

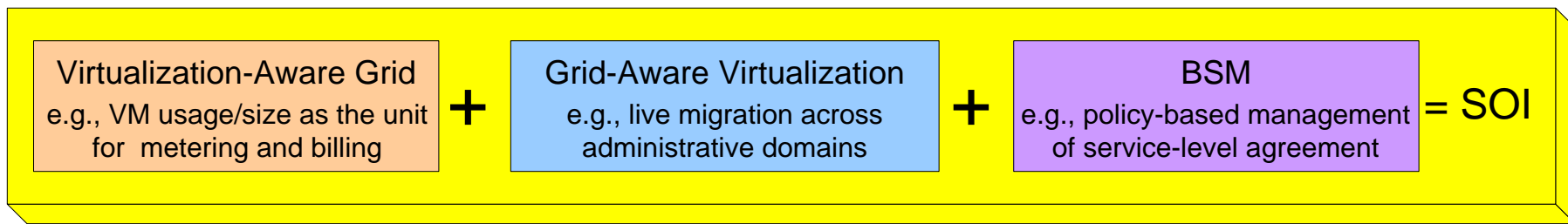
Cloud Computing and RESERVOIR project Resources and Services Virtualization without Barriers

RESERVOIR team

The research leading to these results has been partially funded by the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 215605.

The RESERVOIR Vision

- Goal:
Create the next generation SOI (Service Oriented Infrastructure) for the reliable and effective delivery of IT services as utilities
- Approach
 - Focus on technologies that enable to build cooperating computing clouds
 - Integration of virtualization technologies with grid computing driven by new techniques for business service management □ The Service Oriented Infrastructure (SOI) equation:



Example – Service Definition

Web site service

1. The user uses client tools to generate the service definition.

Includes:

- Tier definition (web servers, application servers, databases)
- Required Virtual Execution Environments (VEEs)
- Software
- Images
- Storage
- Network
- Required configuration
- Inter-tier relations
- [Required QoS](#).

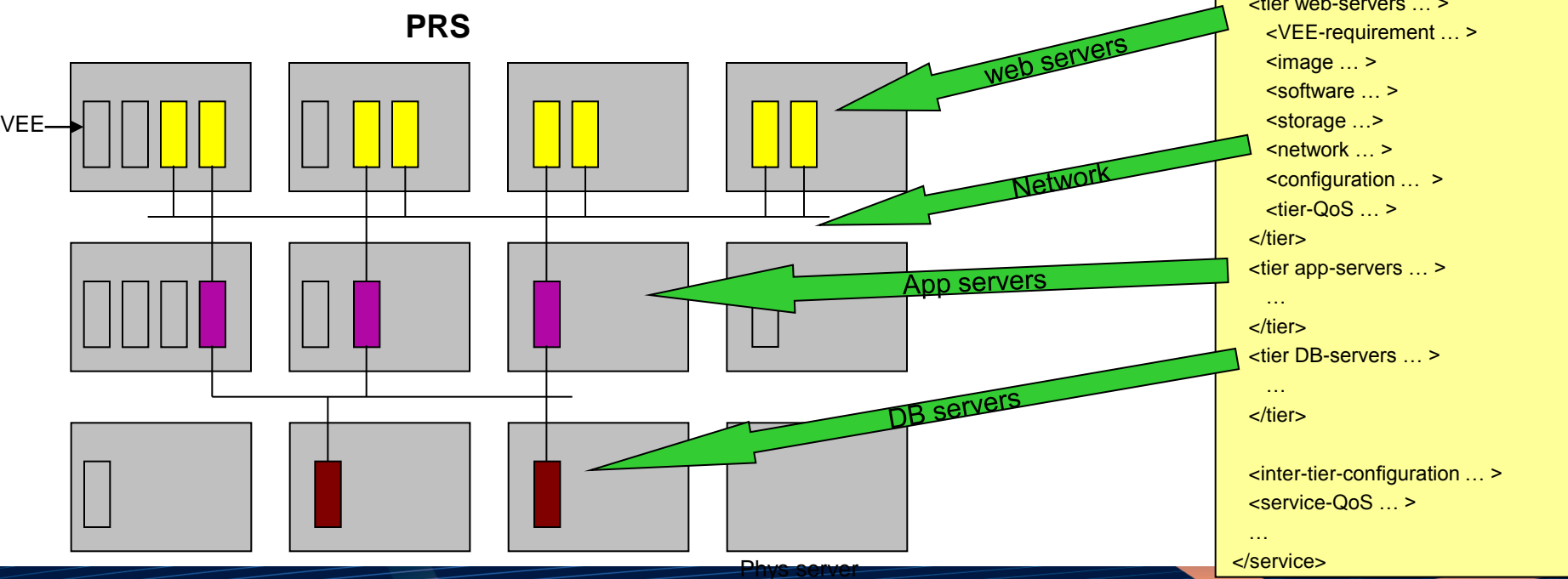


```
<service ... >
  <tier web-servers ... >
    <VEE-requirement ... >
    <image ... >
    <software ... >
    <storage ...>
    <network ... >
    <configuration ... >
    <tier-QoS ... >
  </tier>
  <tier app-servers ... >
    ...
  </tier>
  <tier DB-servers ... >
    ...
  </tier>

  <inter-tier-configuration ... >
  <service-QoS ... >
  ...
</service>
```

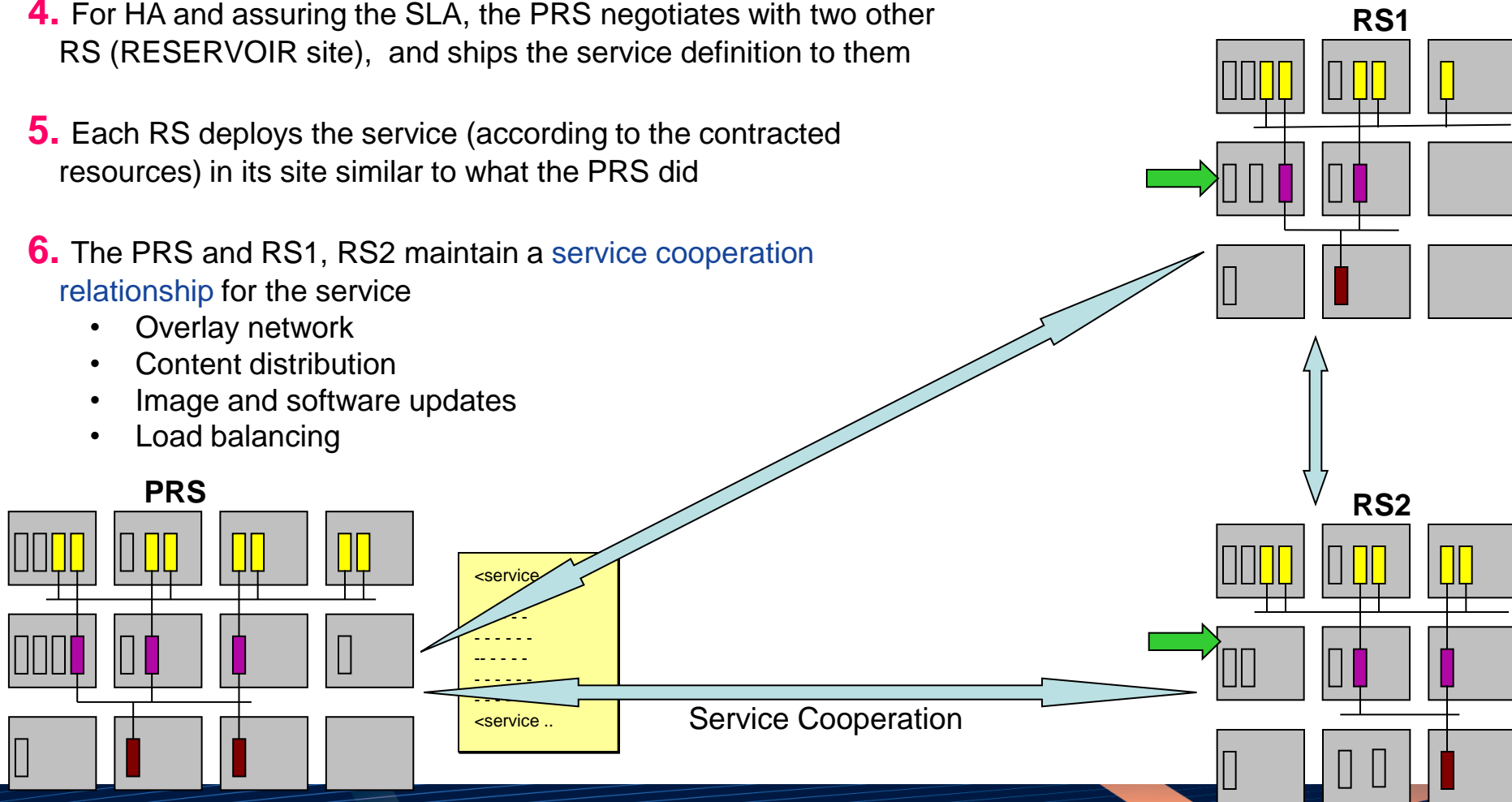
Service Deployment

2. The user negotiates and ships the service definition to a primary RESERVOIR site (PRS)
3. The PRS automatically deploys the complex service on its own site:
 - Configure required storage & network, creates VEEs selecting proper physical resources to meet QoS
 - Install required images, software according the service definition
 - Apply the required configuration
 - Setup the monitoring and billing



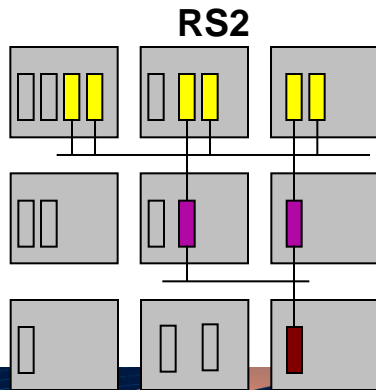
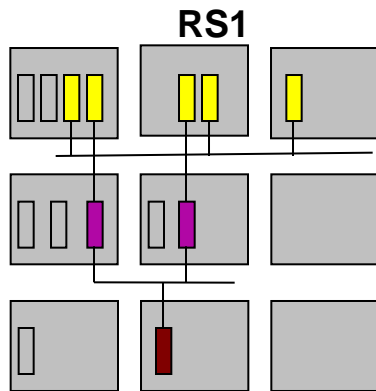
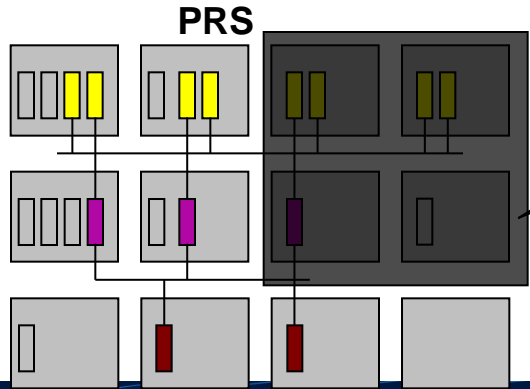
Service Cooperation

4. For HA and assuring the SLA, the PRS negotiates with two other RS (RESERVOIR site), and ships the service definition to them
5. Each RS deploys the service (according to the contracted resources) in its site similar to what the PRS did
6. The PRS and RS1, RS2 maintain a **service cooperation relationship** for the service
 - Overlay network
 - Content distribution
 - Image and software updates
 - Load balancing



HA with Live VM Migration

- 7. PRS site suffers electricity problems and needs to power off physical servers.
- 8. PRS negotiates for additional resources at RS1 employing the RS-RS protocol
- 9. PRS *evacuates* the VEEs on the servers to be powered off, migrating them to RS1
 - Live migration to maintain application servers' states and client connections



Current Status and Issues

- Current status
 - Live migration of Enterprise App (SAP) over sub-networks (Demo at CeBIT 2009)
 - See the demonstration on 10/06/2009
- Focus for year 2
 - Federation
 - Migration
 - Security at different levels of the RESERVOIR architecture

THANK YOU