SynfiniWay Overview

29th October 2009

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When GRID meets Cloud

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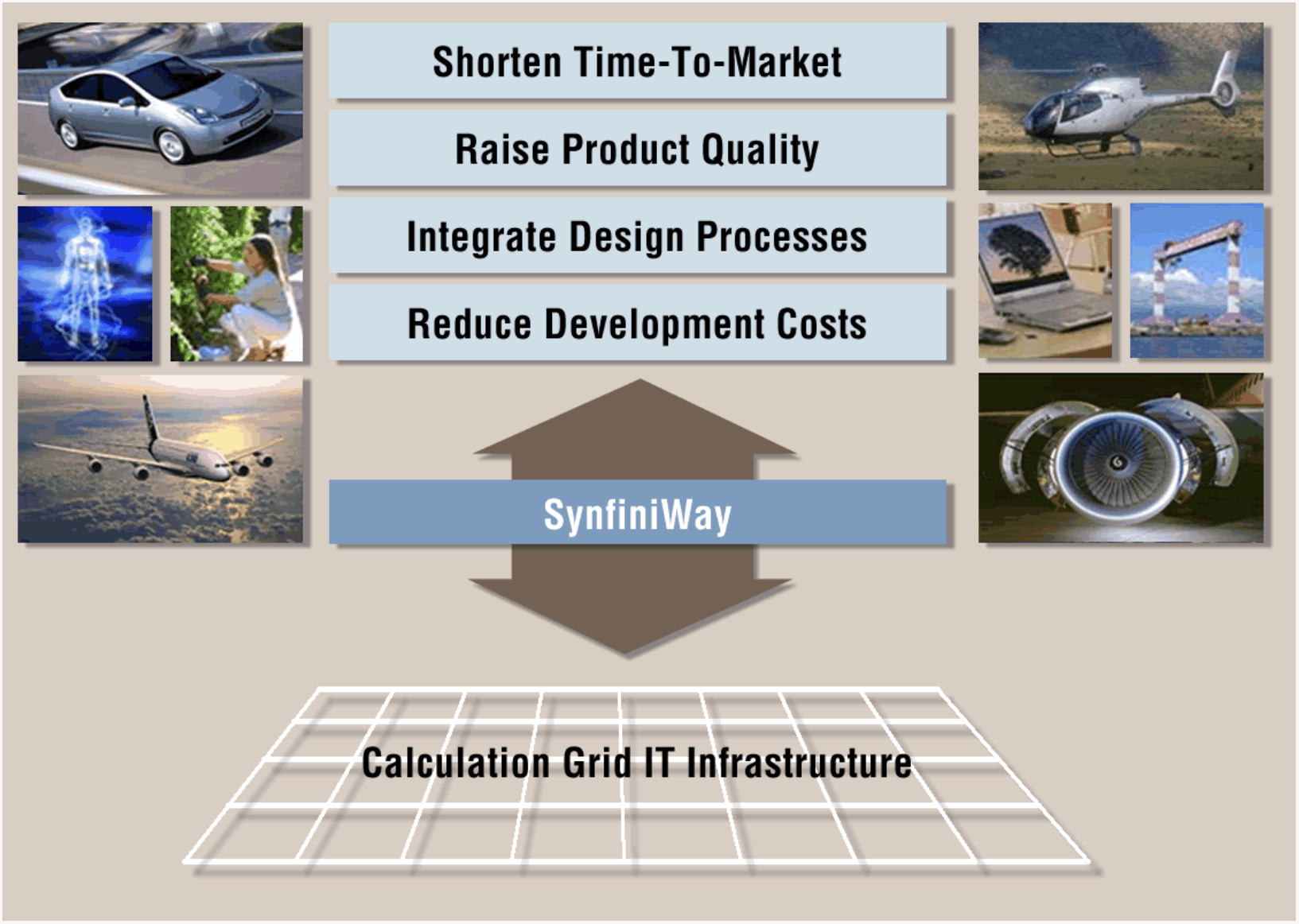
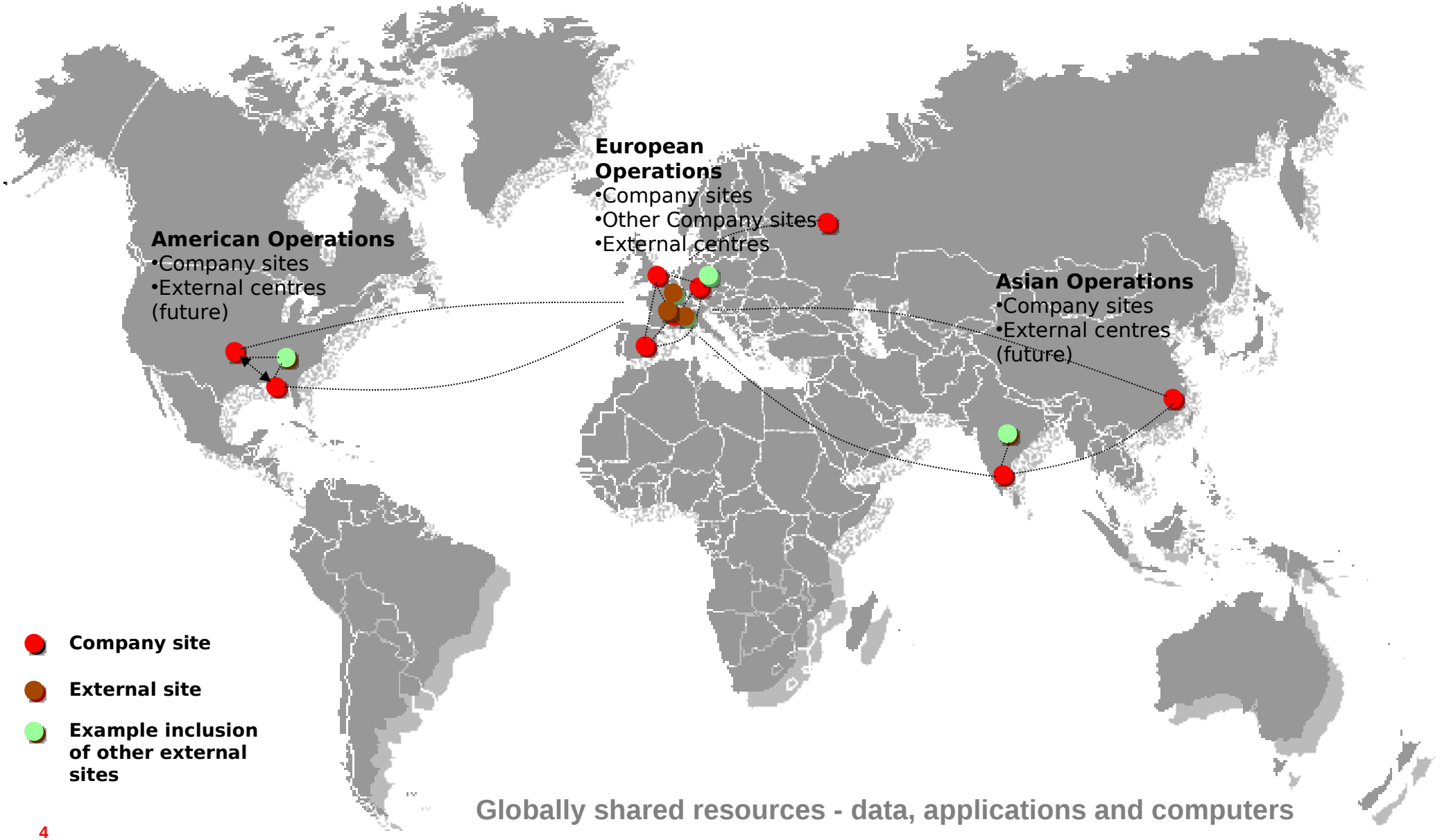
Industry Requirements



What is SynfiniWay

- SynfiniWay is an SOA IT framework for distributed computing relevant to global organisations
- A Middleware that overcomes barriers to organisational and process scale by reducing global IT complexity
- Enables the secure and cost effective use of distributed infrastructures between organisations
  - Applications and data may be situated on any of the distributed infrastructures
  - Access computing power necessary to run each element independent of location/ownership
- Whole workflow completed within a virtualised and adaptable environment that avoids the inefficiencies, waste, and data loss normally associated with increasing scale

Ability to build a truly global Extended Enterprise



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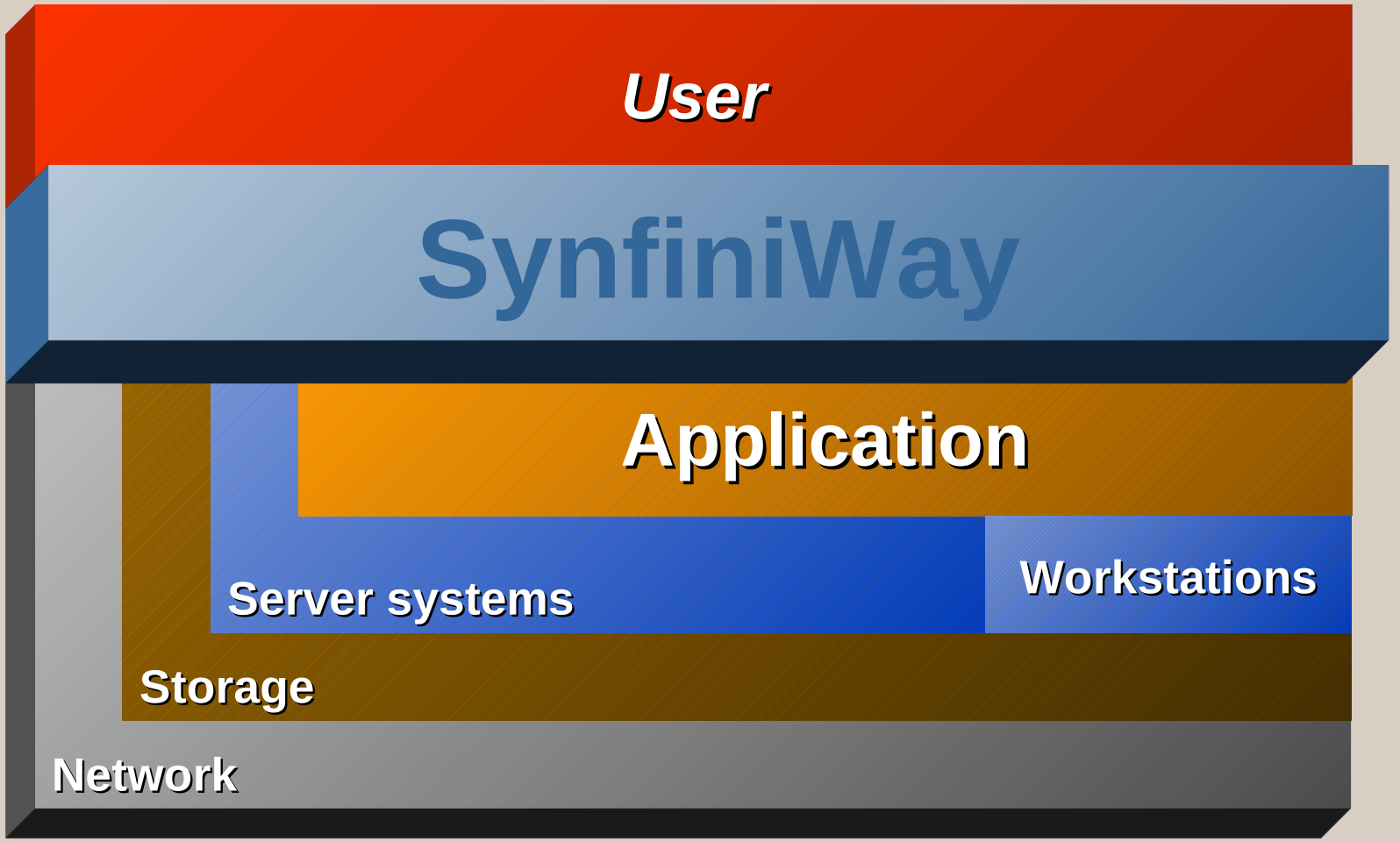
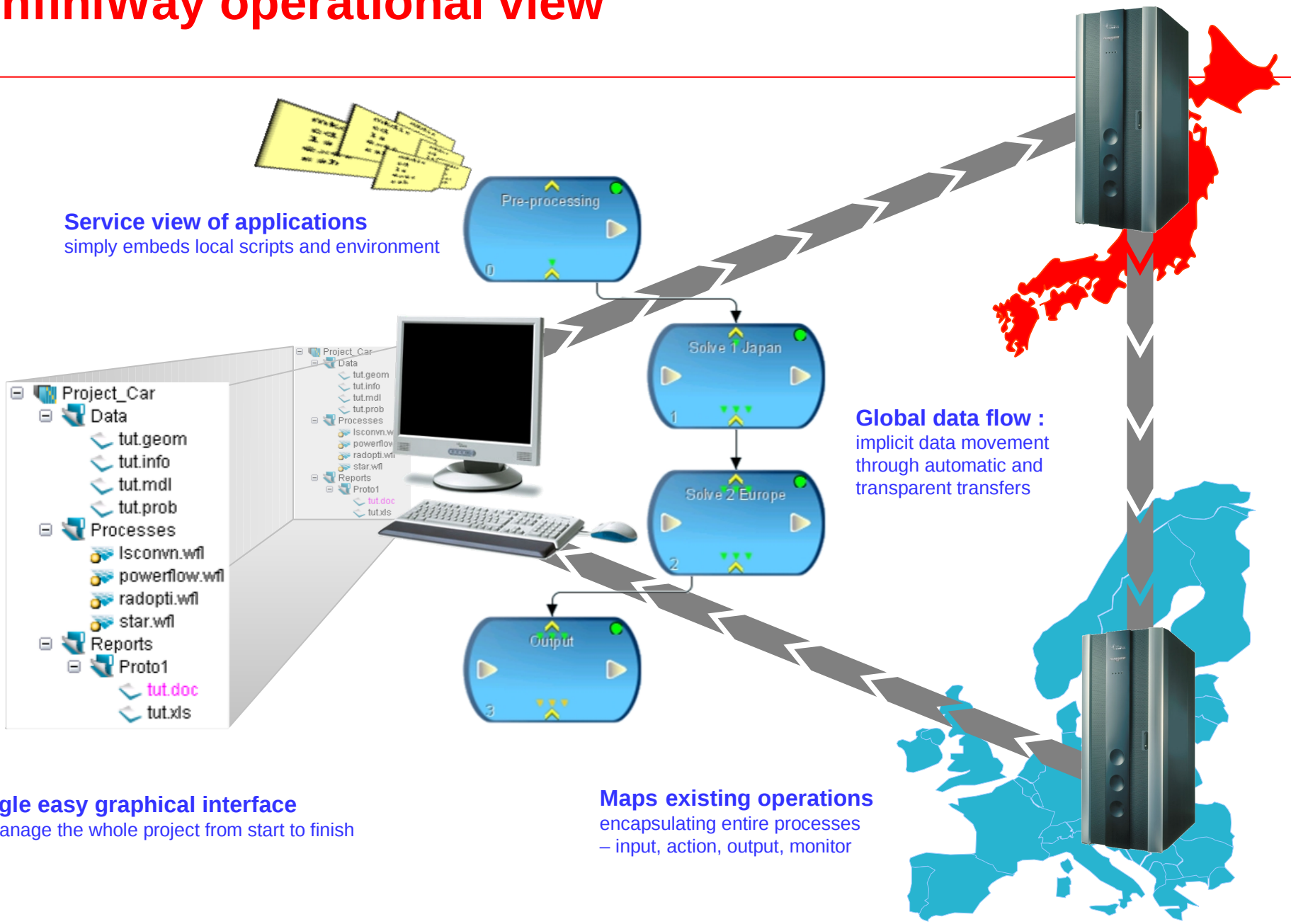
Position in the resource landscape

SynfiniWay is the interface between end-users and the IT infrastructure



SynfiniWay operational view



Service view of applications
simply embeds local scripts and environment

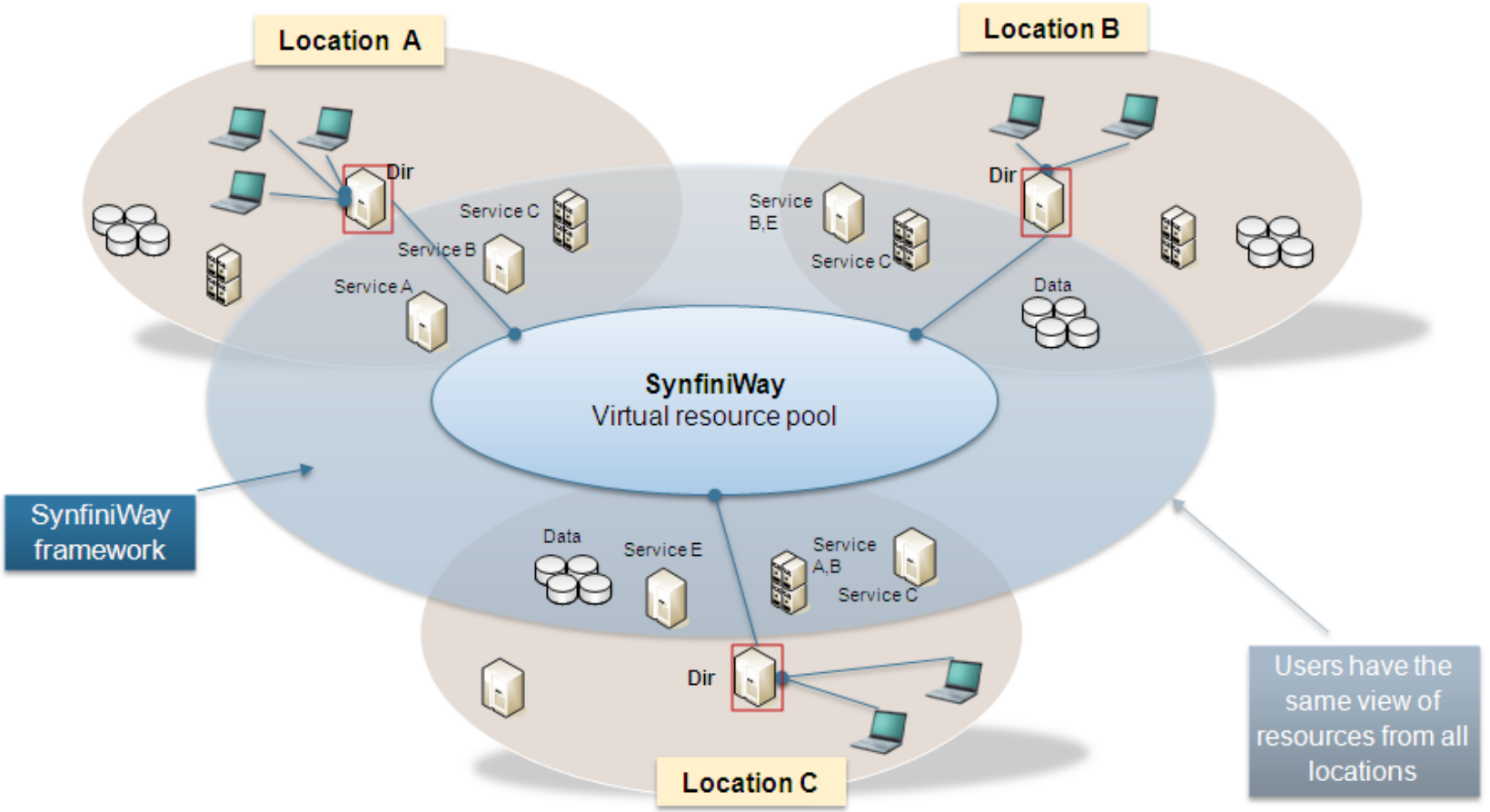
Global data flow :
implicit data movement through automatic and transparent transfers

Single easy graphical interface
to manage the whole project from start to finish

Maps existing operations
encapsulating entire processes – input, action, output, monitor

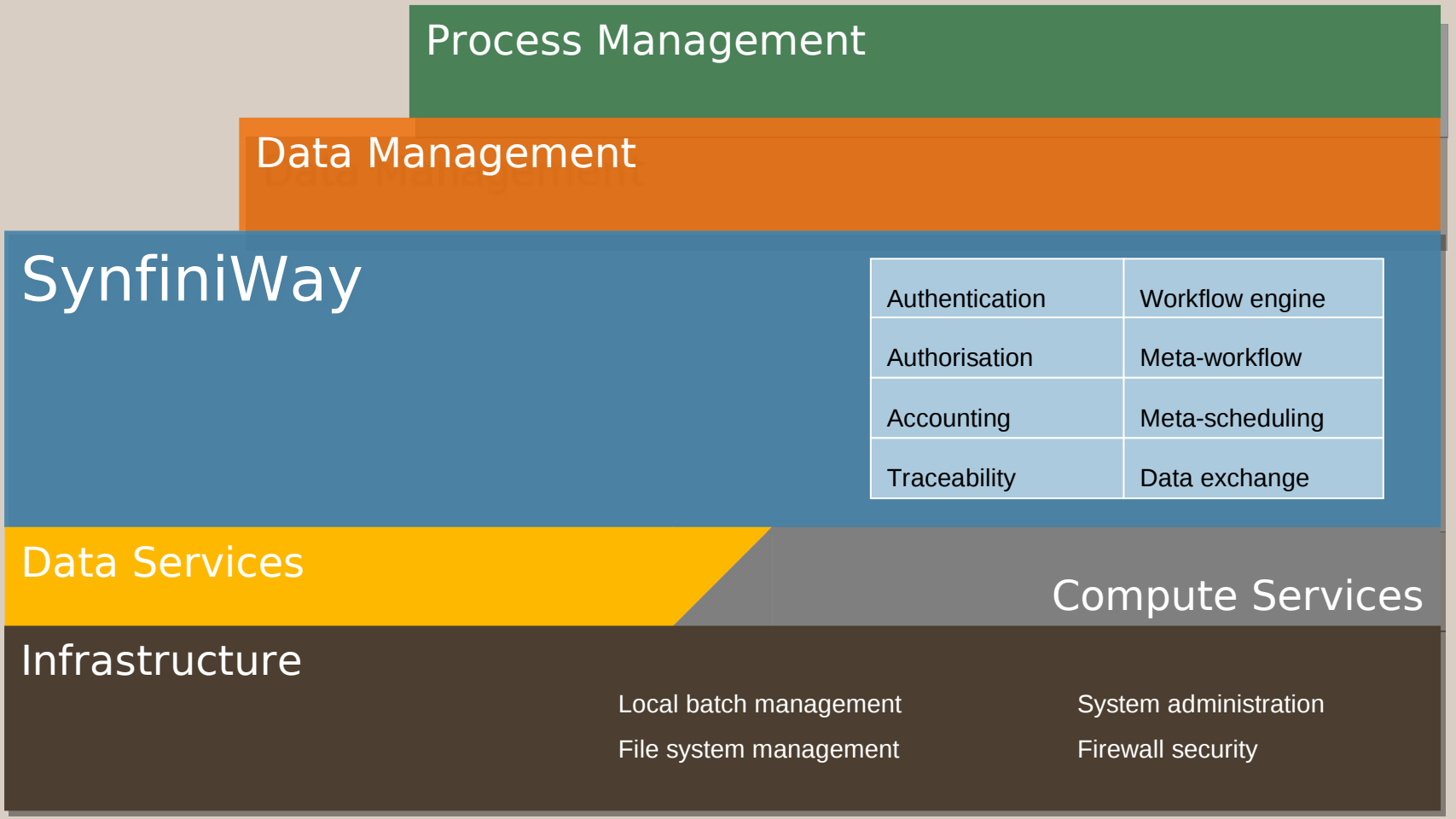
Global IT Virtualisation

- Network abstraction
- Service-based application abstraction
- Security distributed, global user identity
- Workflow engine for global orchestration
- Scheduler based on limits/tags
- Direct implicit data transfer



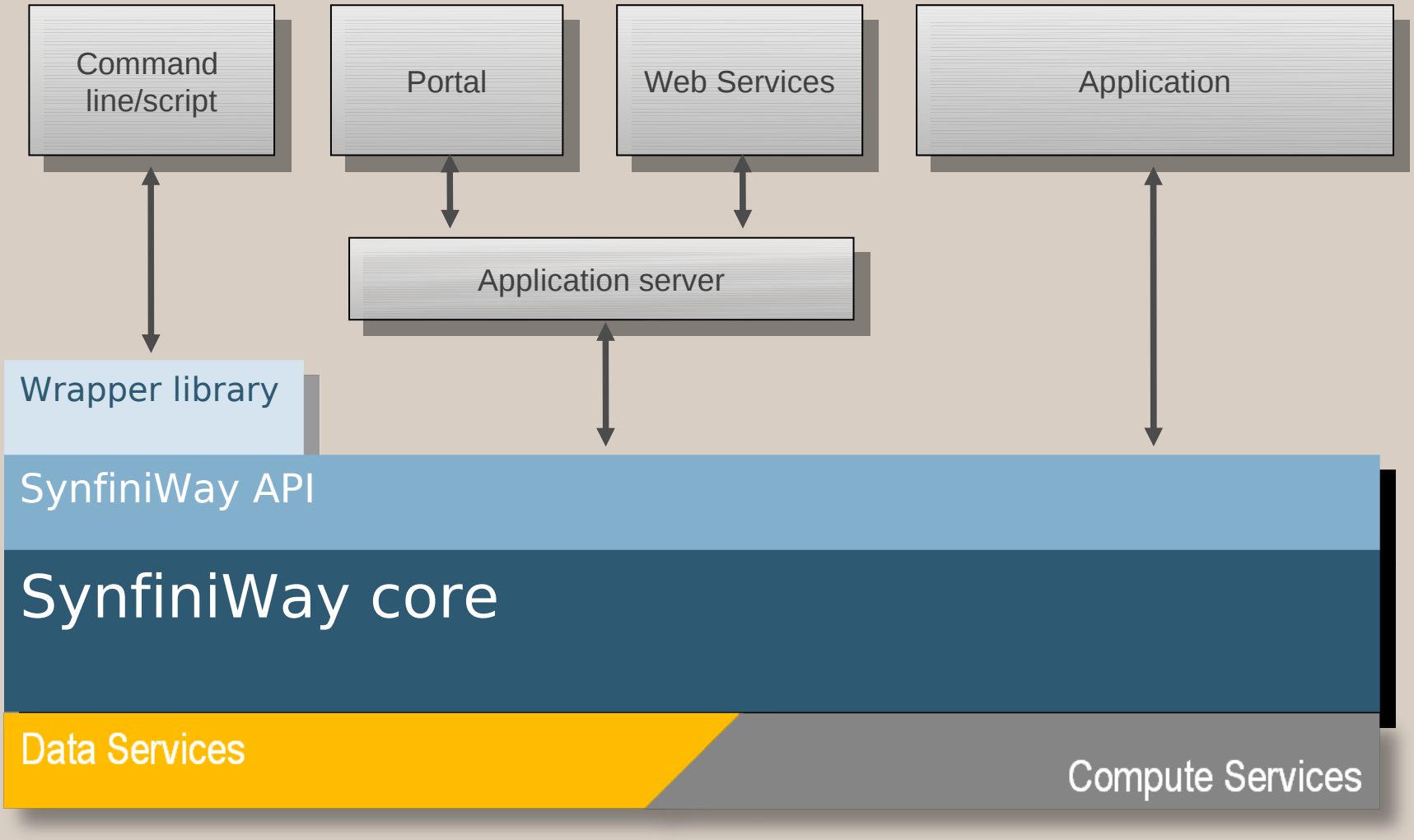
Framework Concept

GENERAL APPLICATION ARCHITECTURE

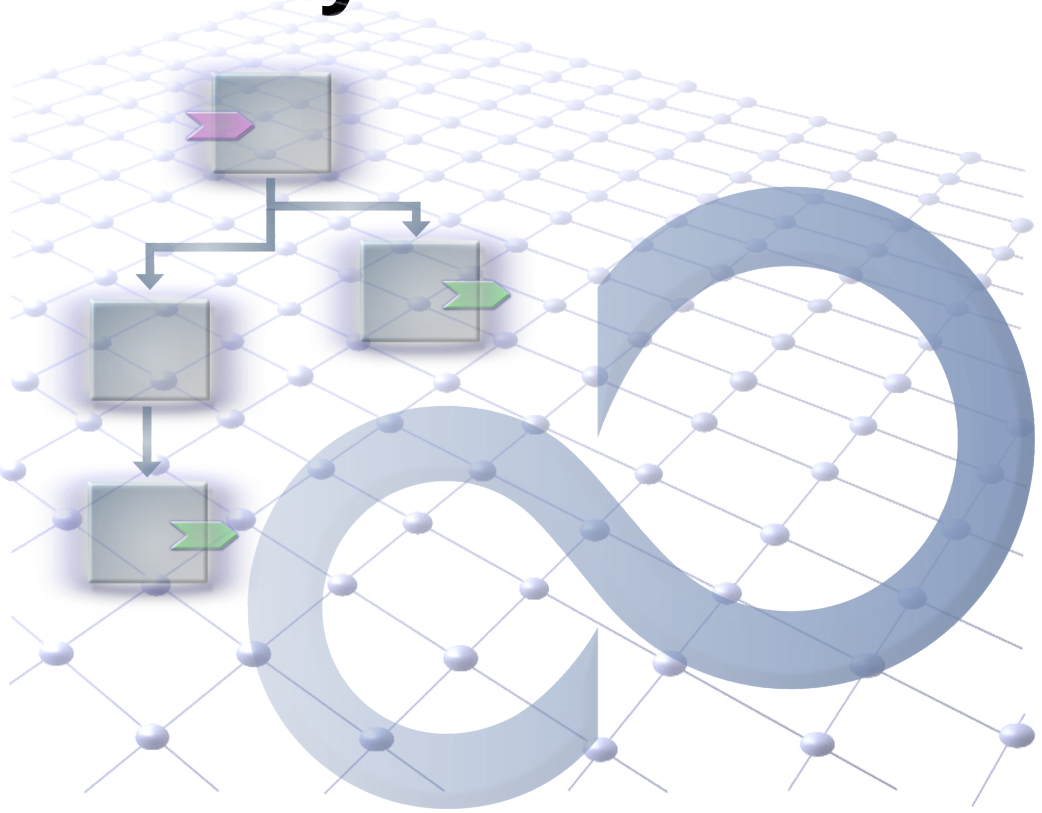


Connections to SynfiniWay Framework

SUPPORTED TECHNOLOGIES



The SynfiniWay Community and Components



Main concepts

- **Service** - defines a logical group of actions related to an application (user or system)
- **Action** - defines how a piece of software is executed
- **Workflow** - a set of tasks managed as a single unit
- **Task** - a service action – instantiation of an action
- **Workspace** - private or shared, defined on the director used to hold projects, workflow definitions and related data
- **Run Directory** - Dynamic work area used running services for users

Main components

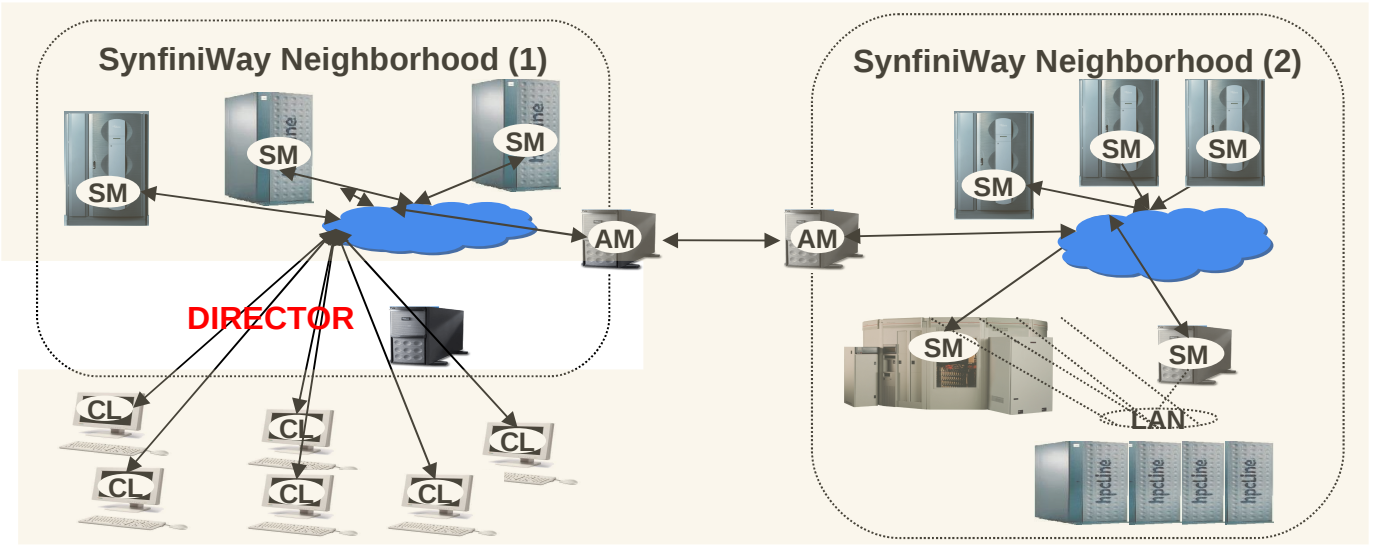
- Server systems
  - Director(s)
  - Service Managers
  - Acquaintance Managers
- Clients
- Community
  - The global set of resources under the control of SynfiniWay
    - Server systems
    - Storage areas
    - Clients
  - Consists of one or more neighbourhoods
- Neighbourhood
  - A distinct set of server systems with local network connection between each other
  - Includes at least one Service Manager

Director

- Manages user connections
- Manages user projects
- Provides user workspace (storage for projects, workflows and data)
- Workflow scheduling and management
- Manages data transfer requests
- Discovers available Service Managers
- Discovers and maintains a list of published services

CL: Client

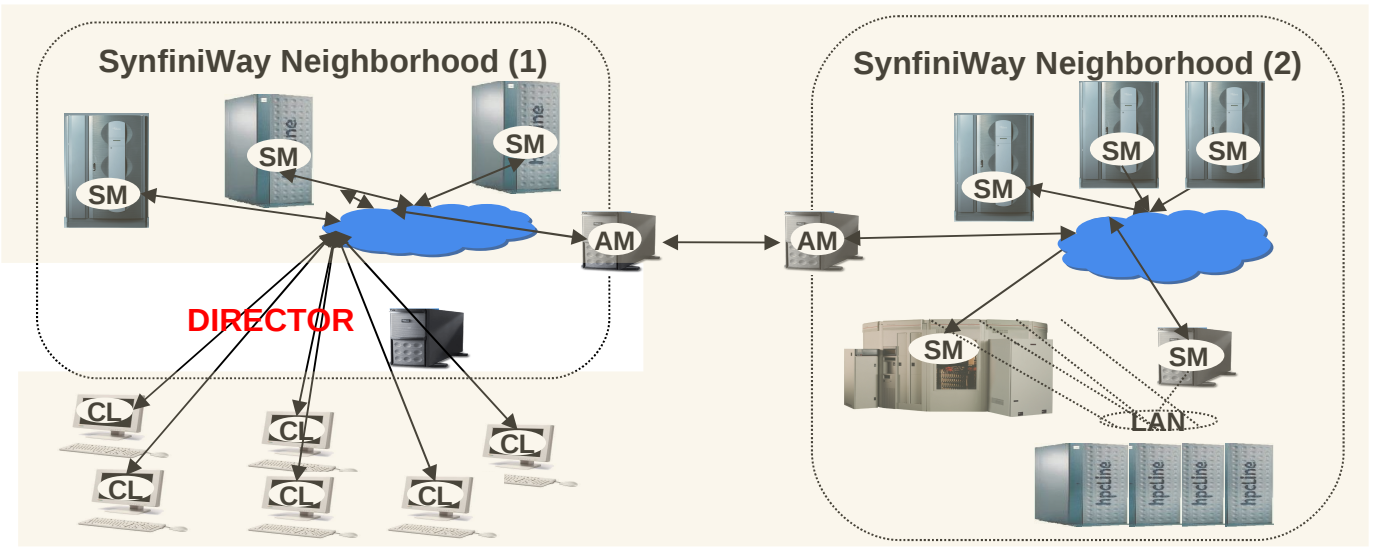
SM: Service Manager



AM: Acquaintance Manager

Service Manager

- One required per cluster or server where services need to be used
- Defines the services available from this host
- Can export directories for access by users
- Interfaces to system services
- Can be dynamically added



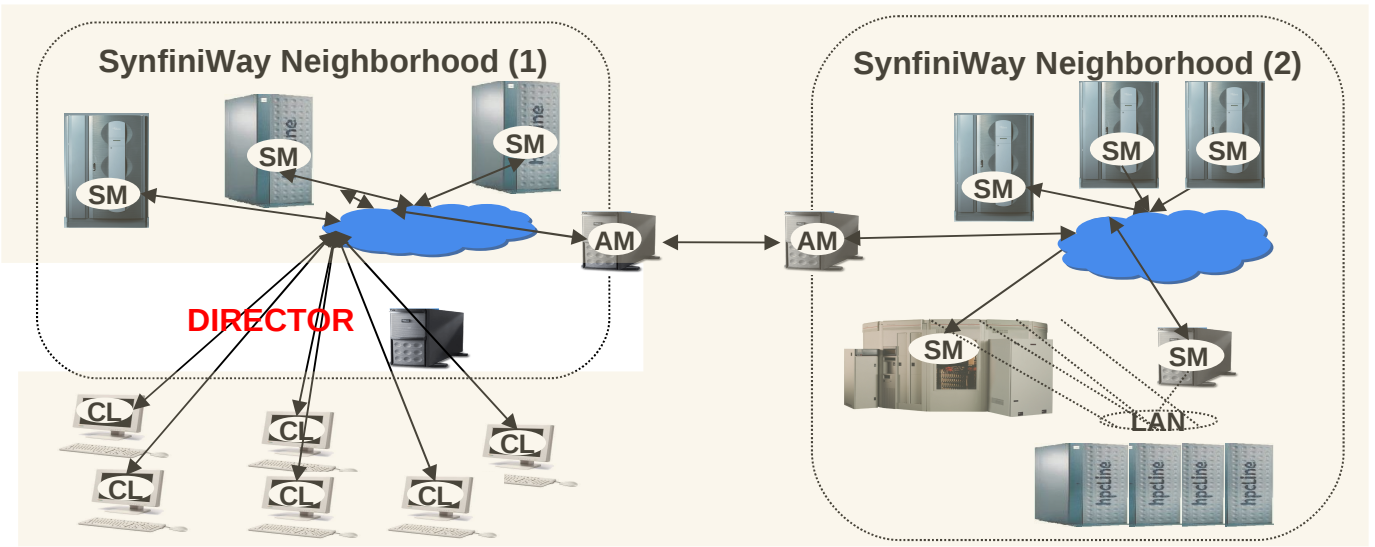
CL: Client

SM: Service Manager

AM: Acquaintance Manager

Acquaintance Manager

- Links multiple neighbourhoods together
- Transparent propagation of service discovery mechanism
- One per neighbourhood
  - handles connection to all other neighbourhoods
  - Can use unencrypted or SSL encrypted links



CL: Client

SM: Service Manager

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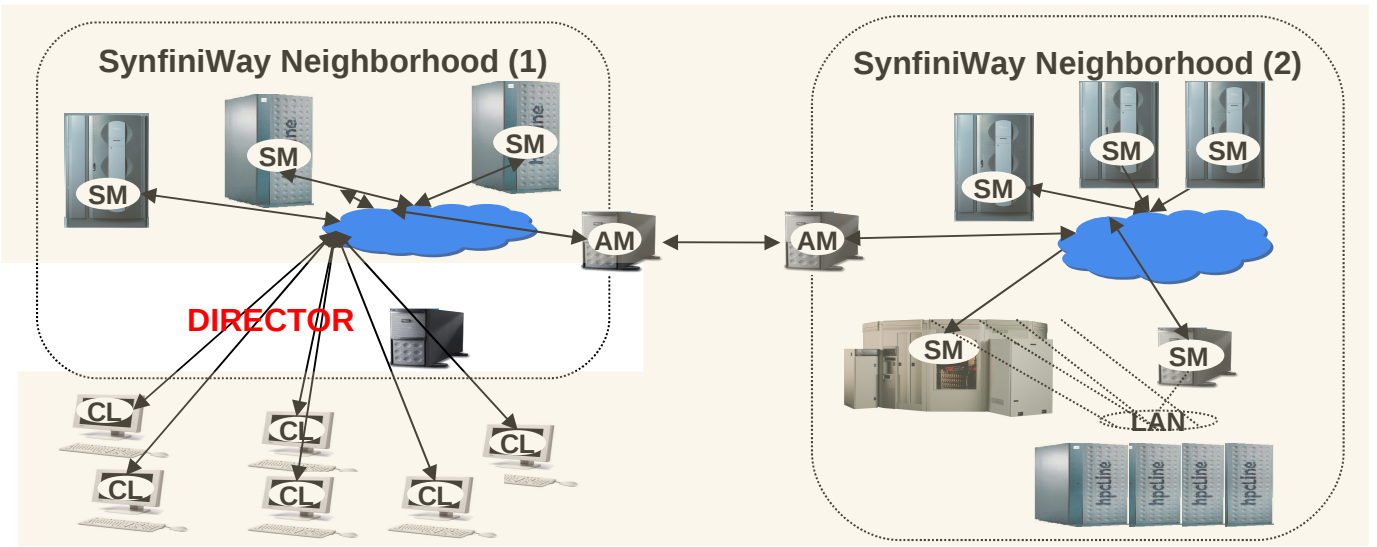
Client interface

- Java Client
  - Runs on the users local system - Windows, Linux, SUN Solaris, IRIX
- Web client
  - Accessed through web browser
- Single sign-on with Graphical interface
  - Connects to a Director
- Interface for creation of workflows (editor)
- Interface to run, monitor, manage workflows (users)
- Access to the user workspace
- Interface to any shared storage areas

CL: Client

SM: Service Manager

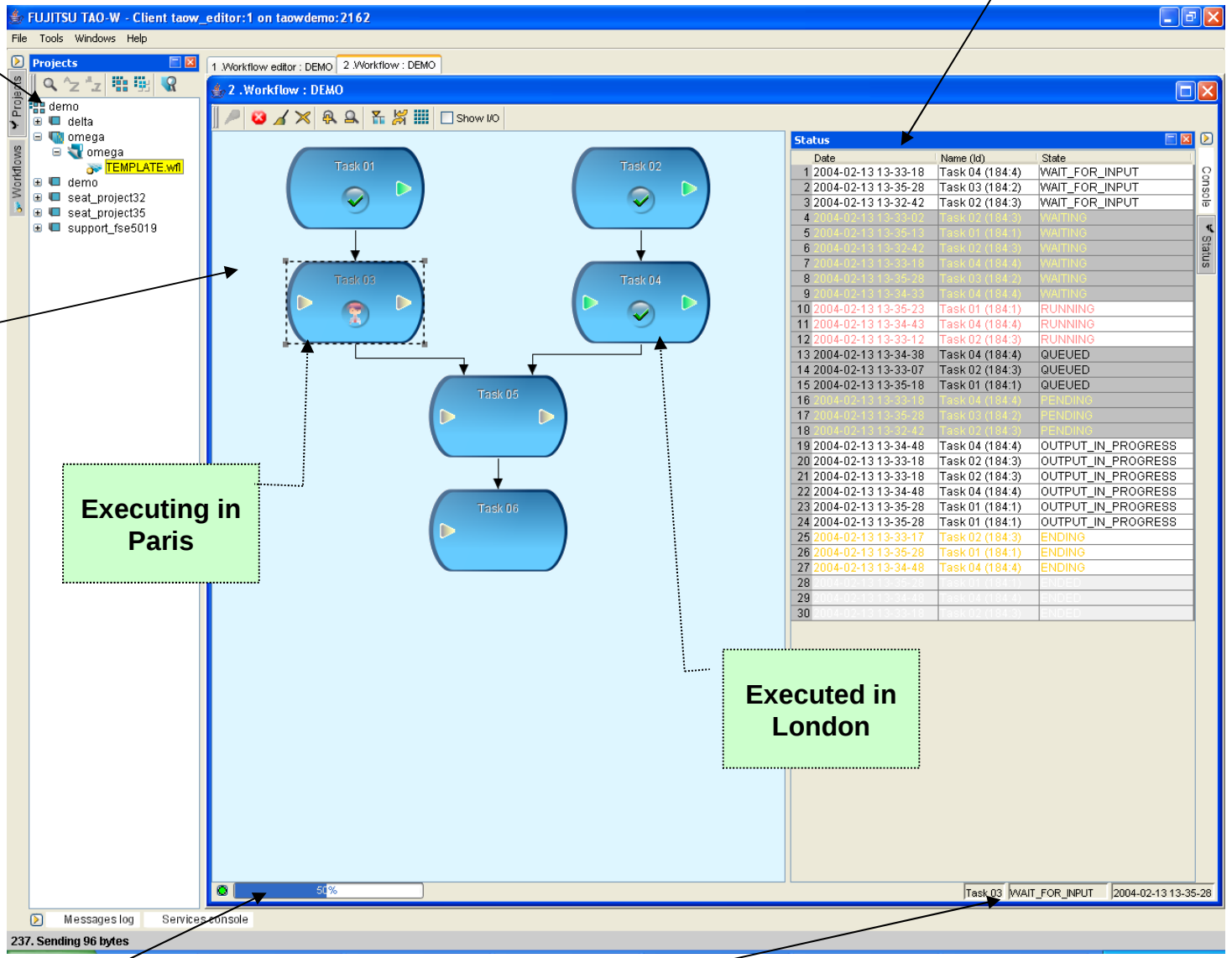


AM: Acquaintance Manager

SynfiniWay desktop

Workflow status

Project list



Graphical workflow display

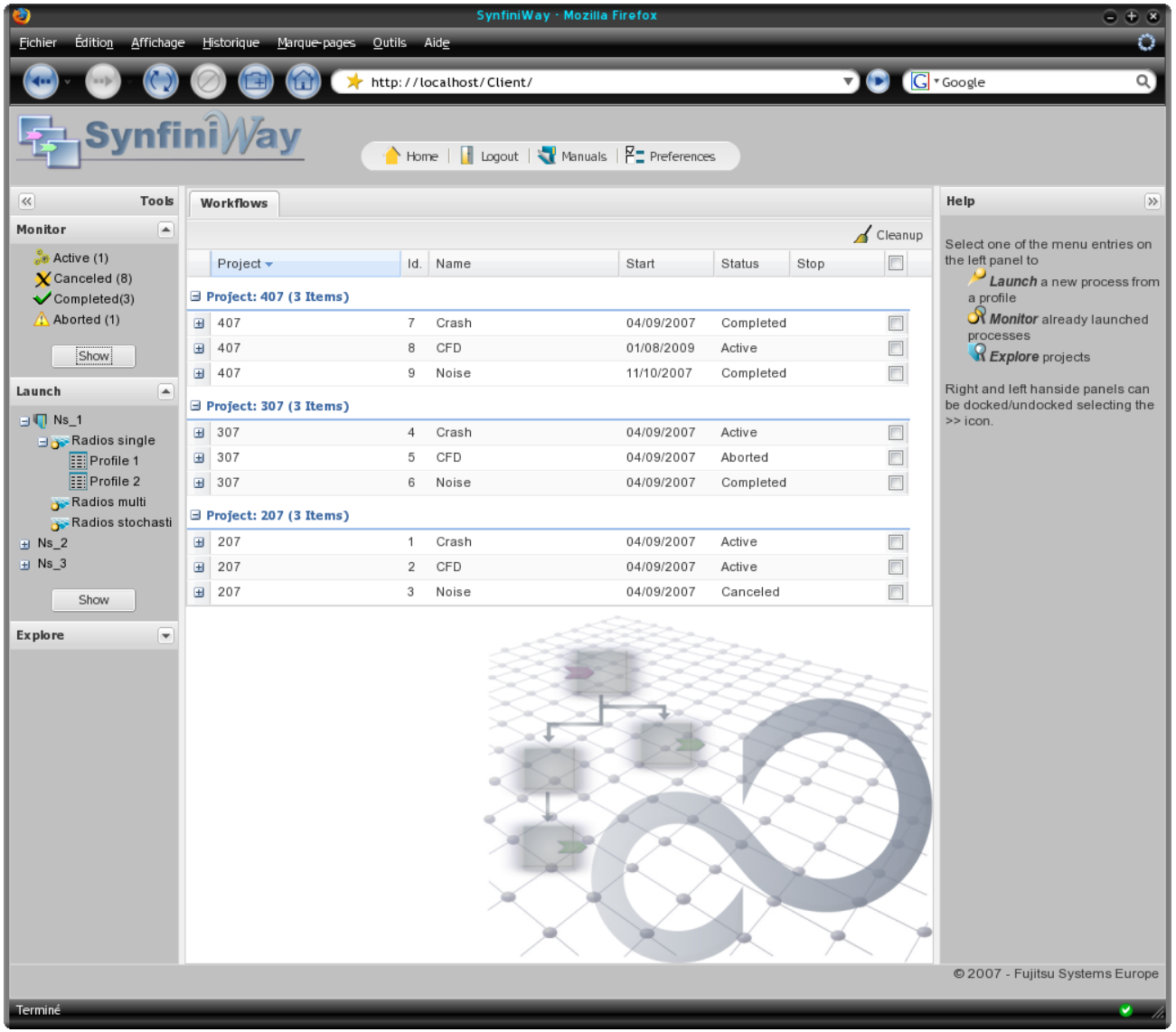
Executing in Paris

Executed in London

Execution status

Task status

WEB Portal



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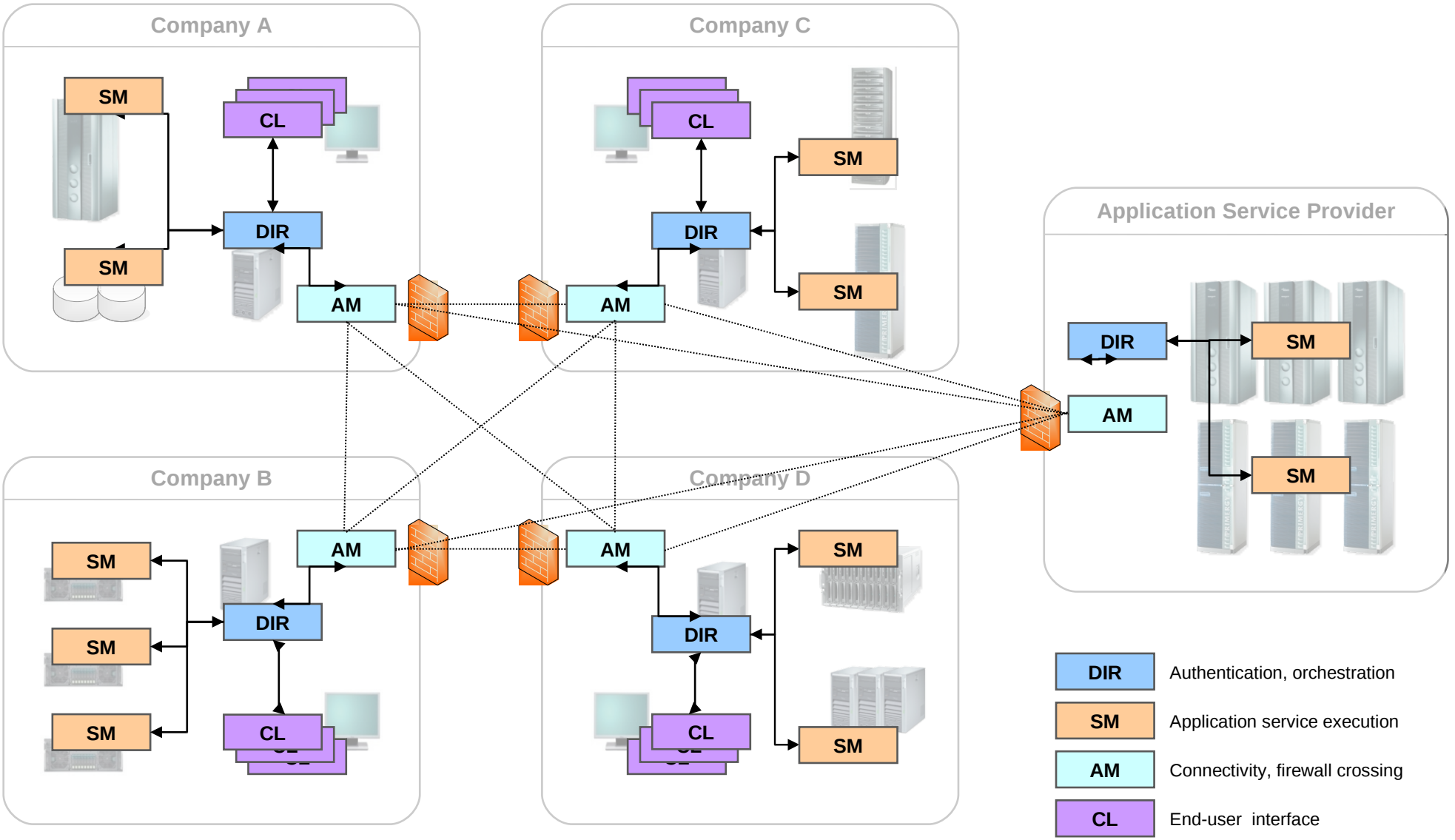
A Real SynfiniWay IT Framework

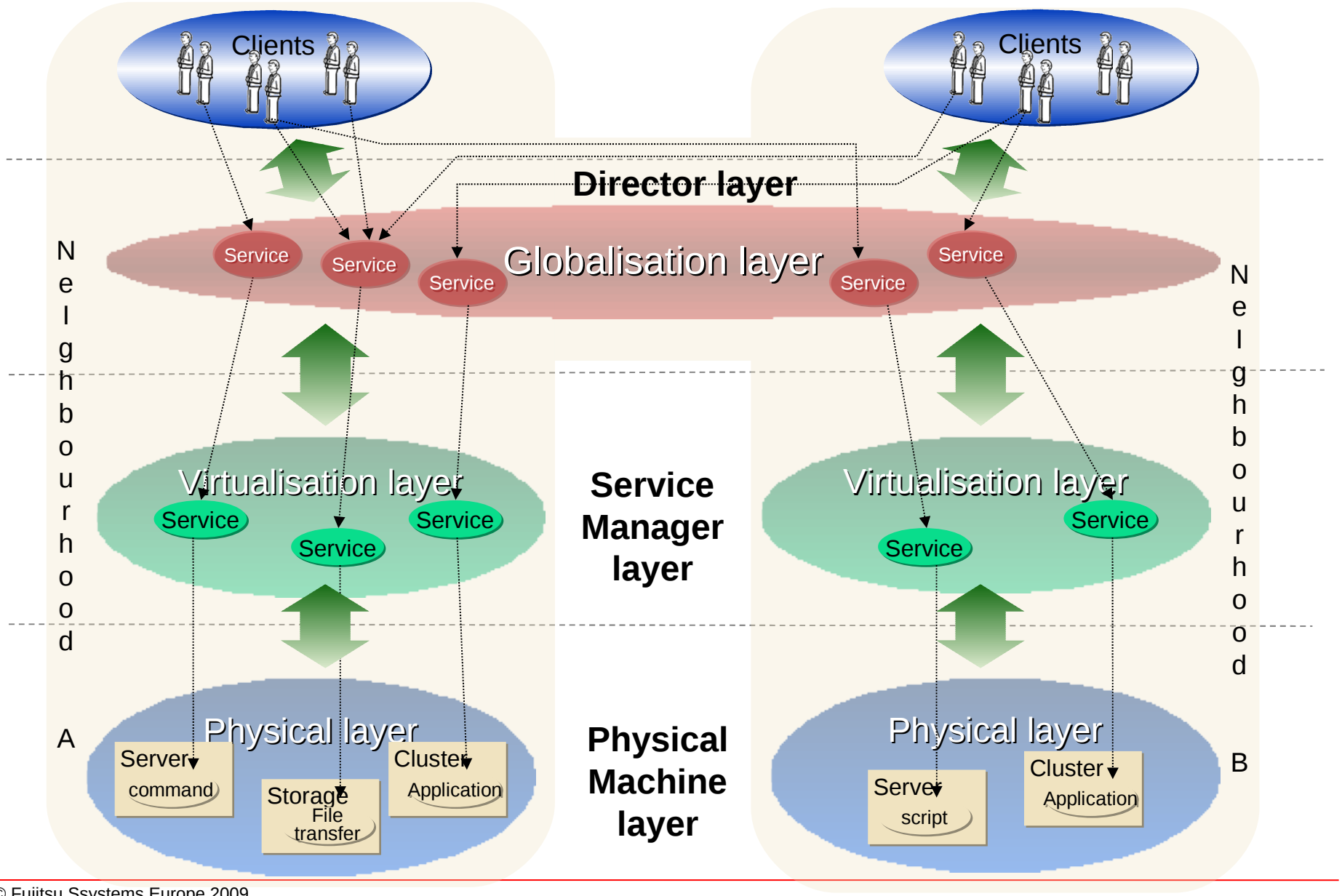
CONCEPTUAL ARCHITECTURE – SOFTWARE AGENT-BASED TECHNOLOGY



Virtualized resources

- Applications
  - Service definitions encapsulate applications
- Hosts where services are provided
  - Independence of location
  - Location is hidden from users
- Data locality
  - Workspace area used by Director
  - Run directory on Service Managers
  - Data directories on Service Managers

Global Virtualisation architecture



Services – What they describe

- Services encapsulate applications
  - It defines an application plus a set of actions that can be applied to it
- Actions describe a unit of work available within the service (this becomes a workflow task)

e.g.

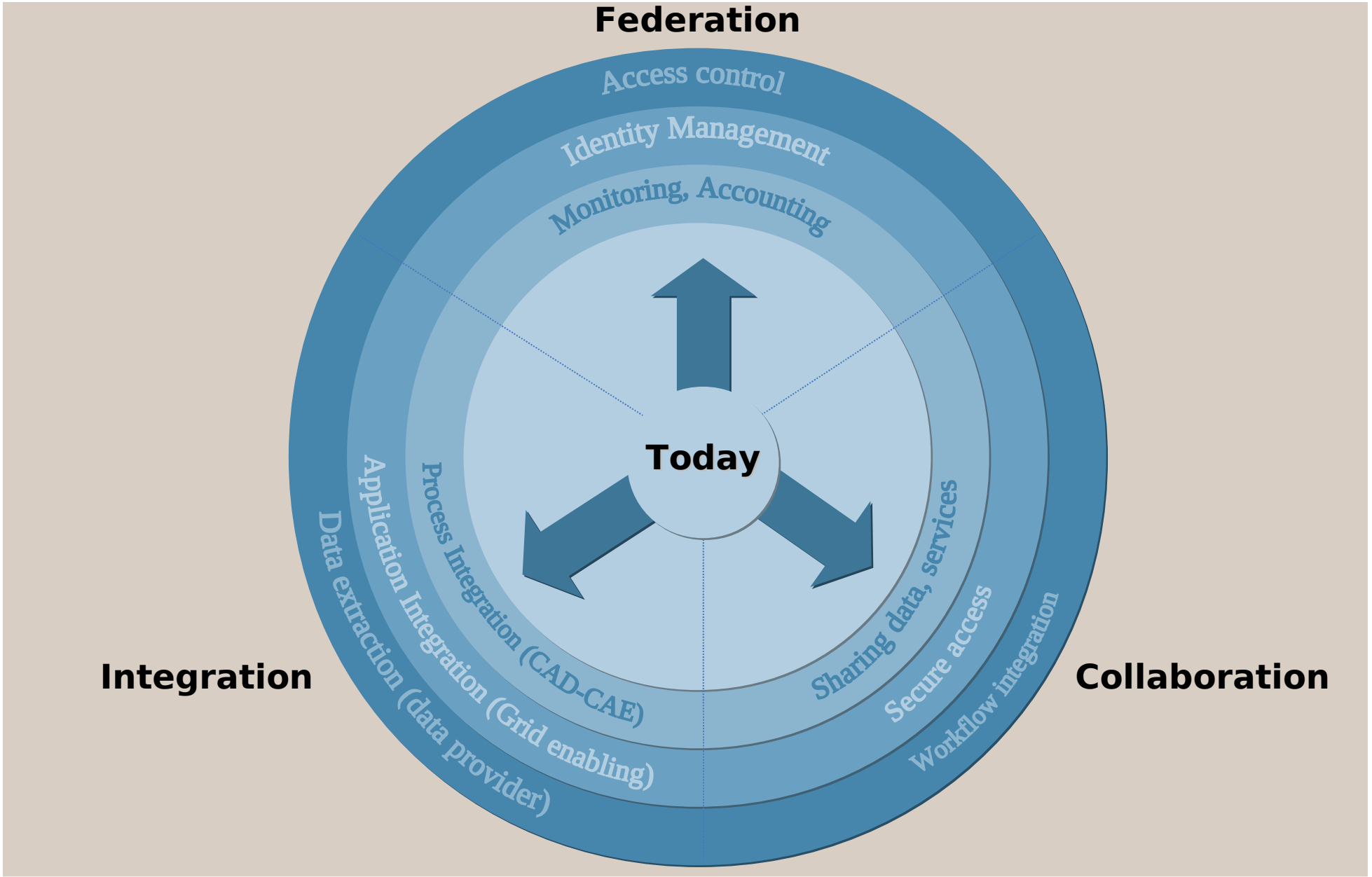
  - The basic action is to “run” an application, but other actions like “get status”, “list files”, “check convergence” can be built as necessary
  - Describes how it can be executed (interactive, batch)
- Includes the User Interface specification for each action
  - Dynamically built in the users client desktop
  - Easily modified when adding/changing actions
  - Allows customisation for application parameters

Services - features

- Service Managers publish services to the SynfiniWay Director
- The SynfiniWay Director enables service usage to authorised users
- Services can be defined on multiple Service Managers
- The same service can be implemented differently for different Service Managers
  - Example
  - One uses LSF another uses PBS – to the user it is the same service
  - Actions available on one Service Manager may not be available on another

Growing SynfiniWay

SynfiniWay enhancement direction



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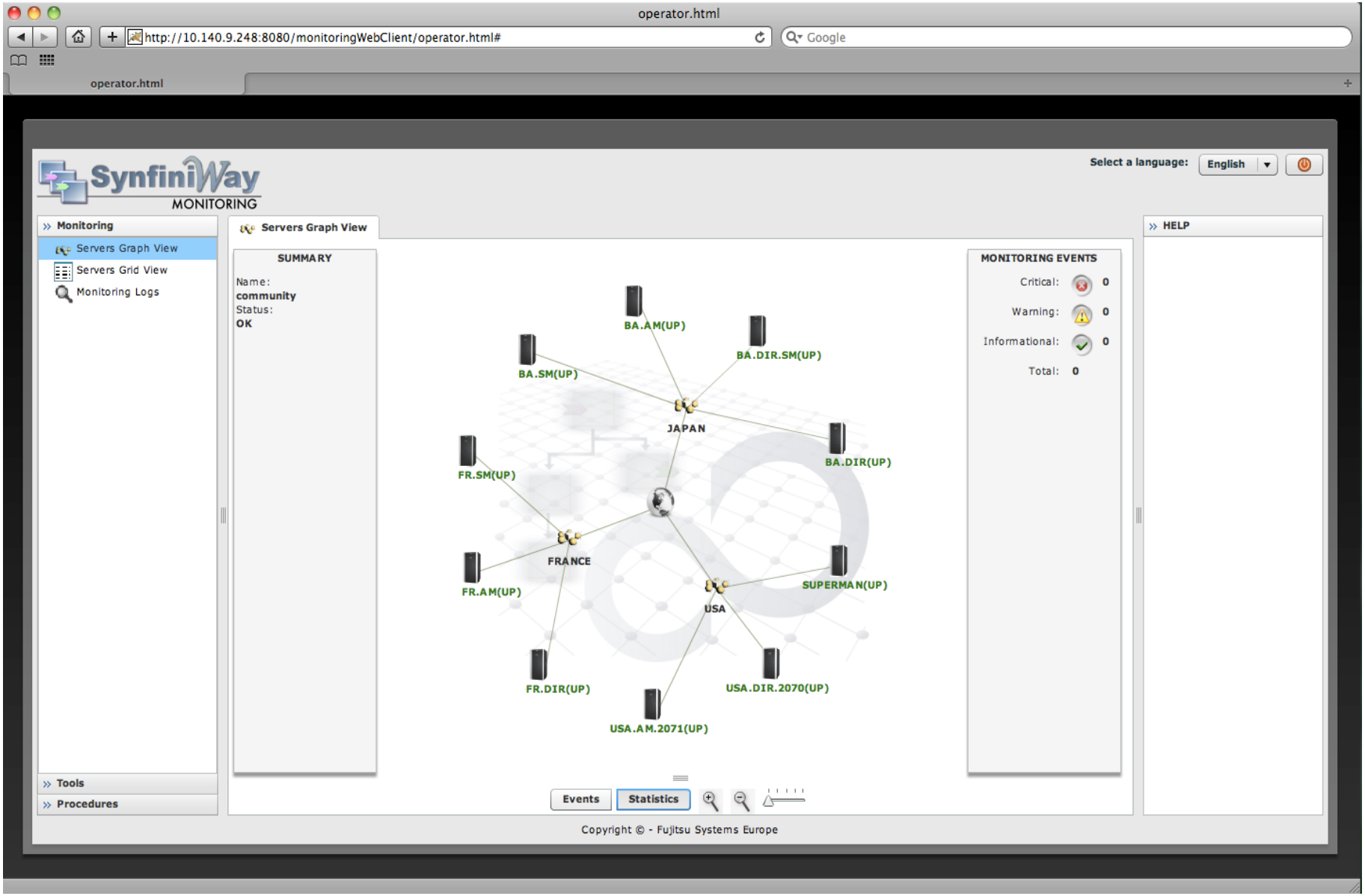
Planned Improvements

- **Workflow**
  - meta-scheduler extension
  - multi-user access to running worklfows
- **User Groups**
  - better identity management
  - notion of roles and group of users with attached access rights
- **Service**
  - service definition simplification
  - service publisher
  - WEB-Service support
- **API**
  - standardized SynfiniWay integration
  - public API to access SynfiniWay
- **Monitoring**
  - distributed monitoring facility
  - global supervision of the GRID with incident diagnostic aid
- **Accounting**
  - events storage / retrieval tools
  - global accounting model, project and cost oriented

Framework Monitoring



Future directions to be considered

- ***Data grid, Data ontology***
  - Enriching external data access capabilities
  - Meta-data management
  - Efficient data transfers
    - Data replication
    - Data cache
    - Data dictionary
  - Data “explorer” browser
- ***Banking and brokering***
  - Budget management
  - Brokering and bidding for services

Is SynfiniWay a Cloud Computing solution ?

- What « cloud computing » means ?
  - The majority of cloud computing infrastructure consists of reliable services delivered through data centers and built on servers with different levels of virtualization technologies
  - The services are accessible from anywhere, with The Cloud appearing as a single point of access for all the computing needs of consumers
  - Commercial offerings need to meet the quality of service requirements of customers and typically offer service level agreement

As a matter of fact, Cloud Computing is SynfiniWay !