Polish Infrastructure
for Supporting Computational Science
in the European Research Space

PL-Grid Operation Model

Enabling Resources Allocation Mechanisms

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Motivation

Best-effort is not enough

- Support various user expectations/requests
- Need of increase manageability of storage data
- Manage heterogeneous resources (special type of nodes including GPGPU)
- PL-Grid: enable one point of contact for users with many providers
- Need to justify international usage
- On international level (mainly in gSLM.eu)
  - increase understanding of resource allocation, SLAs
  - develop from “reliable services” to “reliable services for specific users/VOs”

Ideas from the Theory

***Grid** is a system that*

coordinates resources that are not subject to centralized control...

...using standard, open, general-purpose protocols and interfaces...

...to deliver nontrivial qualities of service.

by Ian Foster ("What is the Grid? A Three Point Checklist", 2002)

***Service** is defined as …*

*..a means of delivering **value** to customers …*

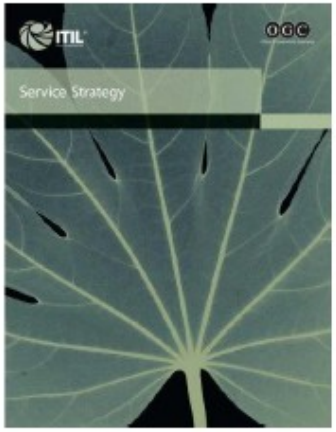
… by supporting them in achieving their goals…

… without the customer being directly responsible for the specific costs and risks associated with the service.

according ITIL, 2007

Value = Utility/resources * Warranty/QoS

ITIL: Bird's Eye View

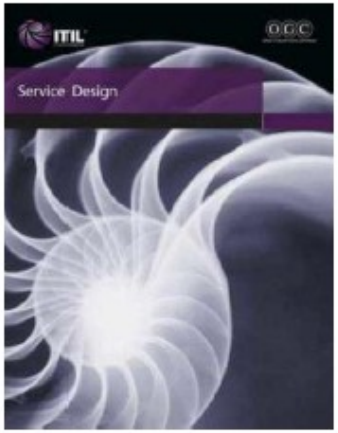


Service Strategy

Financial Management

Service Portfolio Mgmt.

Demand Mgmt.



Service Design

Service Catalogue Mgmt.

Service Level Mgmt.

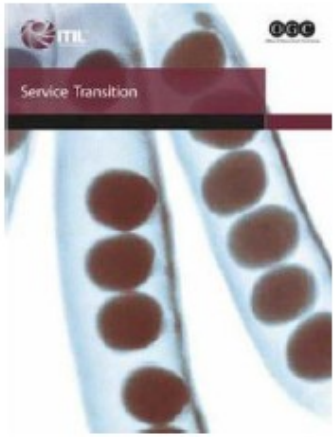
Capacity Mgmt.

Availability Mgmt.

Continuity Mgmt.

Security Mgmt.

Supplier Mgmt.



Service Transition

Change Mgmt.

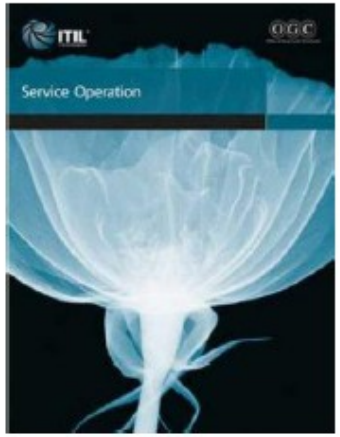
Service Asset and Configuration Mgmt.

Release and Deployment Mgmt.

Service Validation and Testing

Evaluation

Knowledge Mgmt.



Service Operation

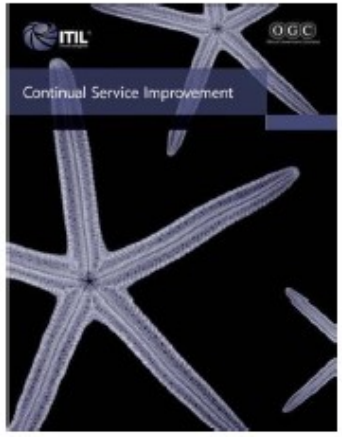
Event Mgmt.

Incident Mgmt.

Request Fulfillment

Problem Mgmt.

Access Mgmt.



Continual Service Improvement

The 7-Step Improvement Process

Service Reporting

Service Measurement

The gSLM project

- Collaboration project 2 Year since September 2010
- Bring together grid and ITSM experts and formulate new approaches to SLM in grid
- Aim: SLM model and roadmap proposal for grid-like e-Infrastructures

Service Delivery and
Service Level Management
in Grid Infrastructures

Find us on the web at www.gslm.eu

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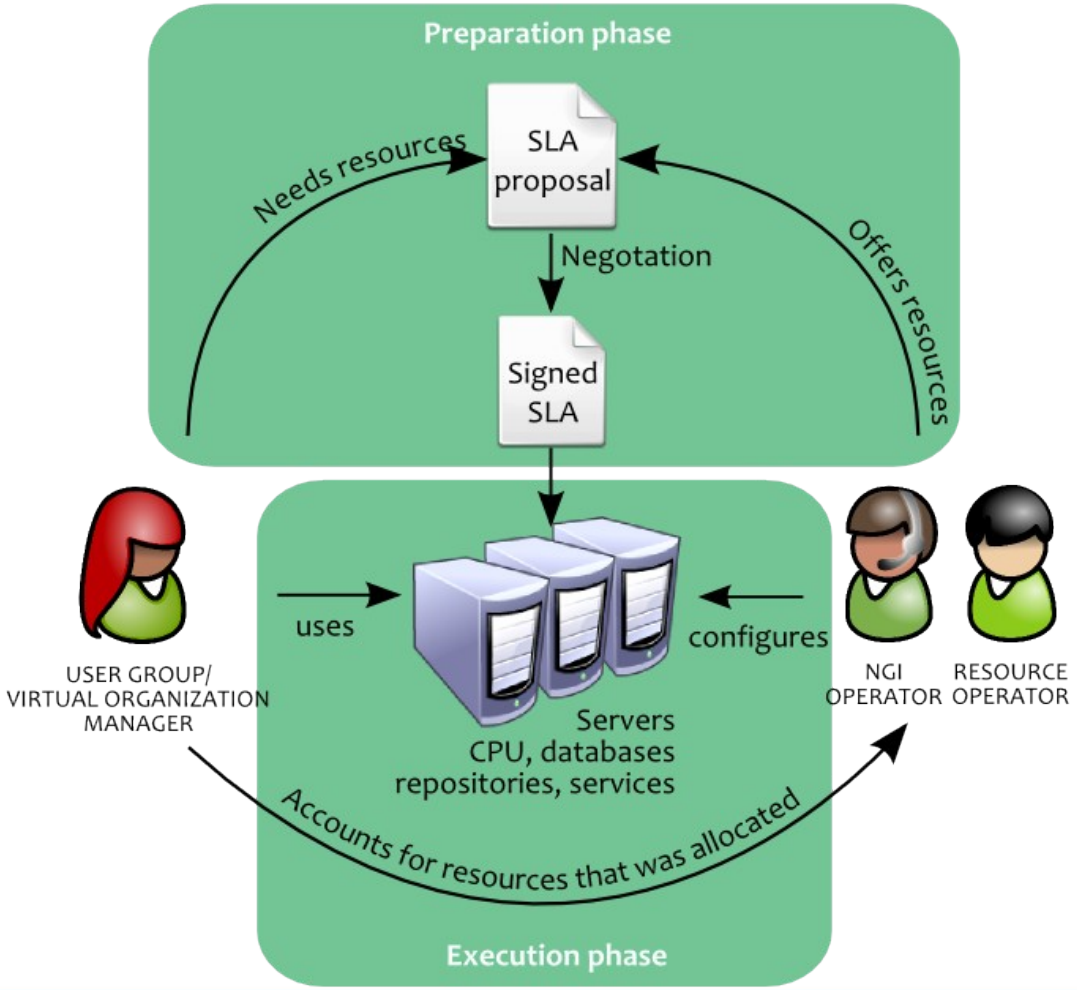
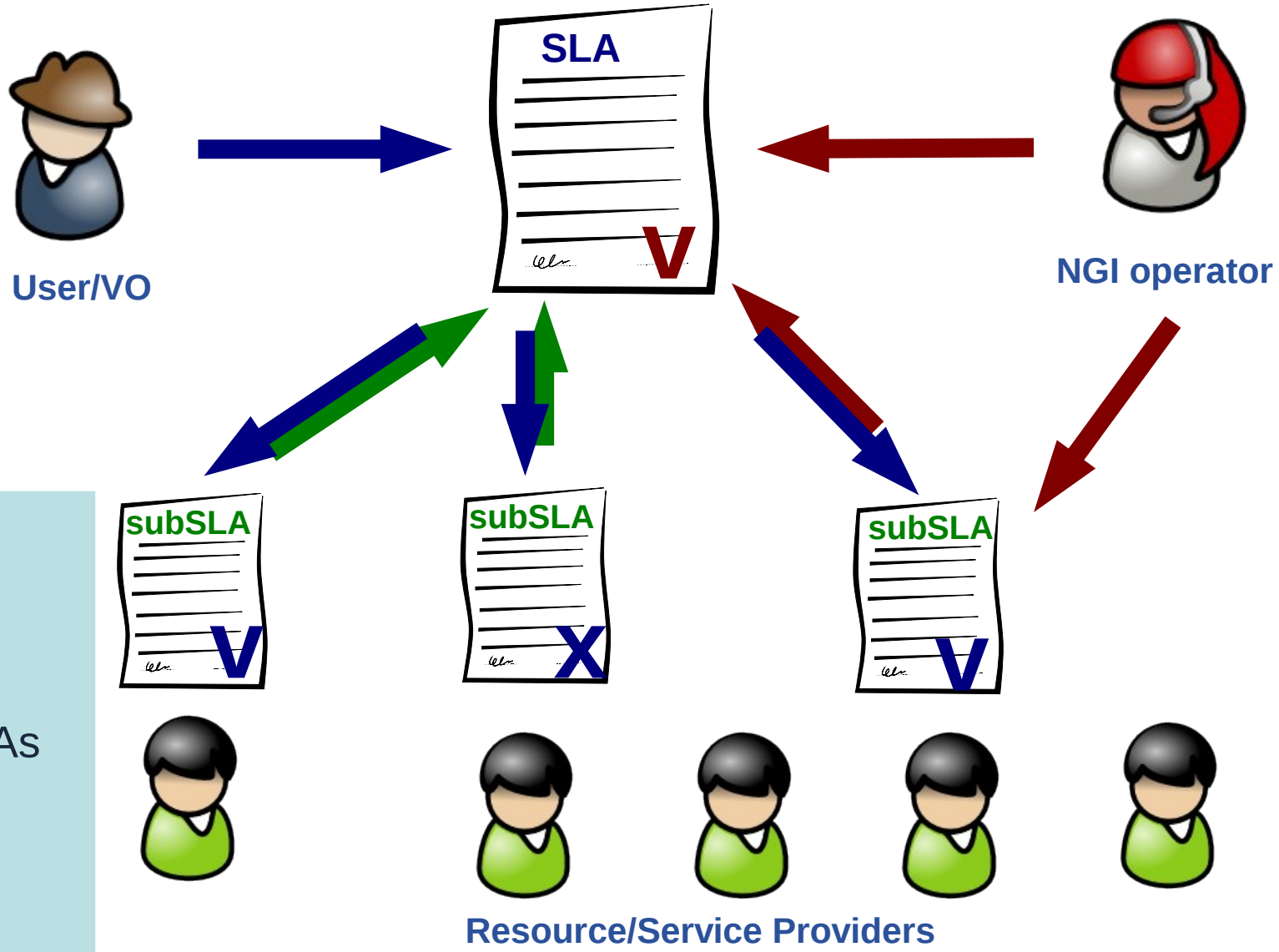
The Main Grid Service

Providing resources to users with required qualities of services



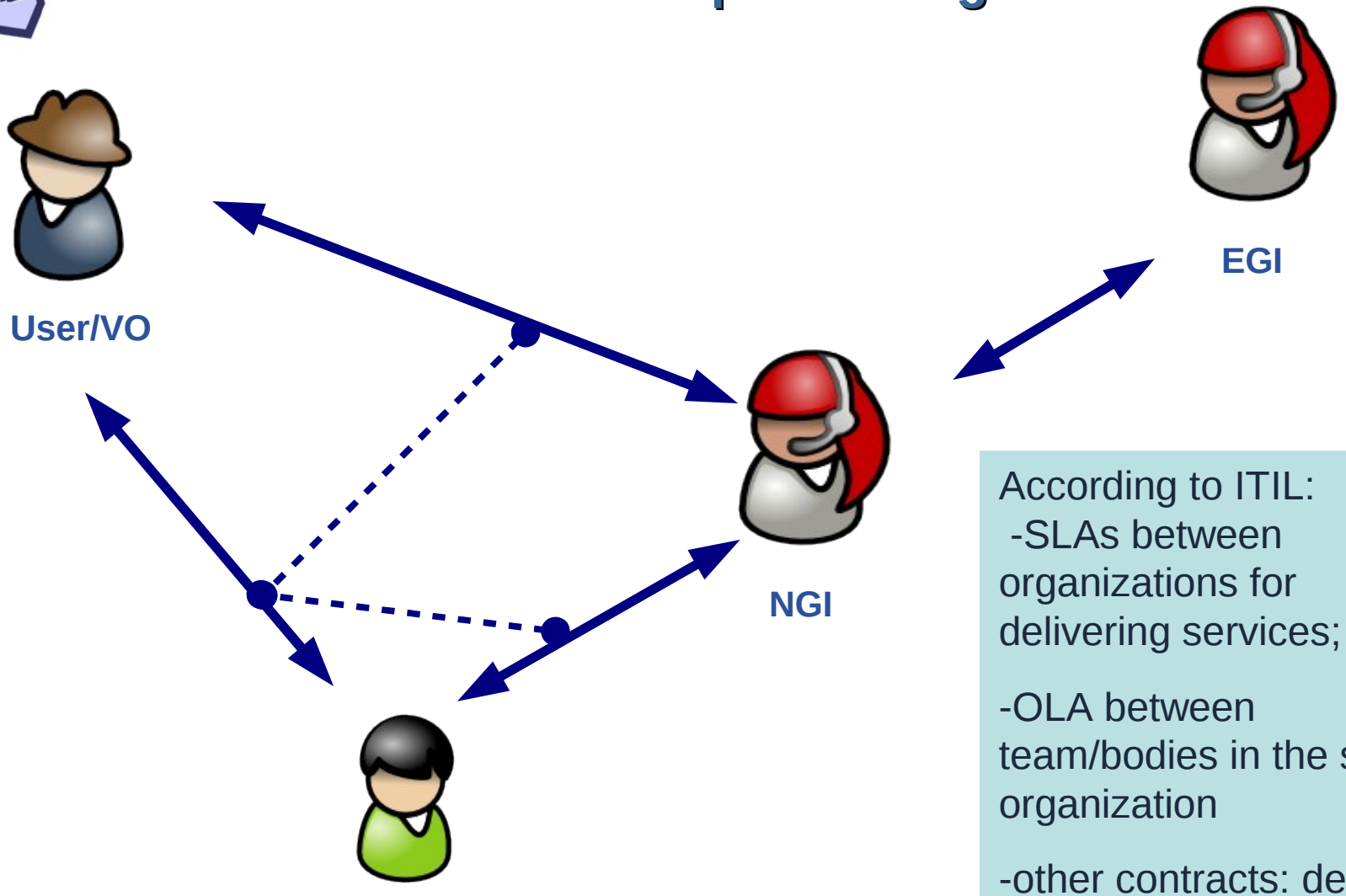
Services are delivered according to SLAs, which can be managed according to ITIL SLM.

Resource Allocation Process in PL-Grid



Problem partially covered by Multi-level SLAs in ITIL

Relations that Require an Agreement



According to ITIL:
-SLAs between organizations for delivering services;

-OLA between team/bodies in the same organization

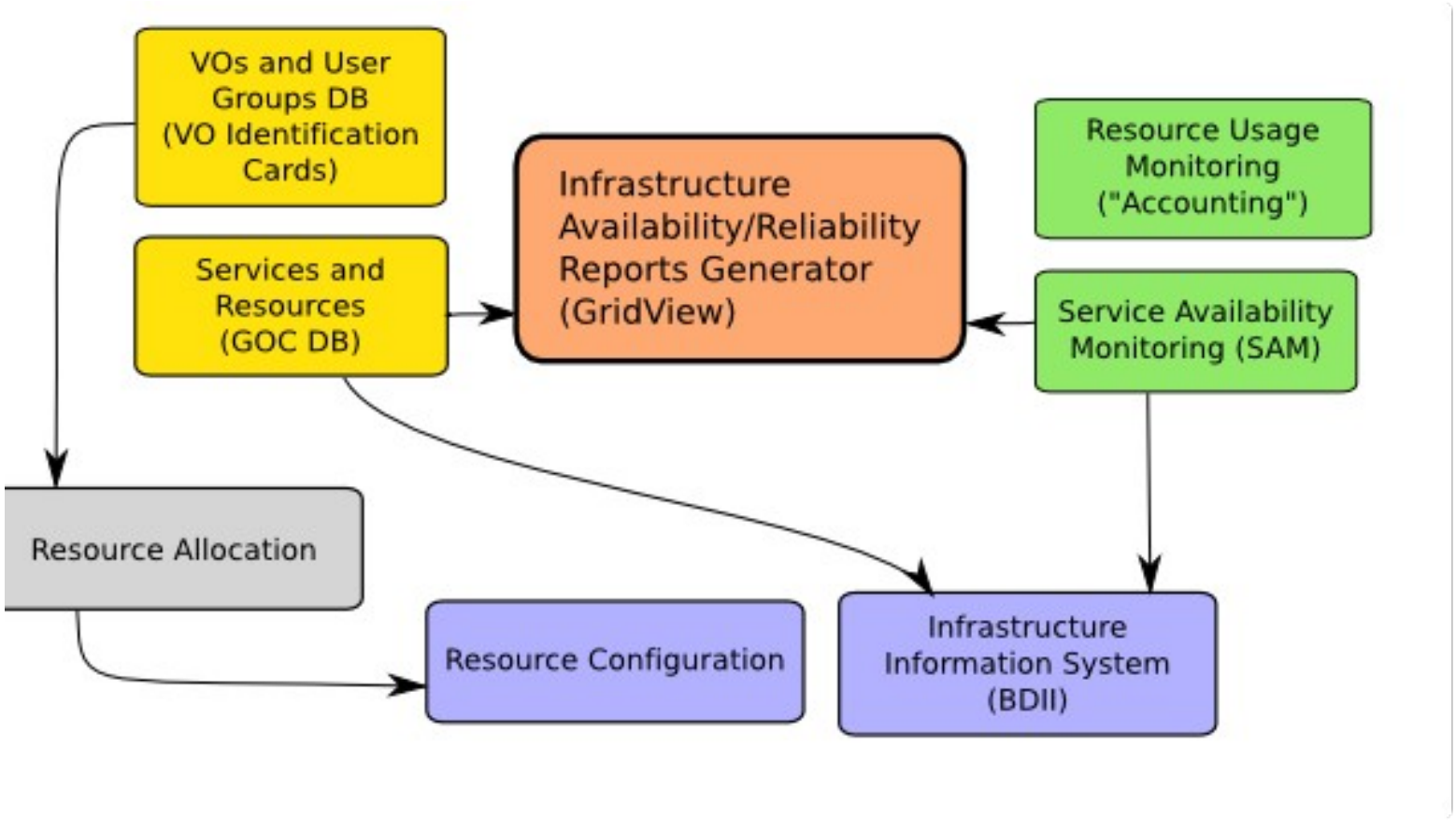
-other contracts: delivering subservices to support SLAs

Complexity

- Many actors
- Many users/VOs
- Remote N-to-N relations
- Several types of services
- Lack of defined set of quality metrics
- Uncertainty with usage characteristics
- Execution services need to be SLA-aware
- ....

ITIL framework was build to give ideas how to deal with complexity in IT management.

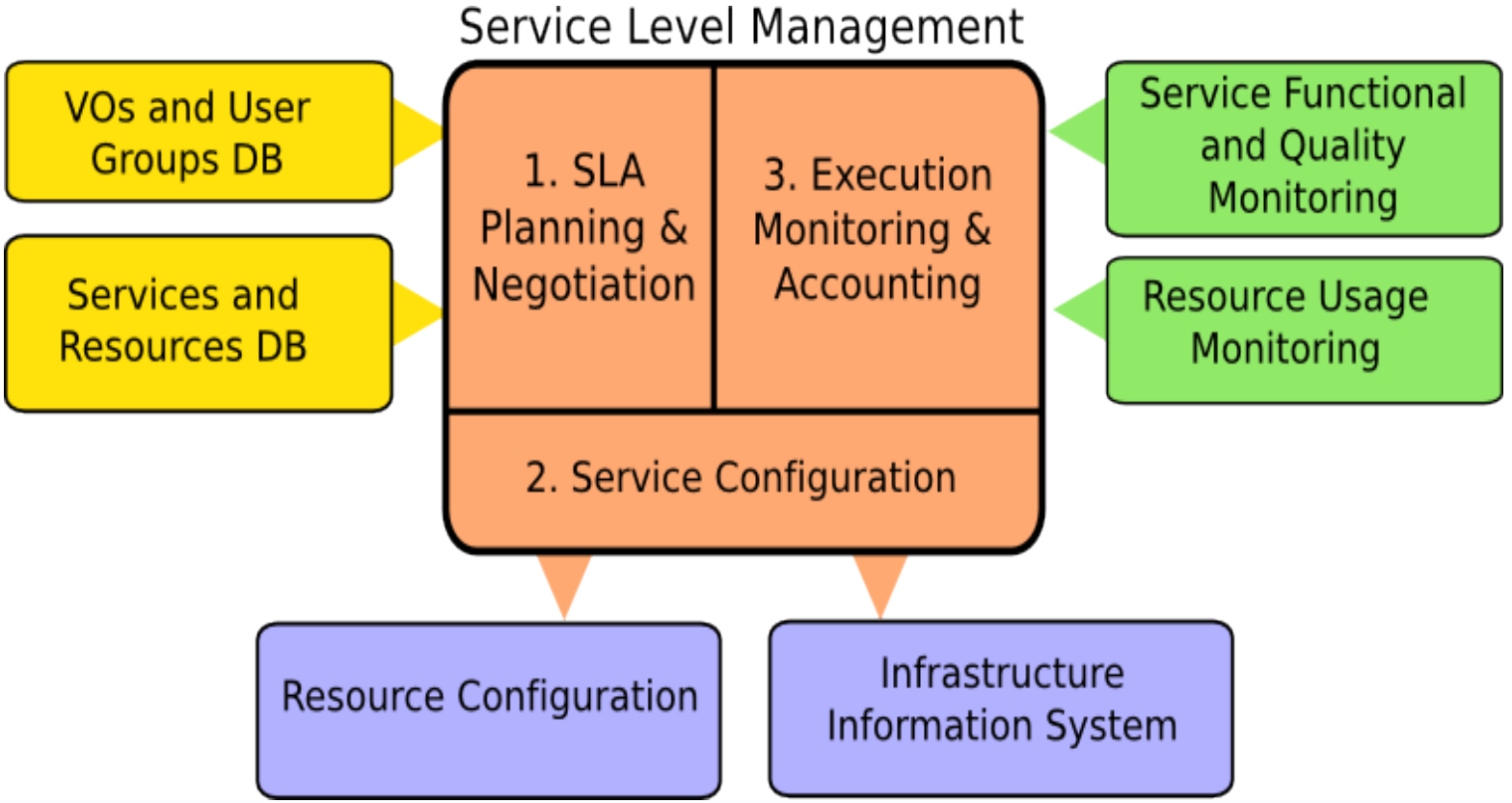
EGEE/EGI Operational Architecture (starting point)



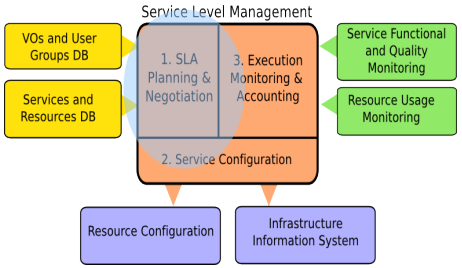
PL-Grid Operational Architecture (in implementation)

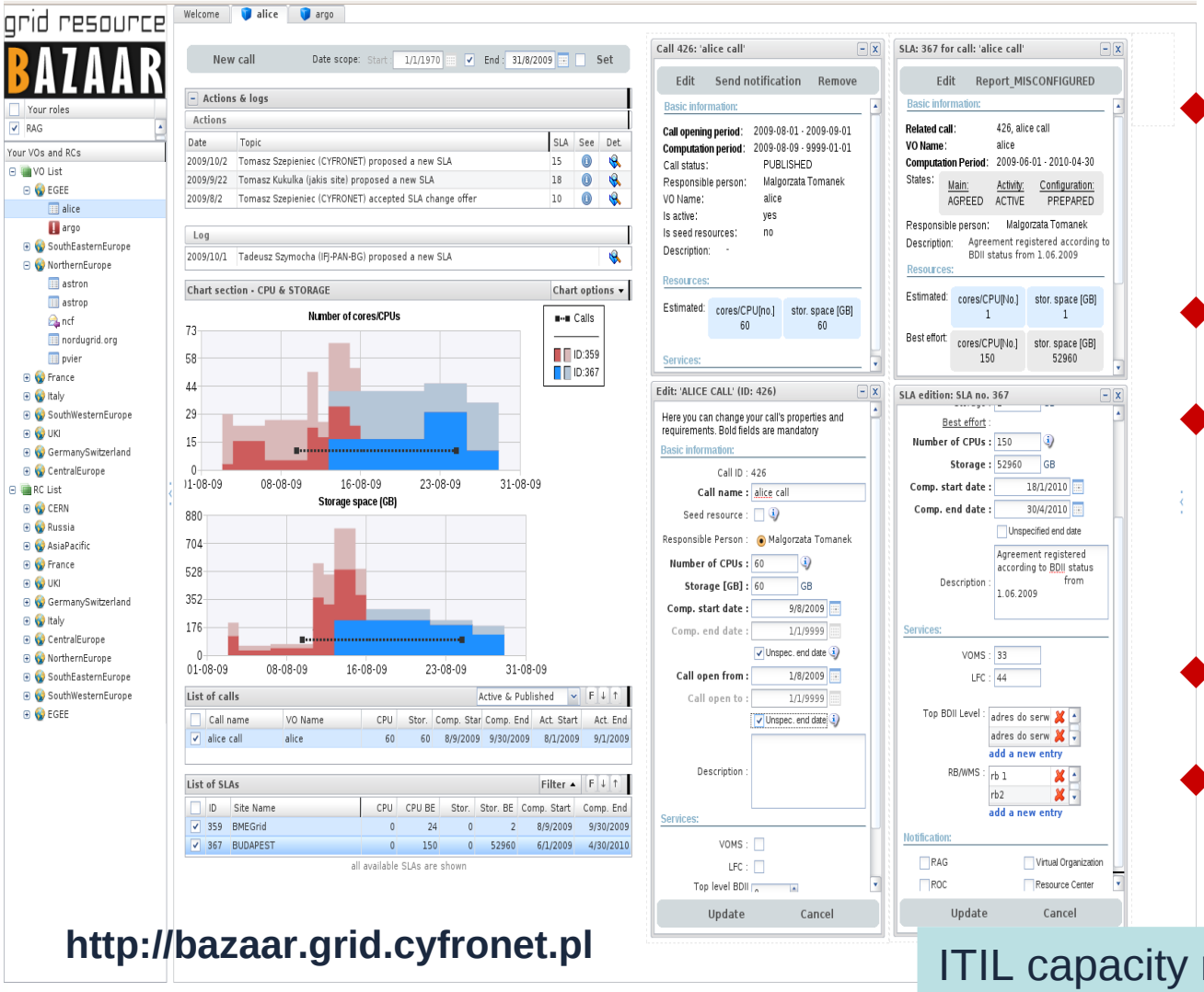
- Goal 1: coordinate and fulfill activities and processes required to provide and manage services for PL-Grid users
- Goal 2: manage the technology required to provide and support these services

Coherent with ITIL definition of “Service Operations”



SLA Planning and Negotiation: Tool



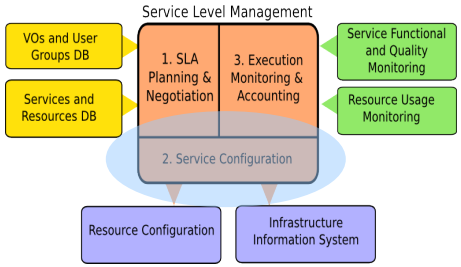


- Resource-related SLAs Dashboard for users, VOs, Resource Providers and NGIs
- Traceable SLA negotiation process
- V1.2 deployed in CIC Portal used for CE ROC and for seed resources operation in EGEEIII
- V2.0 with NGI-role support and new GUI
- Goes into production for PL-Grid from April 2011

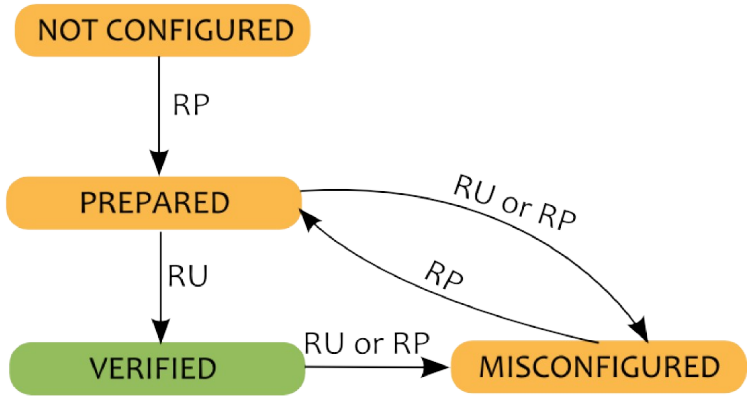
http://bazaar.grid.cyfronet.pl

ITIL capacity management are build inside. Bazaar helps to construct Capacity Plans.

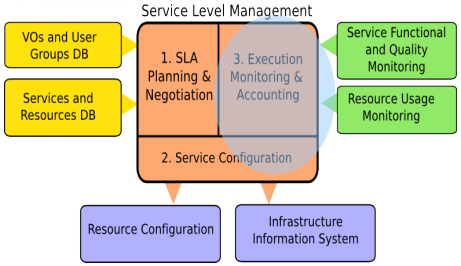
SLA Service Configuration



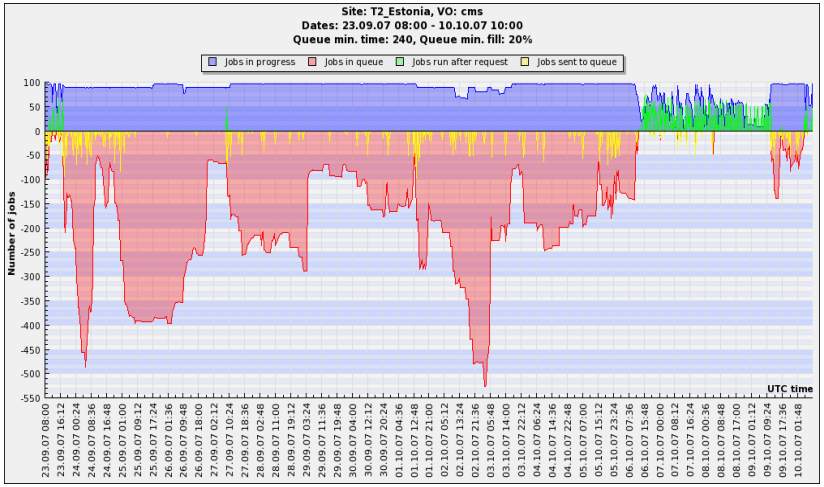
- Resource/Services are configured according to the SLA:
  - Limits
  - Priorities
  - Reservations
  - Quotas
  - Software required
  - ....
- GOLD is deployed for keeping limits for computational resources
- Verification of a site configuration by a VO is required
- Future work: Only sites having an agreed, active SLA with a VO with verified configuration are available in Infrastructure Information System
  - this prevent not-verified resources to be put into 'production'



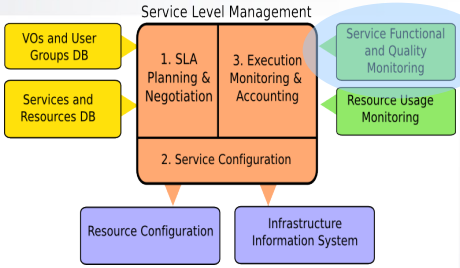
SLA Execution & Accounting



- Infrastructure monitoring results are used to monitor SLA metrics
  - Critical tests
  - Availability/reliability
  - ....
- Accounting data are used to verify SLA metrics:
  - Resource level
  - Failed job ratio
  - Waiting time
  - ....
    - new requirement: **job submission data**
- Option to exclude a site in case SLA violation
- Feedback about sites/VOs can be published



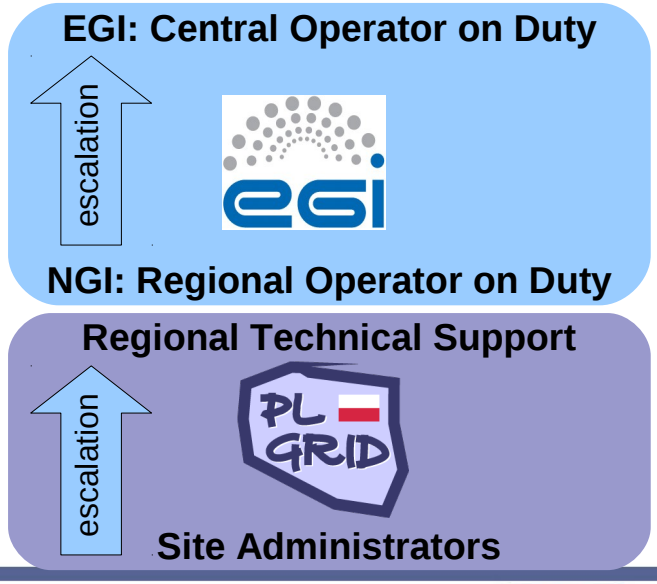
Monitoring Services



- **Definition of monitoring by ITIL**
  - Activity of observing a situation to detect changes that happen over time
  - Ensuring specified conditions are met (or not) and, if not, raise an alert to appropriate group (e.g. availability of key network devices)
- Service **availability** is at the heart of users' satisfaction
- Service availability monitoring coverage in PL-Grid
  - Site grid services (computing/storage gateways, information system, etc.)
  - VO central grid services (VOMS, LFC, central info. system)
    - some missing – WMS
  - PL-Grid scientific software
    - Gaussian, Gamess, Turbomole etc.
  - PL-Grid central services
    - Users portal, user interface, helpdesk system, accounting service – missing
- Generates failure **notifications** which triggers **incident management process**
- Monthly reports provide data for improvement plans
- Future improvements
  - Detect not only failures, but also **potential** failures
  - Not only monitor but also **control** (manipulate service state)

Incident Management in PL-Grid

- **Incident definition by ITIL**
  - Unplanned **interruption** to IT service or reduction of **quality** of IT service – PL-Grid implements first part of the sentence
- **Pro-active, lightweight** troubleshooting procedures in **first 24h**
  - Regional Technical Support notifies the Site Administrators via instant messenger in order to **identify** and **diagnose** – eliminate easily solvable issues
  - If not solved in first 24h – register incident in Helpdesk System – incident is **logged, categorized, prioritized** and processed up to a **solution**
  - If incident unsolvable or unhandled – hierarchic escalation (including EGI level)
- Operational Problems **Knowledge Base**
  - Incident report as source of **useful knowledge**
  - Information to be re-used when same or similar problem occurs
  - Knowledge base link: https://weblog.plgrid.pl/category/1st-line-support/
  - Requires investment, but the more entries, the more it pays off



PL-Grid Helpdesk/Service Desk

- **Service Desk definition by ITIL**
  - Functional unit responsible for dealing with a variety of service events, often made via phone call, web interface, or automatically reported infrastructure events
- **PL-Grid Helpdesk** allows reporting issues, problems and service requests
  - Access via phone call, e-mail or web interface for PL-Grid users and staff
  - Each report/ticket receives unique **identifier** for further reference
  - Hierarchical escalation
    - to Operations Centre manager and operations meeting (long standing items)
    - to EGI – unsolvable locally, through interface with Global Grid User Support
  - Functional escalation - to other support units by reassigning the ticket
- Functions
  - Triage (categorization, priority, assign to a support unit)
  - 1st line support – solve trivial, and covered by Knowledge Base, build FAQ & KB
  - 2nd line support – experts, respond to cases not recorded yet in KB
  - 3rd line support – developers, fixes requiring development, significant changes
- Helpdesk Metrics allow to **evaluate system performance**
  - quantitative (no. of items), teams **response time**

Conclusions

- To keep users satisfaction with grid technology we need to delivered them *value (resources with non-trivial qualities of service)*
- ITIL (set of good practices work out in IT) helps dealing with complexity
- There is an initial momentum: gSLM, SLA4D-Grid, OLA Task Force in EGI-InSPIRE, interest from NGI-France
- PL-Grid Initiative (Polish NGI) develops SLA-aware operations model and tools that support this model
- Collaboration in needed to converge into a compatible model