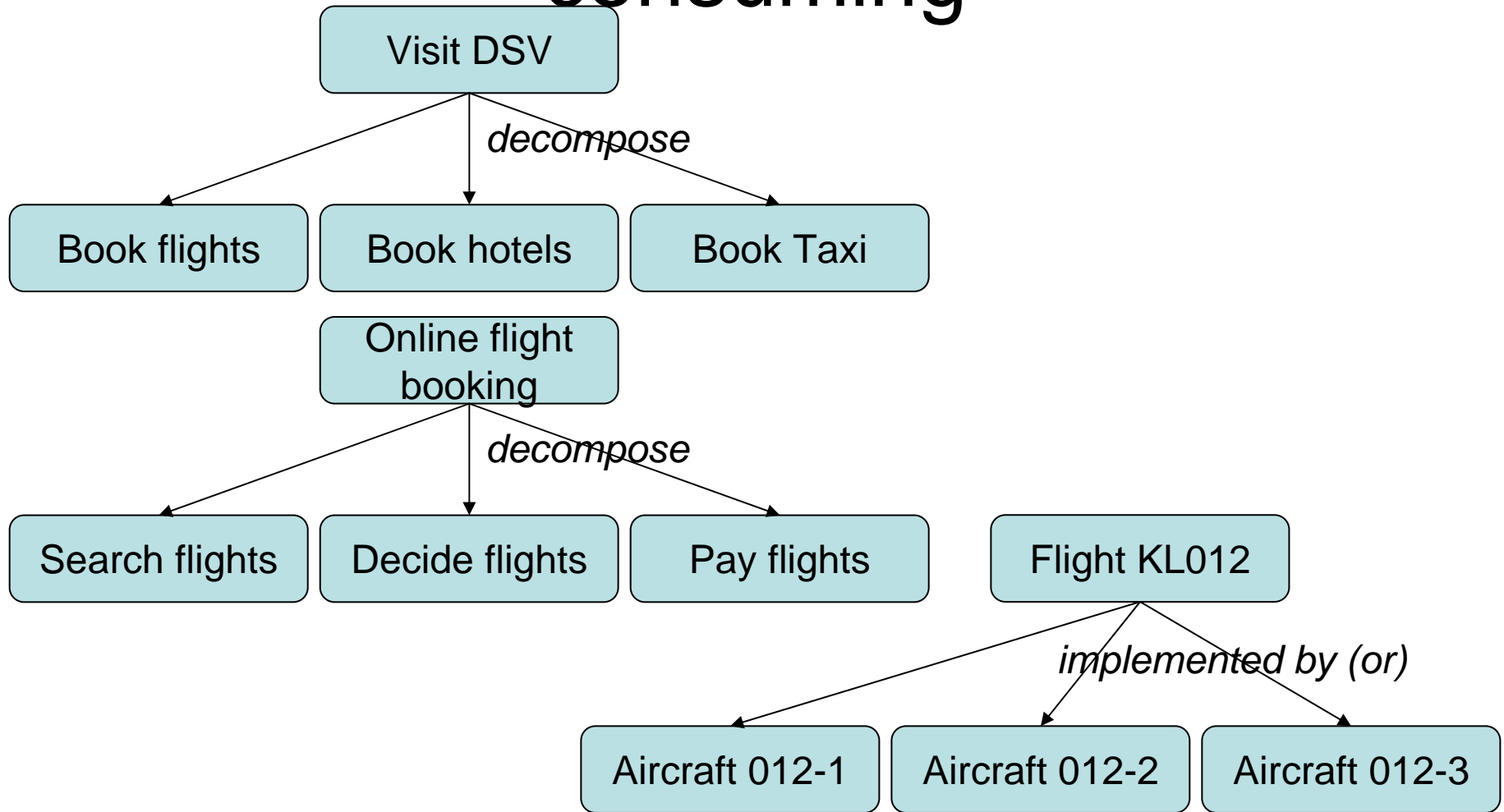


# Virtual Organizations and Web Services

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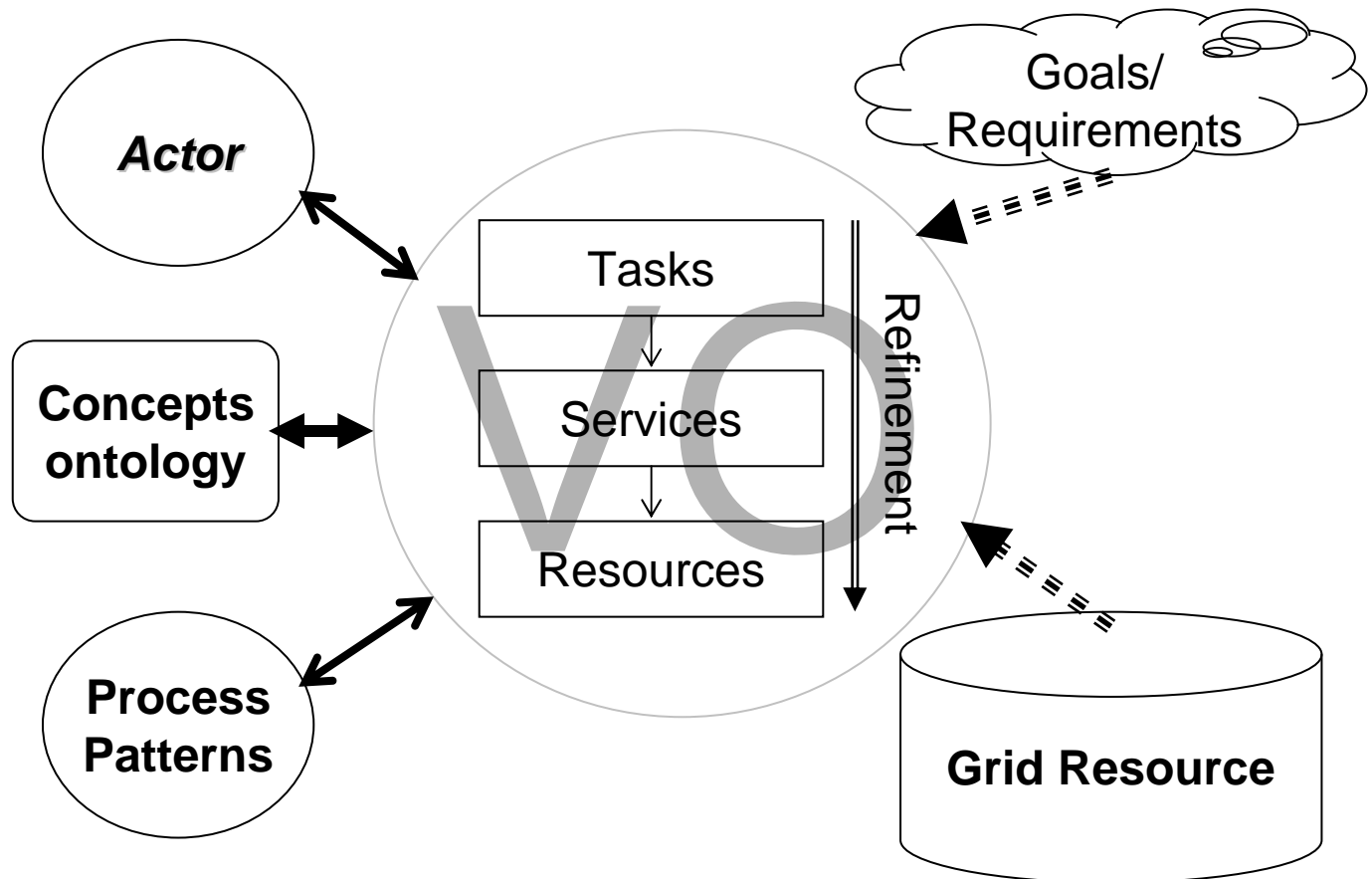
# Introduction – what services I’m consuming



# Introduction – organizing services and resources

- These services (flights, accommodations, transportations, service searching, etc.) are offered by different companies and organizations (airlines, hotels, transportation companies, search engines, data suppliers, conference organizers).
- For your purpose of visiting and presenting your work at DSV, they worked together (with different roles, different functions, different ways) to form a temporary “**organization**” – Virtual Organization.

# modelling

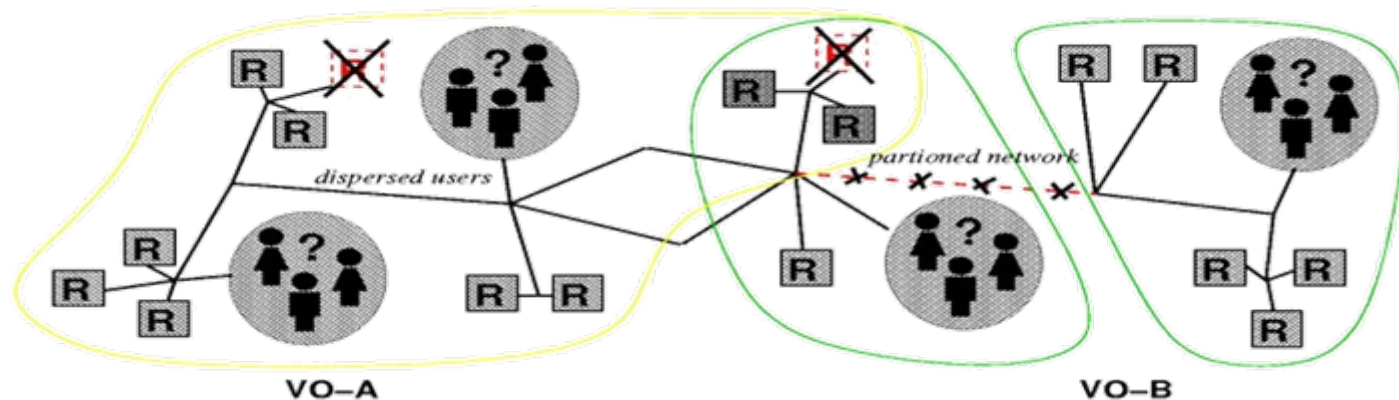


# What is grid computing?

- Definition of the Grid
  - Controlled sharing of geographically distributed resources
  - Virtual Organization
  - Analogy with power grids
    - Consistent, pervasive, dependable, and transparent access to electricity from different sources
- Characteristics of a Grid
  - No centralized control center
  - Heterogeneity (of resources)
  - Scalability
  - Dynamic and Adaptable

# Grid – what is the grid?

“Resource sharing & coordinated problem solving in dynamic, multi-institutional virtual organizations”  
 [Foster, Kesselman, Tuecke 2001]

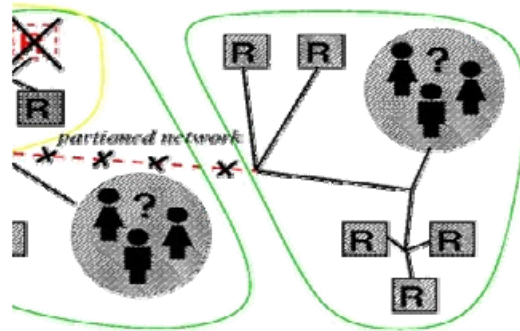


*“When the network is as fast as the computer's internal links, the machine disintegrates across the net into a set of special purpose appliances” (George Gilder)*

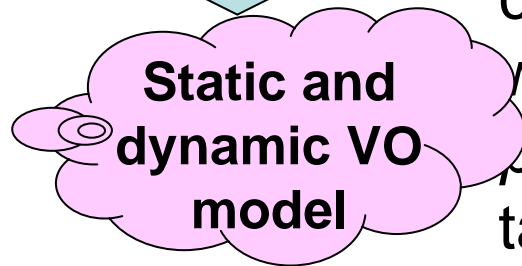
# The semantics of knowledge

- Semantics for Grid Applications and Grid Middleware
- Semantic Grids
  - Grids and Grid middleware that makes use of semantics for its installation, deployment, running etc.
- Knowledge Grids
  - A virtual knowledge base derived by using the Grid resources, in the same spirit as a data grid is a virtual data resource and a compute grid a virtual computer.
  - Knowledge Grids include services for knowledge and data mining.

# What is VO?



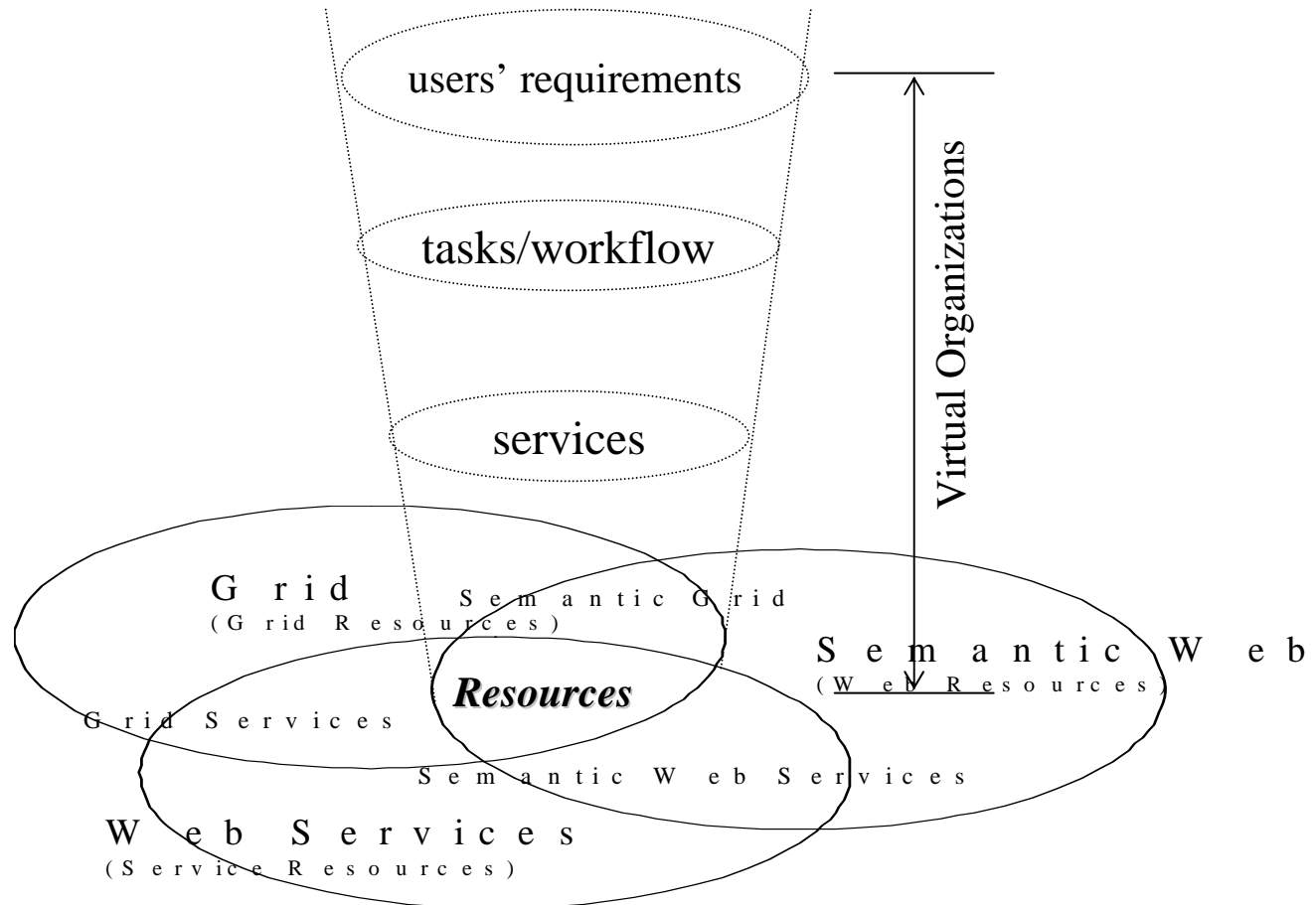
virtual organization can be en as “a *temporary* alliance *contracted* individuals or mpanies linked together by ormation and communication technologies, which assembles for the *purpose* of a specific business task”.



Intelligent decision making and operations



# Where VO?



# VO – Pre-formation

- Describing and asserting policy
  - Flexible and extensible schemas, transparency
- Can you be a member of this VO?
  - Matching task, integration
- How do we set your roles so you can be?
  - Configuration
- Are these set of policies mutually consistent?
  - Configuration and verification
- Service Level Agreements
  - Matching provides and expects clauses
- Authentication & Authorisation
  - Reconcile diverse policies

# VO – Forming & Operating Communities

- Define membership & roles; enforce laws & community standards
  - I.e., policy for service-oriented architecture
  - Addressing dynamic membership & policy
- Build, buy, operate, & share infrastructure
  - Decouple consumer & provider
  - For data, programs, services, computing, storage, instruments
  - Address dynamics of community demand

# VO – Runtime

- Mapping roles and operations (OGSA)
- Capturing domain ontologies (OWL)
- Annotating services (RDF(S))
- Coupling resources (OGSA)
- Starting reasoning mechanism (OWL)

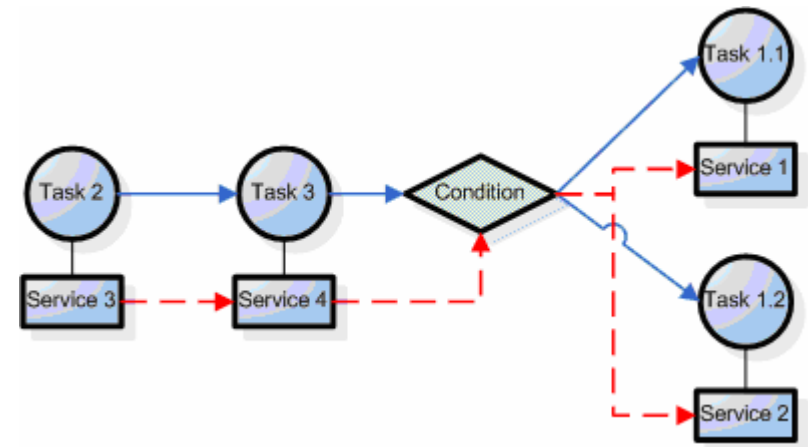
# Internal structure of VO

- Horizontal
  - Workflow
- Vertical – Hierarchy
  - Task-Service-Resource
- Operations
  - decomposition
- Dynamic and static
  - Time dimension and states

# Structure – Workflow

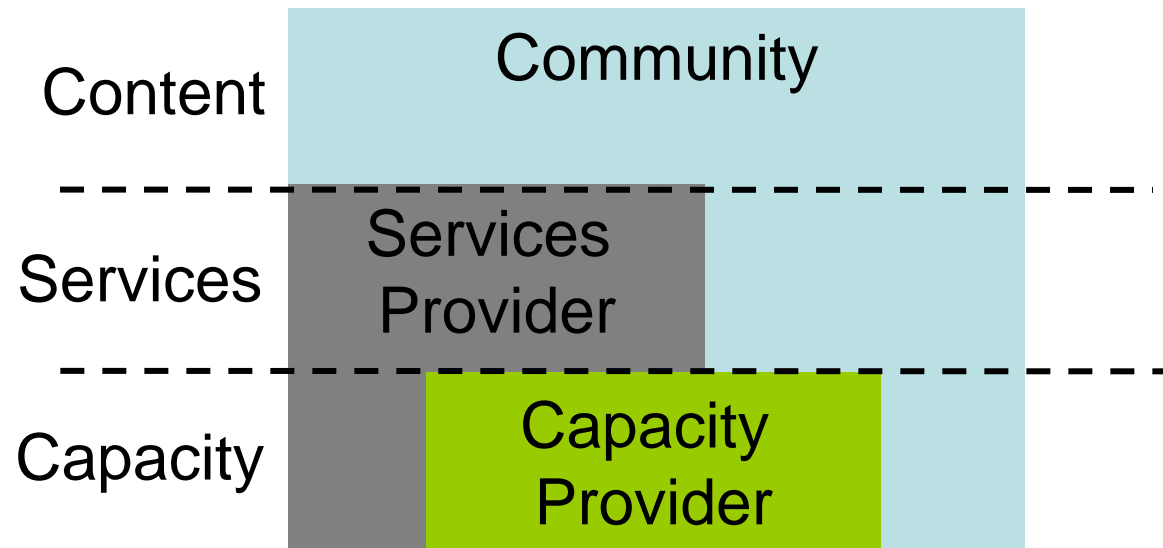
- A virtual organization is an organization of being task-driven, resource-based, and workflow-managed.
- It concerns the dependence between resources available for the virtual organization and time sequence dependence.
- A workflow model for a virtual organization represents a series of states and their transitions.

In the life cycle of a virtual organization, a series of states and their transition flows form a state-transition graph.



# Assembling Services

- 1) Integrate services from other sources
  - Virtualize external services as VO services

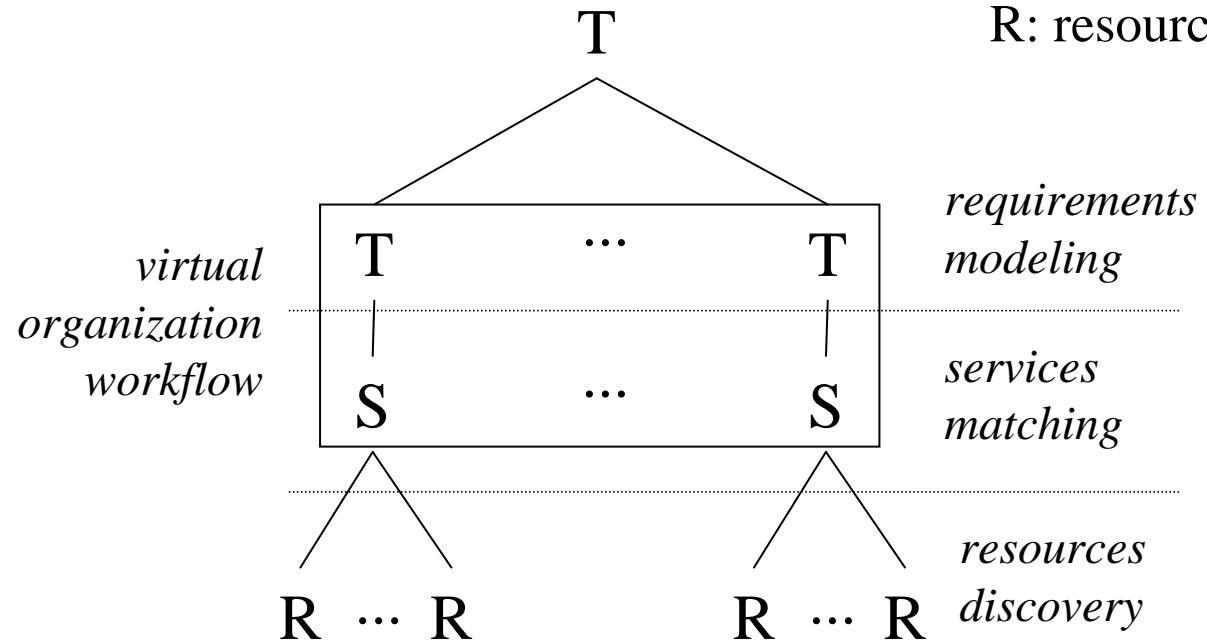


- 2) Coordinate & compose
  - Create new services from existing ones

"Service-Oriented Science", Science, Foster, 2005

# Structure – three layers

T: task  
 S: service  
 R: resource



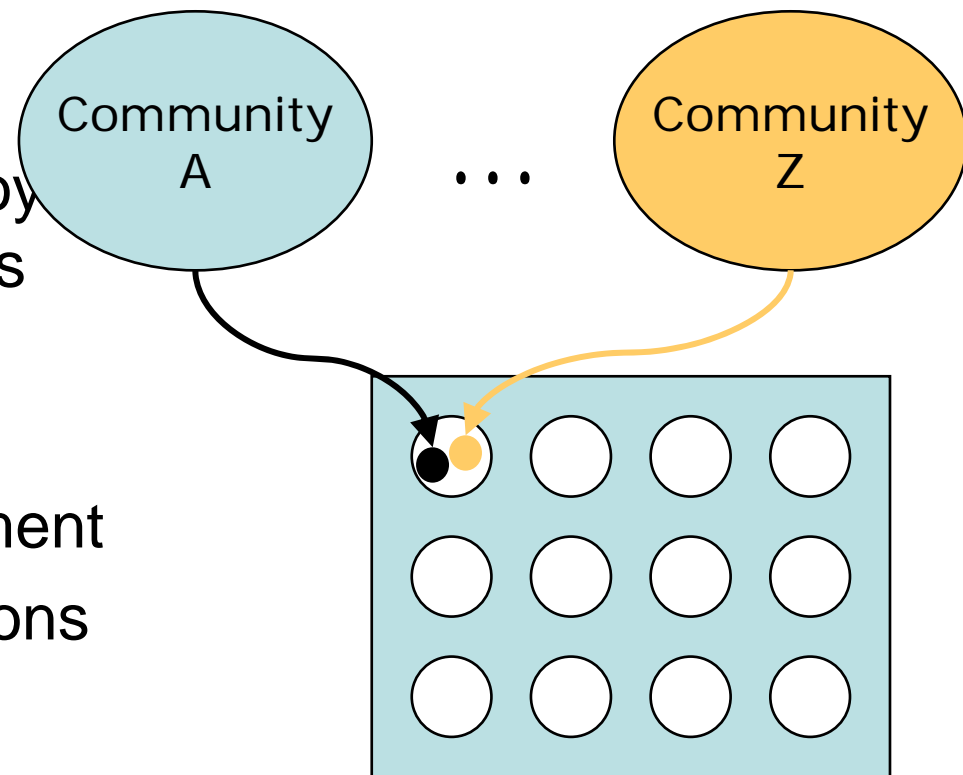


# How does a VO work?

- Client uses a VO interface
- A VO instance is created from a **Factory** with the help of a **Registry**
- The VO instances run with appropriate resources automatically allocated
- New VO instances can be allocated and destroyed dynamically, to benefit performance
  - Example: A web serving environment could dynamically allocate extra instances to provide consistent user response time

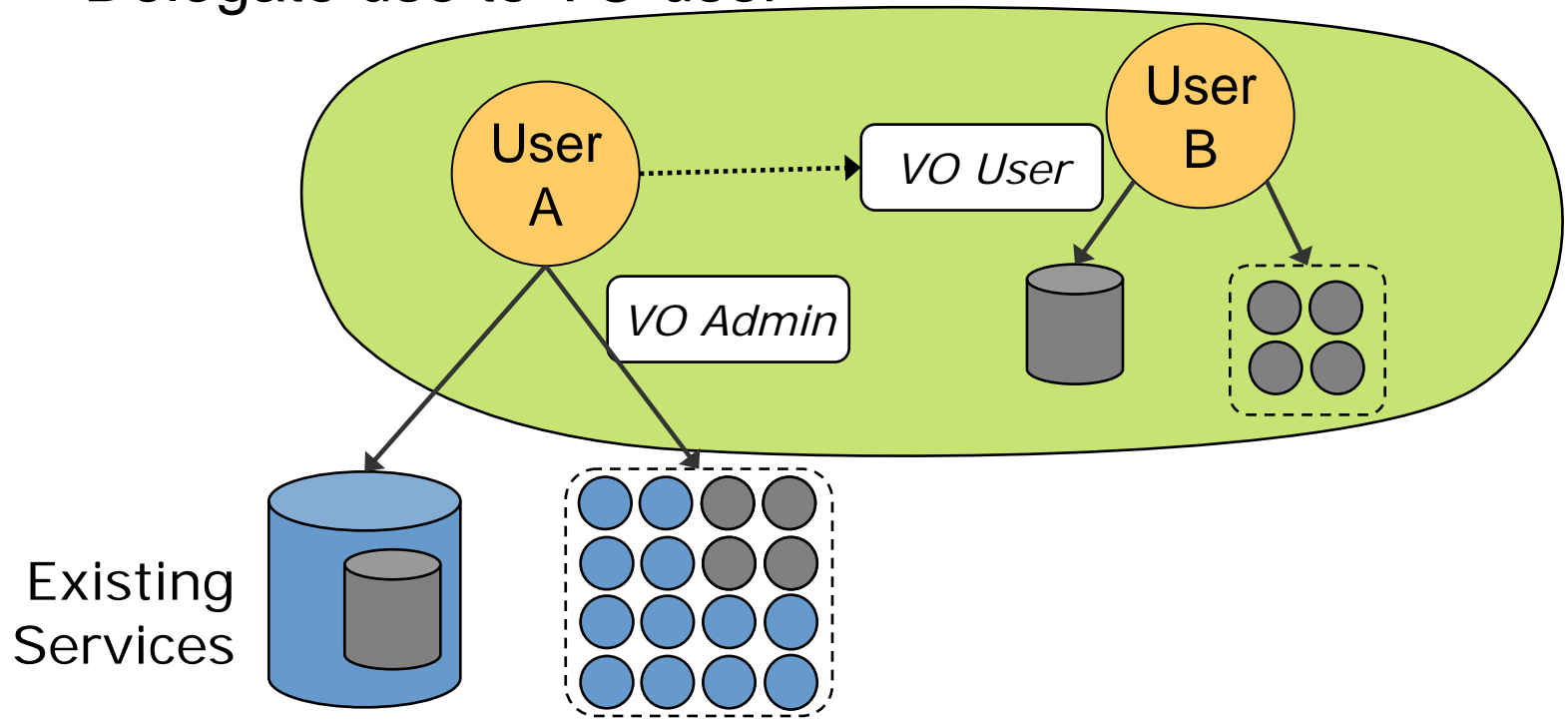
# Providing VO Services – Integration from Other Sources

- Negotiate service level agreements
- Delegate and deploy capabilities/services
- Provision to deliver defined capability
- Configure environment
- Host layered functions



# Virtualizing Existing Services into a VO

- Establish service agreement with service
  - E.g., WS-Agreement
- Delegate use to VO user



# Next: Web Services

## Discovery

- Automated Discovery services or workflows
- Knowledge assisted brokering & match making
- Guided instantiation and substitution



## Composition

- Automated Composition
- Self organising SOA
- Guided workflow assembly
- Composition (workflow) verification and validation