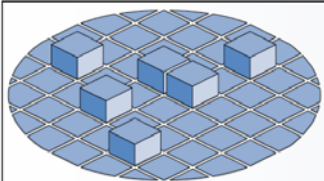
GPE as interoperability framework





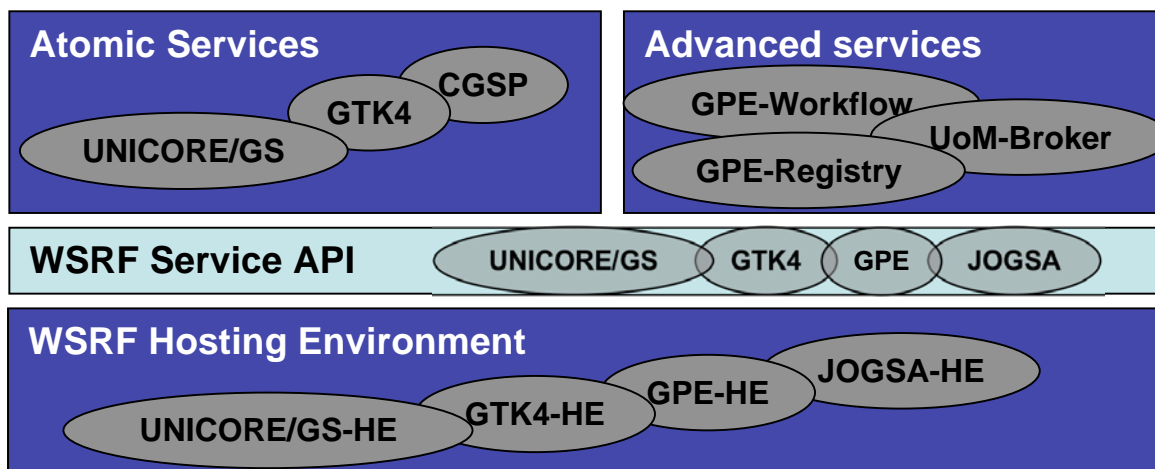
- ✚ Prototype goal: Full atomic service implementation
 - ◆ UNICORE/GS and GTK4 were not available at start of project
- ✚ Intel GPE alpha release as prototype
 - ◆ Application and portal client with GridBean examples
 - ◆ First draft of atomic service client API
 - ◆ WSRF hosting environment (including official Interop test)
 - ◆ UNICORE-style Java TSI as execution back-end
 - ◆ Authentication and authorization through https and UNICORE UADB
 - ◆ SOAP with attachments or GridFTP (CINECA) for file transfers
- ✚ Proof-of-concept implementations for UNICORE/GS and GTK4 succeeded
- ✚ D2.1 and 2.2 delivered on time

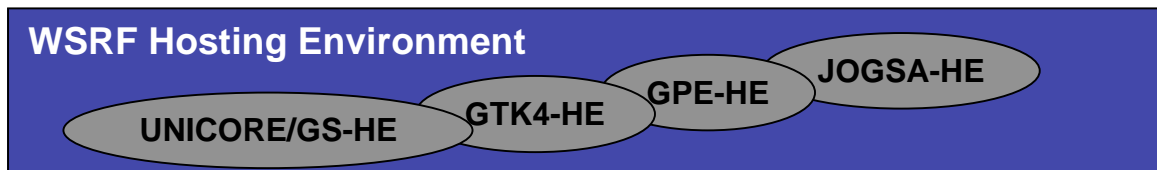
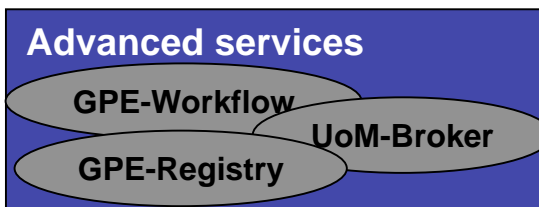
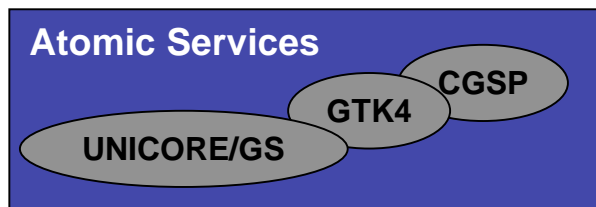
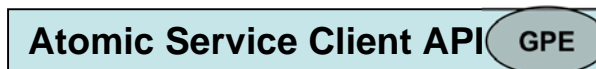
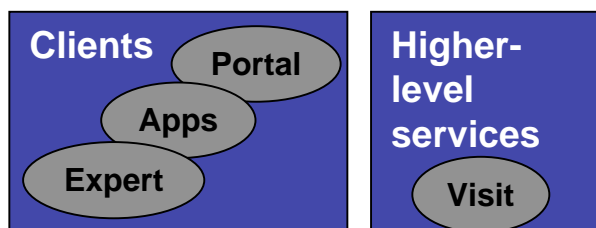
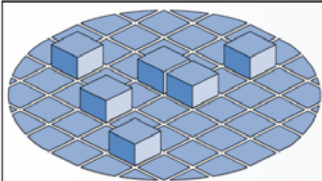
It's working!



Level 1: Interoperability between WSRF services

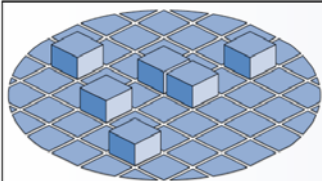
- UNICORE/GS passed the official WSRF interop test
- GPE and JOGSA hosting environments successfully tested against UNICORE/GS and other endpoints
- WSRF specification will be finalized soon!**
 - Currently: UNICORE/GS: WSRF 1.3, GTK: WSRF 1.2 draft 1





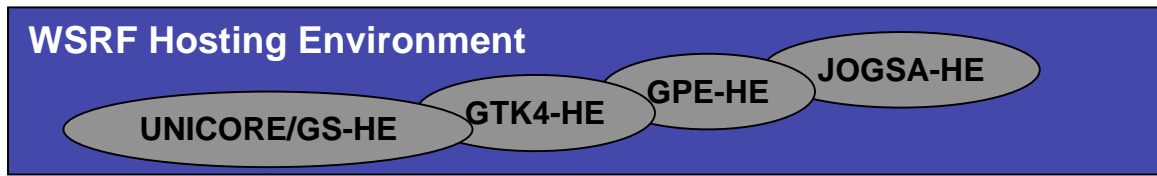
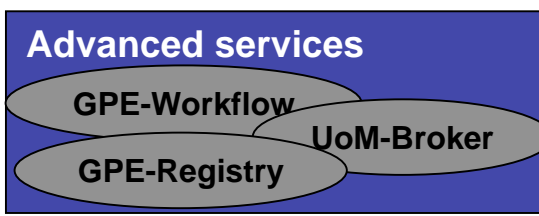
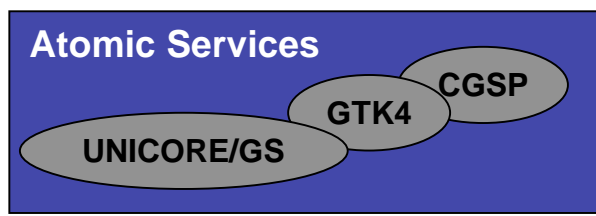
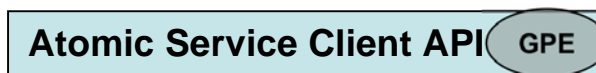
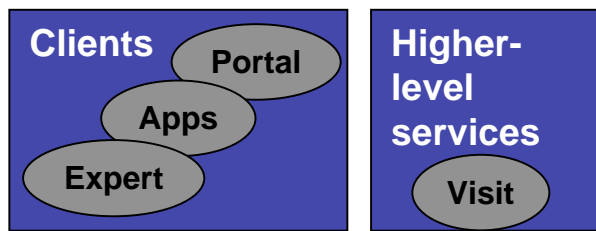
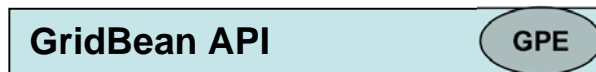
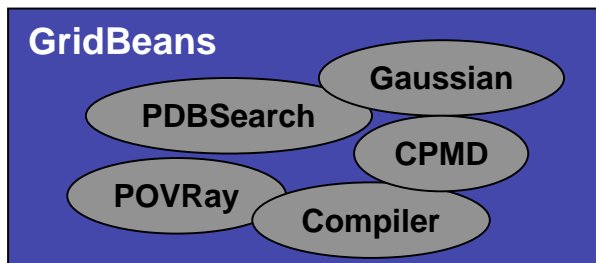
Level 2: Interoperability between atomic service implementations

- Client API hides details about WSRF hosting environment
- Client code will work with different WSRF implementations and WSRF versions if different stubs are being used **at the moment!**



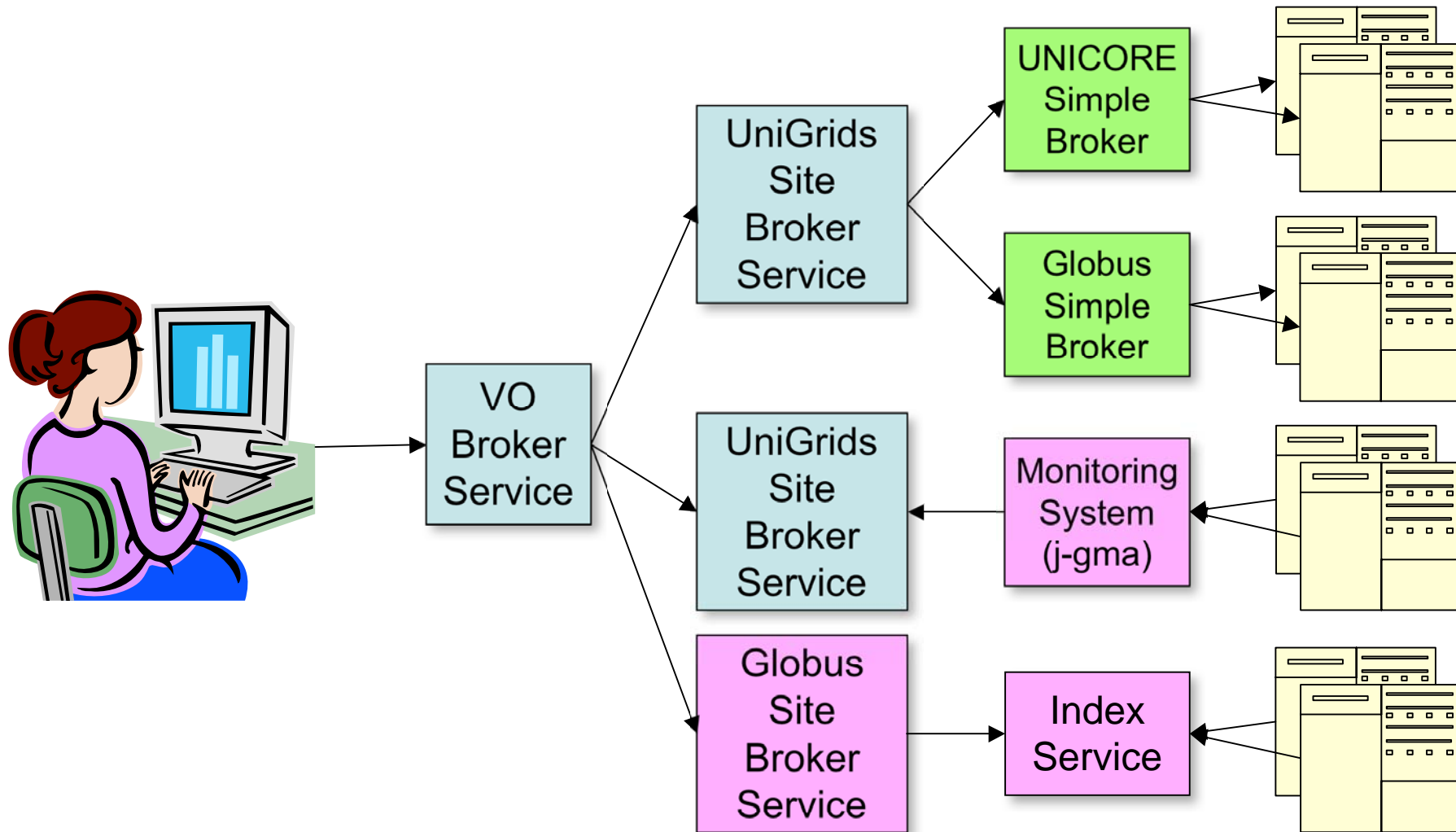
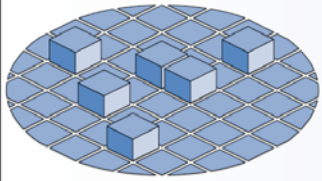
UniGrids

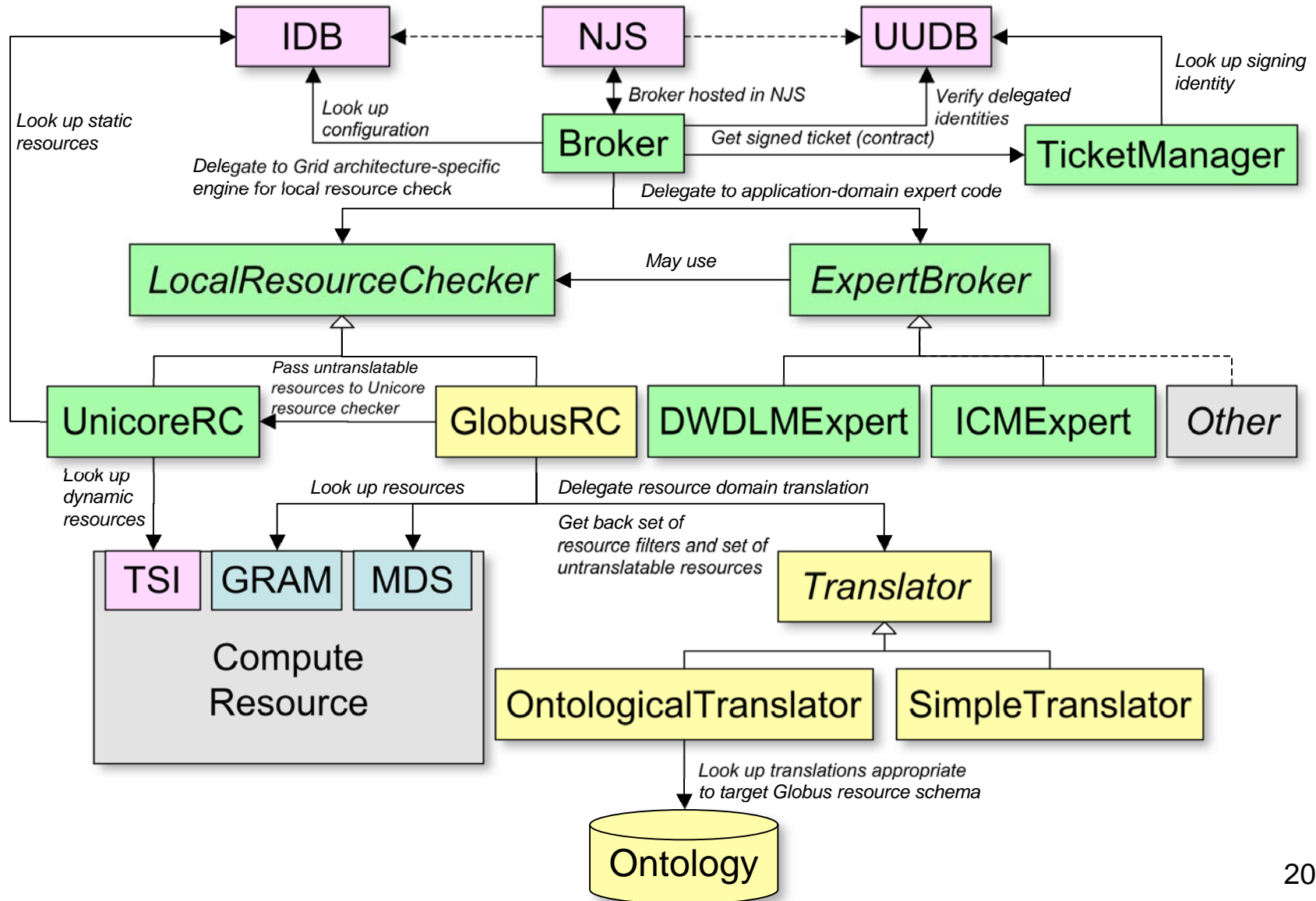
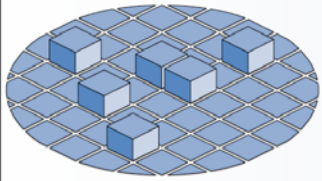
Three levels of interoperability

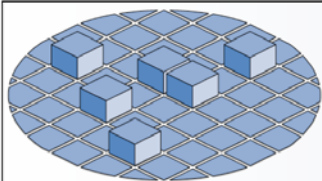


Level 3: GridBeans working on top of different Client implementations

- ⚙ Independent of atomic service implementations
- ⚙ Independent of specification versions being used
- ⚙ GridBean run on GTK or UNICORE/GS without modifications
- ⚙ GridBeans survive version changes in the underlying layers and are easy to maintain

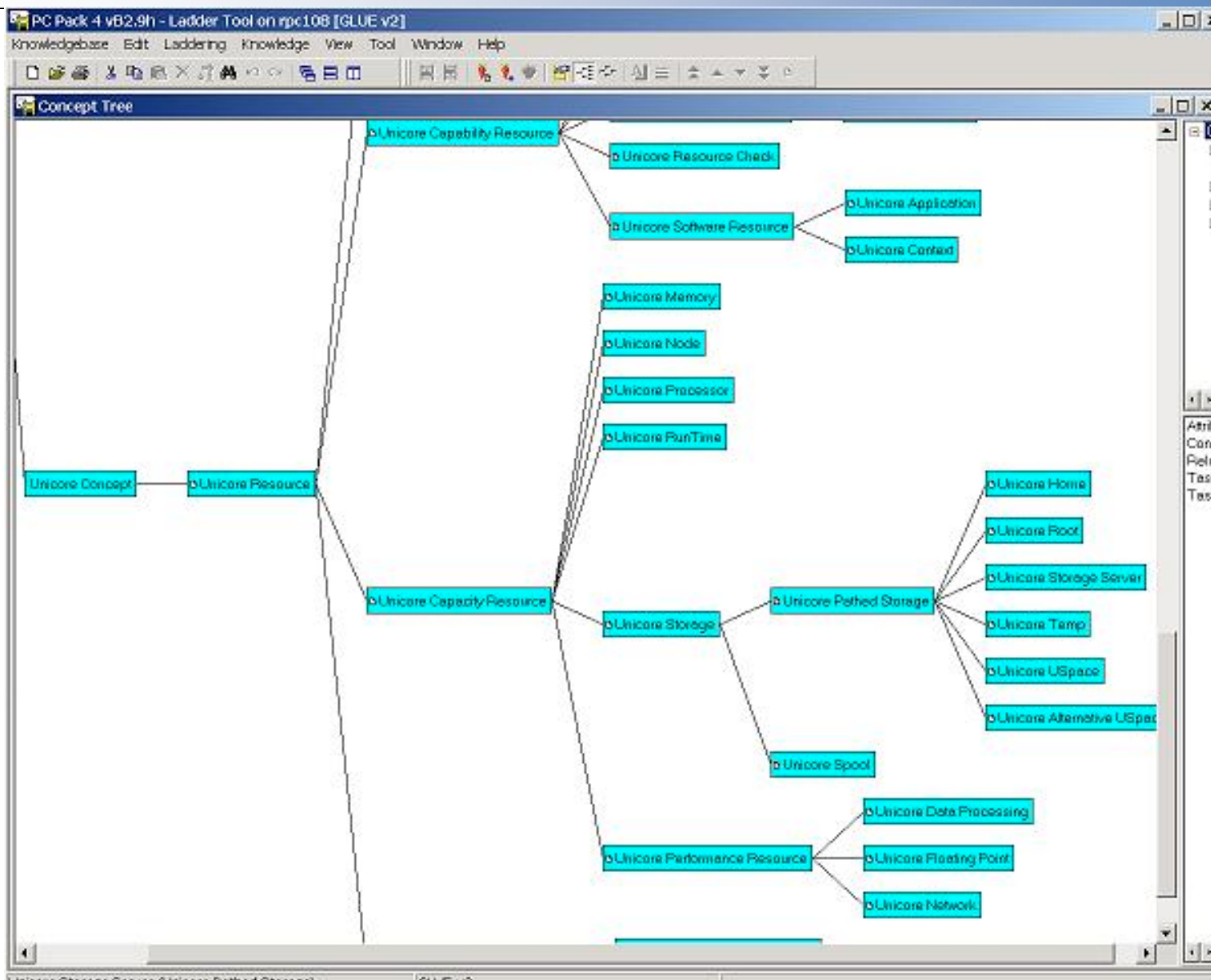


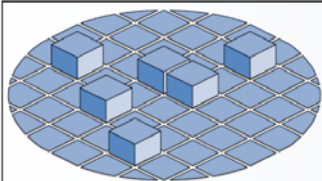




UniGrids

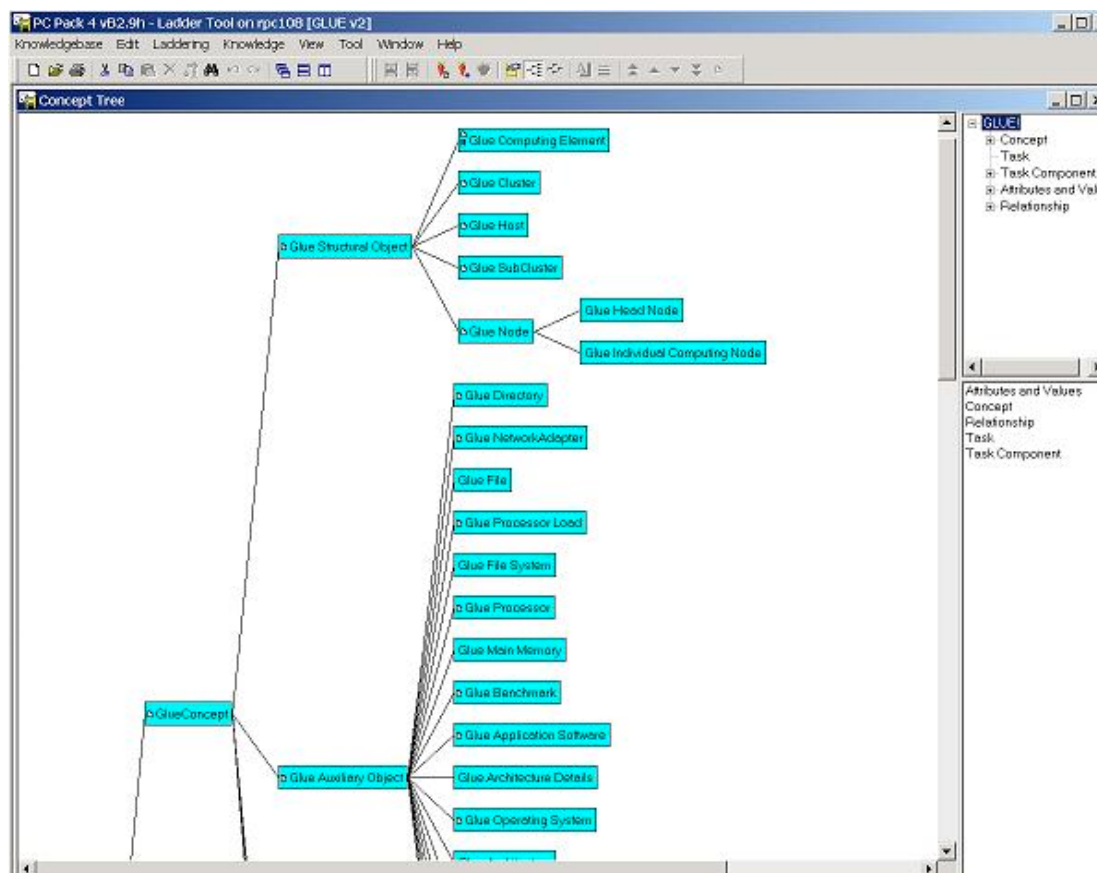
Unicore: Modelling Resources

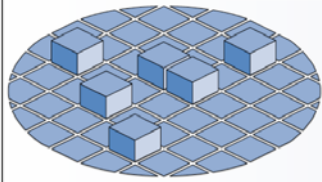




UniGrids

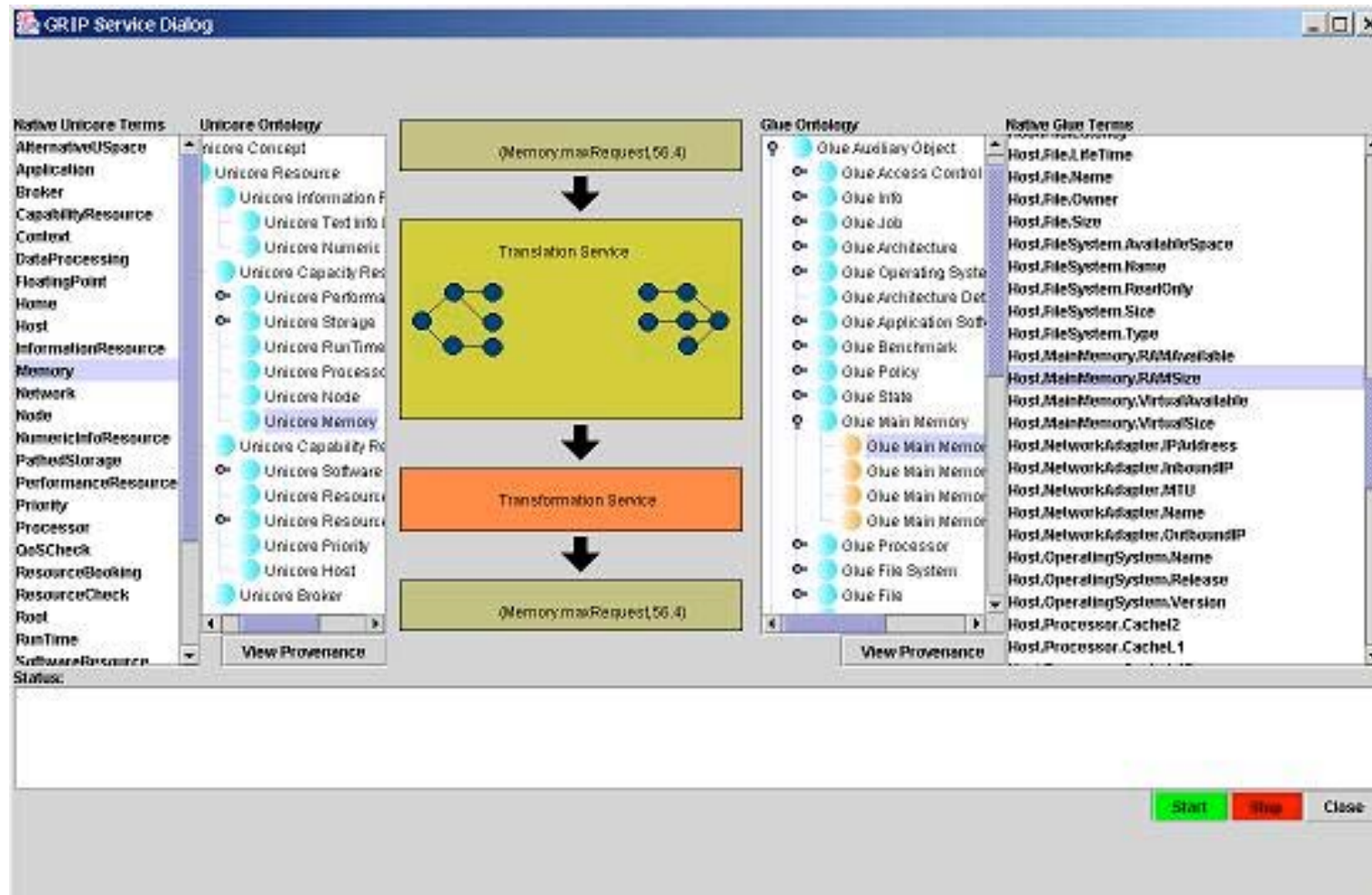
GLUE: Modelling resources

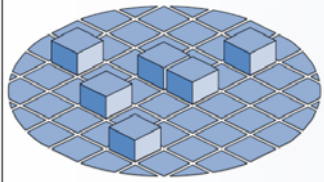




UniGrids

Translation Service Prototype



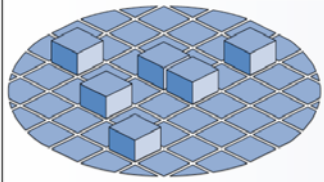


Open Grid Services Architecture (OGSA)

- *Dave Snelling, FLE – leader in GGF on OGSA*
 - ◆ *Area Director Architecture*
 - ◆ *Co-chair WSRF Working Group in OASIS*
- *Roger Menday, FZJ, Vivian Li, FLE, Ralf Ratering, Intel*
– members WRSF working group

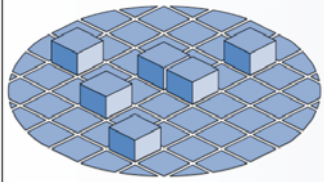
The organisations became institutional members

- *Specification of WSRF completed – Public comment period ended beginning of September*
- *Work on subsequent specifications in progress (WS-ResourceLifetime, WS-BaseFaults, Application Notes – Menday is co-editor)*



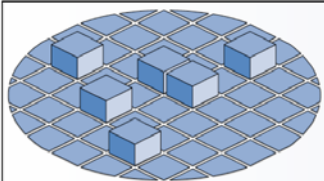
Standards Work in GGF

- ❏ OGSA-RSS (Resource Selection Services)
 - ◆ Donal Fellows, UoM, co-chair
- ❏ OGSA-BES (Basic Execution Services)
- ❏ OGSA-ByteIO
 - FLE, UoM, Intel have helped create the groups and are contributing as authors and editors
- ❏ JDSL – Job Submission and Description Language
 - JSDL 1.0 draft completed – passed public review period essentially unchanged (GWD-021)
 - FLE and UoM and NAREGI were major drivers and contributors to the standard



The GGF NOMCOM

- ❖ Since 2003 the Management of GGF (GFSG) is selected by the Nominating Committee (NOMCOM)
 - 10 voting representatives from the membership
 - three nonvoting members (chair, advisor, liaison)
- ❖ In 2003 number of Europeans on GFSG decreased from 4 to 3 (out of 21)
- ❖ In 2004 three Europeans were on NOMCOM
Europeans in GFSG increased from 4 to 7.
- ❖ In 2005 five Europeans were on NOMCOM
Two from UniGrids; D. Erwin chairman
Europeans increased from 7 to 14 (out of 34)
3 AP, 17 US.



**Research Centre Jülich
(Project manager)**



**Consorzio Interuniversitario
per il Calcolo Automatico
dell'Italia Nord Orientale**



Fujitsu Laboratories of Europe



University of Warsaw



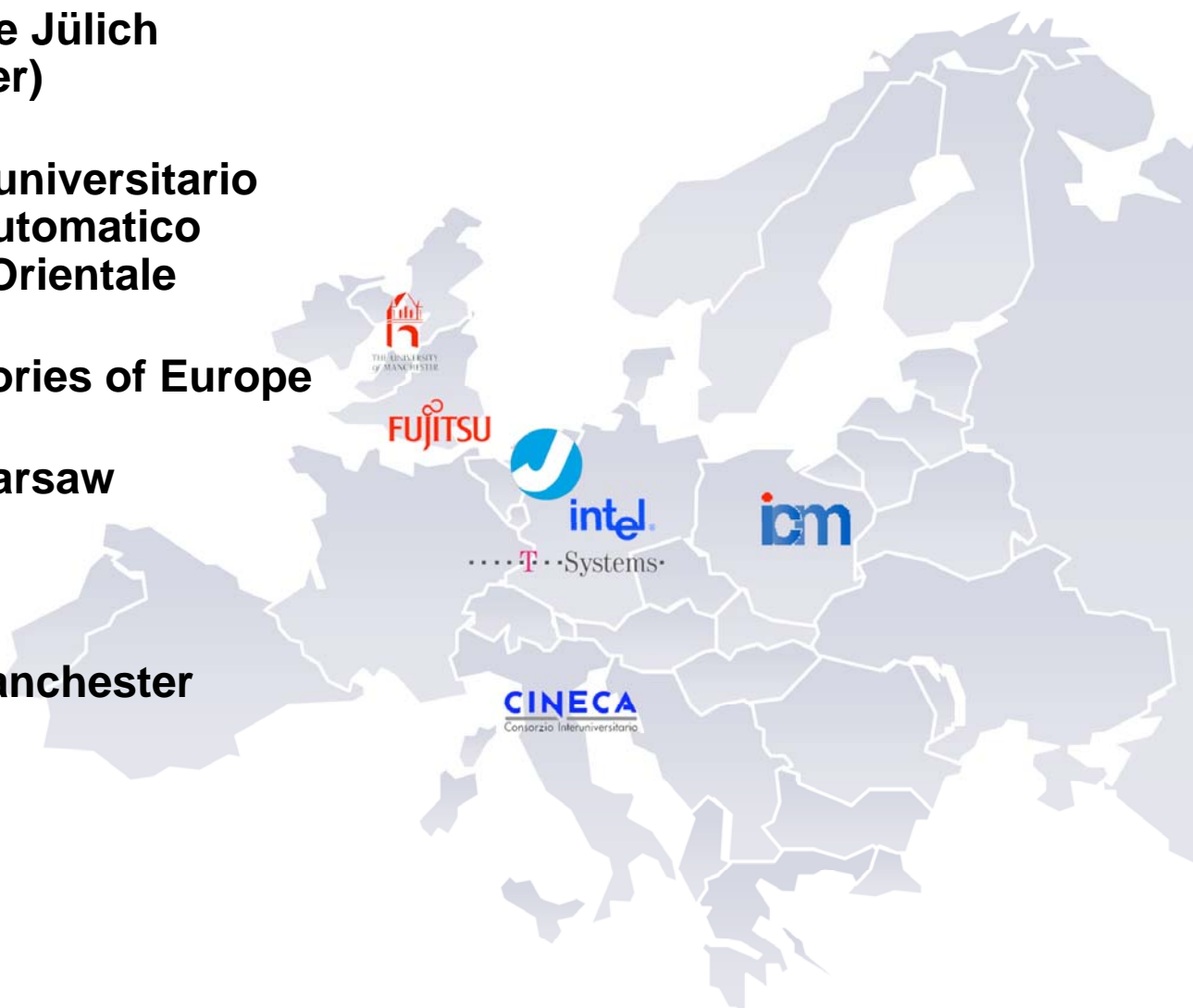
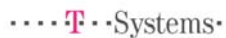
Intel GmbH

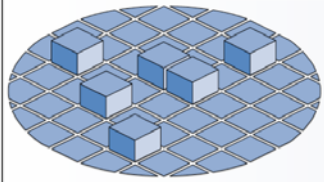


University of Manchester



T-Systems SfR





UniGrids

UNICORE in other Projects

NAREGI – National Research Grid Initiative

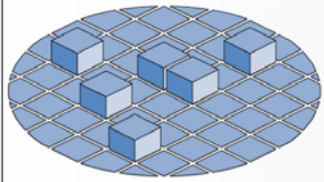
- ❧ One of Japanese Government's Grid Computing Projects
- ❧ Funded by MEXT (Ministry of Education, Culture, Sports, Science and Technology)
- ❧ Runs from 2003 to 2007
- ❧ 2 B Yen (~17M US \$) budget in 2003



DEISA – Distributed European Infrastructure for Supercomputing Applications

- ❧ EU FP6 Integrated Project (Grid Infrastructure)
- ❧ Builds and operates a distributed terascale supercomputing facility.
- ❧ Total computing power already > 20 teraflops.

Distributed
European
Infrastructure for
Supercomputing
Applications



- ❖ Unicore embodies experience in Grid computing gained in a series of projects from 1997 onwards.
- ❖ The original Unicore embodied many features of an SOA, the move to OGSA is natural and consonant with the basic design.
- ❖ However Web services lose the elegance of the AJO model expressed via inheritance in Java.
- ❖ In the longer term an ontological approach to resource modelling puts Unicore/UniGrids in a position to develop a semantically rich middleware that is standards compliant and interoperable with other major middleware systems.