

Open Grid Services Architecture

Based on documents available from
the OpenGridForum (OGF)

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Resources

- <http://www.globus.org/ogsa/>
- <http://forge.gridforum.org/sf/projects/ogsa-wg>

OGSA Use Cases

“Based on the use case documents the OGSA-WG will (a) specify, in broad but somewhat detailed terms, the scope of important services required, (b) identify a core set of such services that are viewed as essential for many Grid systems and applications, and (c) specify at a high-level the functionalities required for these core services and the interrelationships among those core services.”

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From

GWD-I (draft-ggf-ogsa-usecase-003)

Table 1: Use cases and contributors in this document

Chapter	Title	Contributors
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4	Online Media and Entertainment	Tan Lu, Boas Betzler
5	National Fusion Collaboratory	Kate Keahey
6	Service-Based Distributed Query Processing	Nedim Alpdemir, Norman Paton
7	Grid Workflow	Takuya Araki
8	Grid Resource Reseller	Jon MacLaren, William Lee
9	Inter Grid	Jeffrin J. Von Reich
10	Interactive Grids	Jeffrin J. Von Reich
11	Grid Lite	Jeffrin J. Von Reich
12	Virtual Organization Grid Portal	Charles Severance
13	Persistent Archive	PA Working Group of GGF
14	Mutual Authorization	Shawn Mullen
15	Resource Usage Service (RUS)	Bill Horn

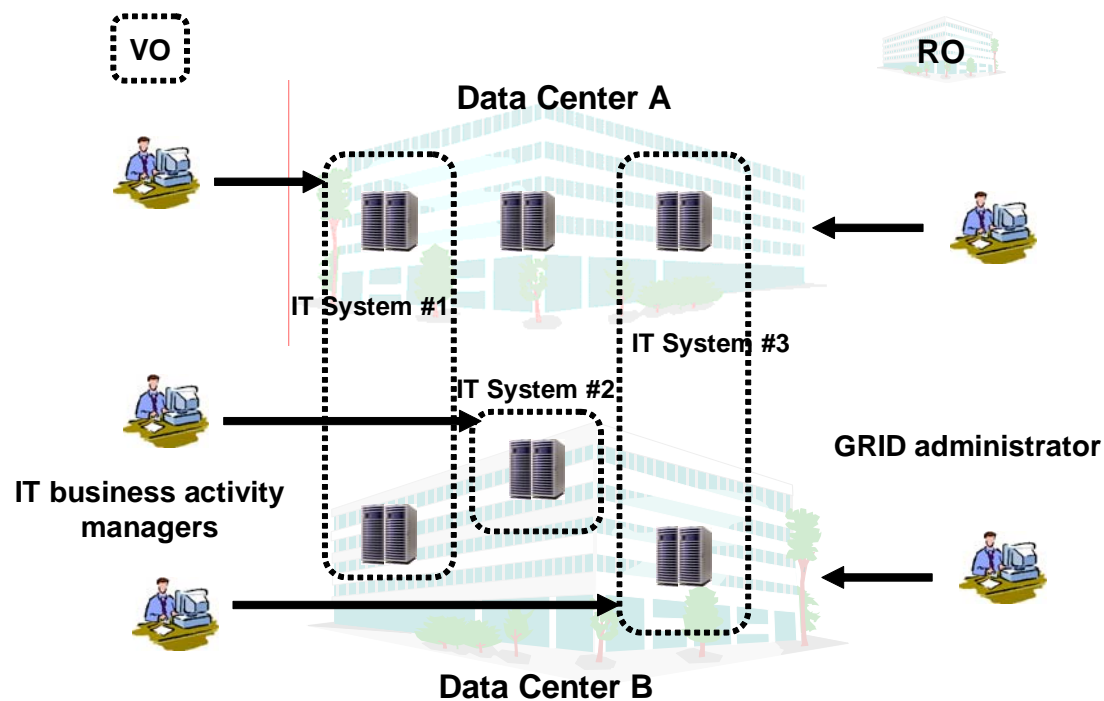
Commercial Data Centre (CDC)

“Many enterprises have been consolidating IT resources such as servers and storage into data centers in order to reduce the total cost of ownership. In addition, many enterprises are outsourcing or planning to outsource their IT resources and/or their management, which allows them to focus on their core businesses. Consequently, data centers need to manage several thousands of IT resources, which include servers, storage, and networks. Decreasing the management complexity and increasing utilization of these resources require an innovative GRID-based resource management software, which we call a “Commercial GRID System” (CGS). All references to Grid technologies or simply to “Grids” in this use case refer to the CGS. Finally, we call a data center that implements the CGS a “Commercial Data Center” (CDC).”

Customers

- **Grid administrator**
- **IT System Integrator**
- **IT business activity manager**
- **End Users** (who are also actors)

The following figure depicts some of the actors described above. The data centers correspond to Real Organizations (ROs) and the IT business activities correspond to Virtual Organizations (VOs). The IT business activity managers create VOs and run their services in them, expecting that the VOs are reliable, scalable, secure, and deliver the required QoS. On the other hand, the Grid administrators manage ROs and the Grid alleviates their work.”



Scenarios

- Multiple in-house systems
 - For each in-house system, the Grid makes reservations in advance, allocates hardware, deploys necessary software and data, and starts the needed applications. All these procedures are automated.
- Limited time commercial campaign
 - Current systems for these campaigns require fixed IT resources, which are over-provisioned to cope with peaks in demand. Thus they need high initial purchase and maintenance costs. The Grid could provide necessary IT resources on demand and charge based on usage.
- Disaster recovery
 - IT systems providing essential public infrastructure services, such as banking systems and air traffic control systems, require disaster recovery capabilities. The Grid could provide a standard disaster recovery framework across remote CDCs to these IT business activities at lower cost.
- Global load balancing

Functional Requirements for OGSA

- **Discovery**
- **Authentication, Authorization, and Accounting**
- **Advance Reservation**
- **Brokering**
- **Data Sharing**
- **Provisioning**
- **Scheduling**
- **Metering and Accounting**
- **Fault Handling**
- **Policy**

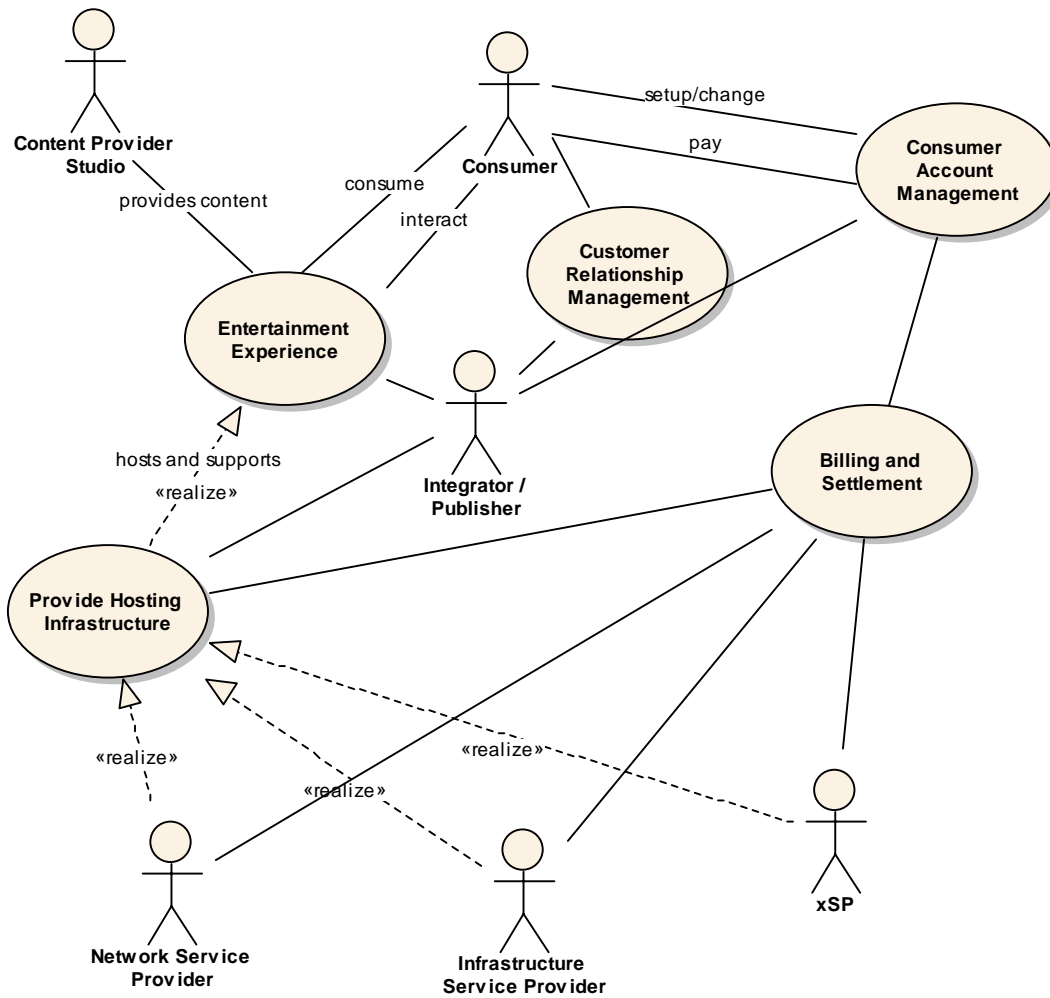
Functional Requirements for OGSA

- **Security**
- **Virtual Organization**
- **Monitoring**
- **Load balancing**
- **Disaster Recovery**

Online Media and Entertainment

To deliver an entertainment experience, several actors form a VO for this purpose. In a first step we want to focus on the following roles of actors:

- A consumer who consumes the entertainment content.
- A service provider that hosts the entertainment content.
- A publisher that offers the entertainment content.
- A developer that consumes the entertainment content.



Online Media and Entertainment Use Case Scenario

Consumer	Publisher	Studio	xSP
Sign up for account (with xSP)			Create Account
	Create a user subscription offer		
		Purchase and subscribe to hosting environments	Create a business offer for publishers (environment on demand)
			Provide subscription to game environment (includes reserve/scheduling and purchase)
	Delete a user subscription offer		Delete offering
Subscribe to contents/game(s) (with Publisher)	Create Authorization		Retrieve Authorization information
Authorization/authentication			Authorization/authentication
Find Content			Publish available contents
Create a M&E session			
Retrieve/use content			Create the On Demand hosting environment (provisioning, failover, workload management)
			Monitor Resources
			Add a physical resource
			Add new functionality/service
			Upgrade functions/services
			Delete an environment on demand offer
			Delete a physical resource from pool of servers
			Delete resources/services
			Load balancing
			Error capture, Problem Determination, Failover, and Recovery
	Define metering requirements		Meter usage
Apply a client patch/PTF			
			E-Commerce Integration
	Generate billing record based on billing and rating packages		Generate billing record based on billing and rating packages
	Bill player for usage (monthly, per hour, etc)		Bill publisher for usage/footprint

OGSA

From a consideration of a number of use cases (two of which I have summarized in the previous slides) the following were identified as requirements which were both important *and* broadly relevant.

- *Interoperability and Support for Dynamic and Heterogeneous Environments*
 - Resource virtualization
 - Common management
 - Discovery and Query
 - Standard protocols & Schemas

- ***Resource Sharing Across Organizations***
 - Global name space
 - Metadata management
 - Site autonomy
 - Data on resource usage

- ***Optimization***

Optimization refers to techniques used to allocate resources effectively to meet consumer and supplier requirements. Optimization applies to both suppliers (supply-side) and consumers (consume-side) of resources and services.

- ***Quality of Service (QoS)***

- Service level agreements
- Service level attainment
- Migration

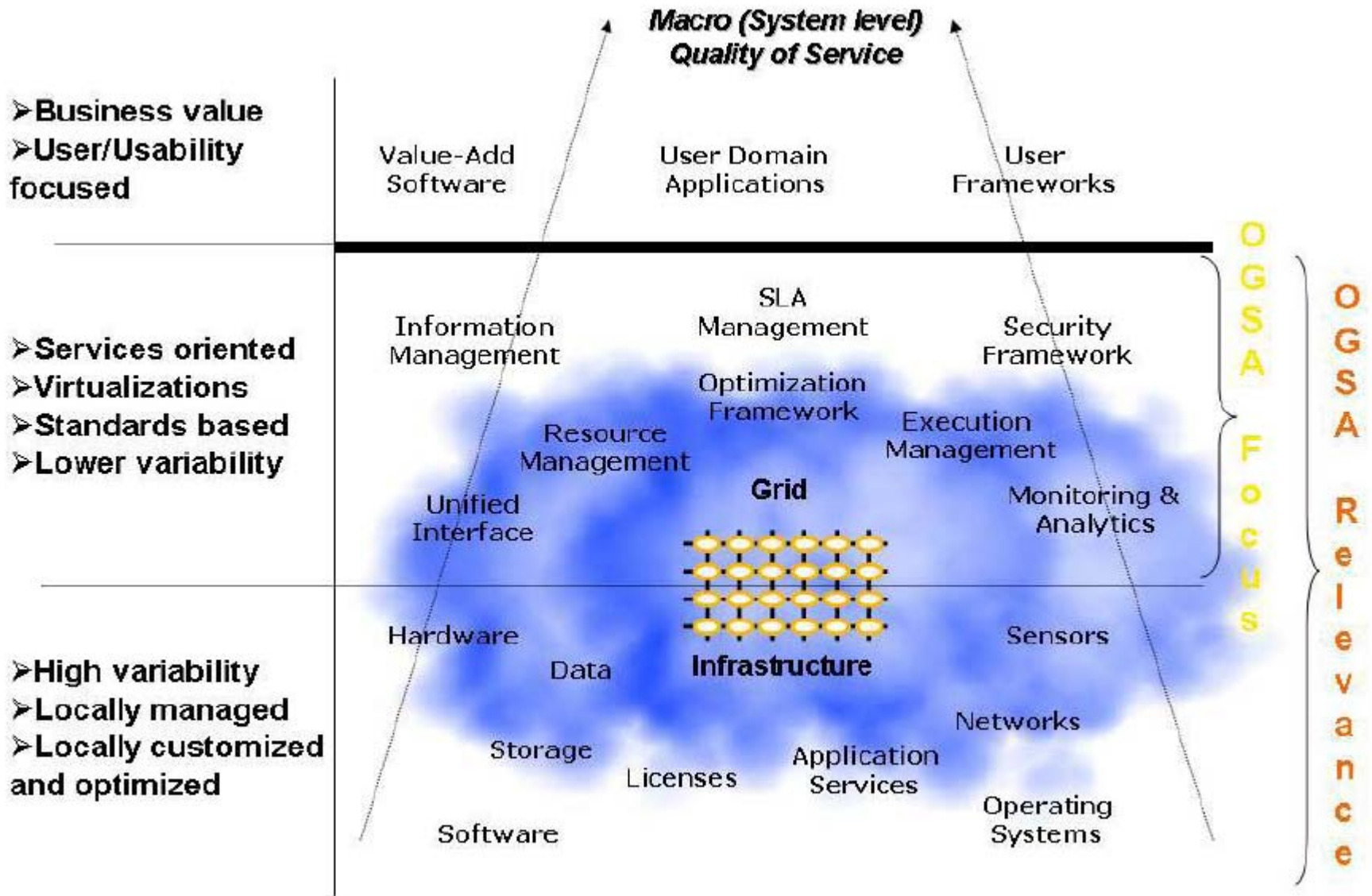
- ***Job Execution***

- Support various job types (simple to complex workflow)
- Job Management
- Scheduling
- Resource Provisioning

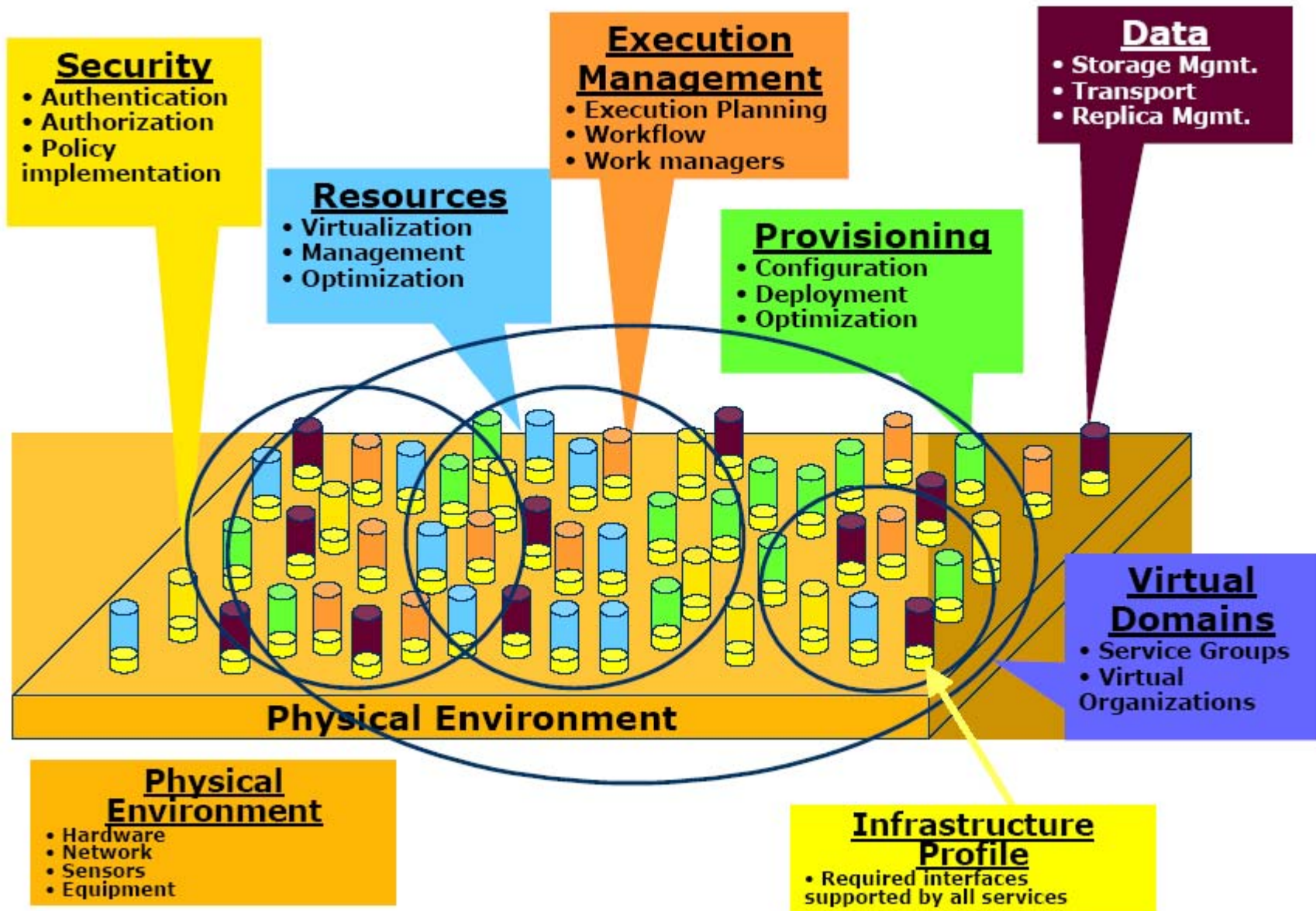
- *Data Services*

- Access
- Consistency
- Persistency
- Integration
- Location management

- *Security*
 - Authentication and authorization.
 - Multiple security infrastructures.
 - Perimeter security solutions.
 - Isolation
 - Delegation
 - Security policy exchange.
 - Intrusion detection, protection, and secure logging.
- Administrative Cost Reduction
- Scalability
- Availability
- Extensibility and Ease of Use

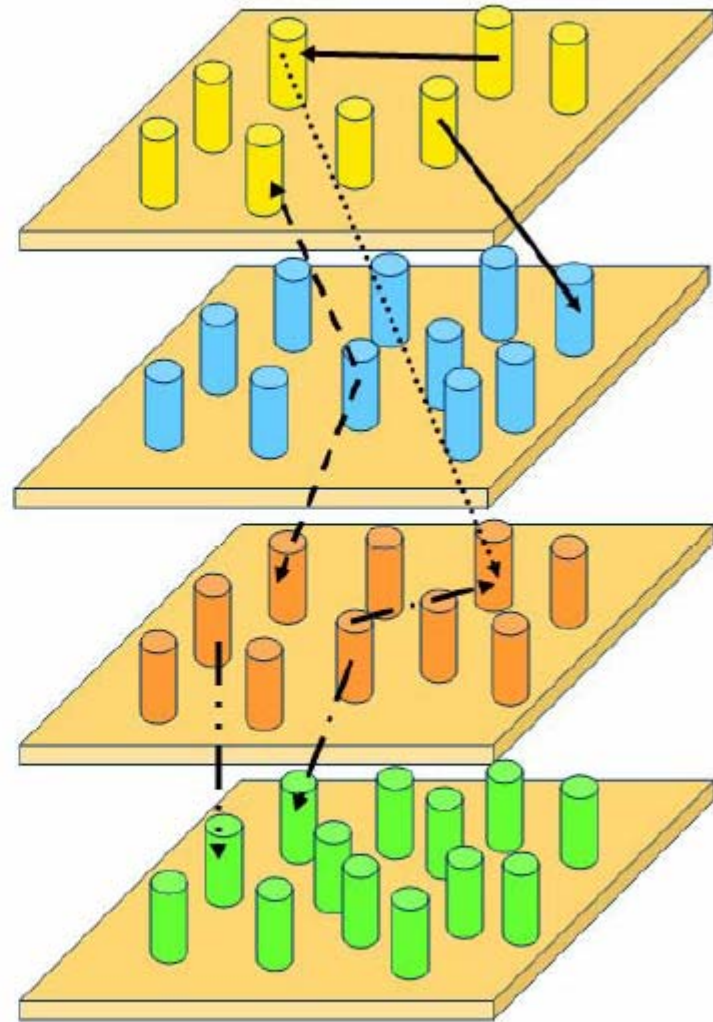


Conceptual Grid Infrastructure



OGSA Framework

- Source *uses* target capabilities to provide a service to a client →
- Service *composes* the capabilities of the underlying services to provide a higher level capability - - - →
- Service *delegates* requests to a related service for fulfillment →
- Service *refers* to the related service for substantiating a request (validation, concretization) - . . →
- Service *extends* (subsumes and augments) the capabilities of the related service - . . . →



Service Relationships