

European Grid Infrastructure

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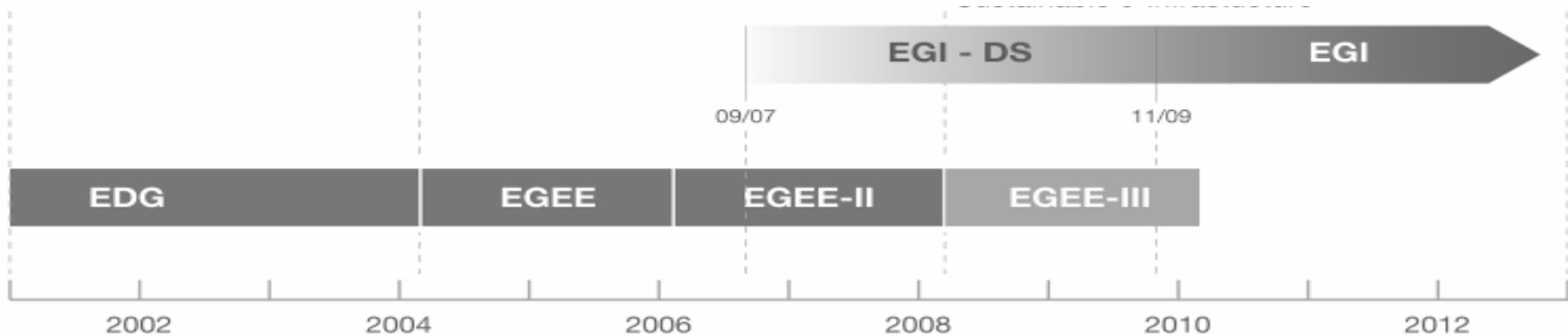
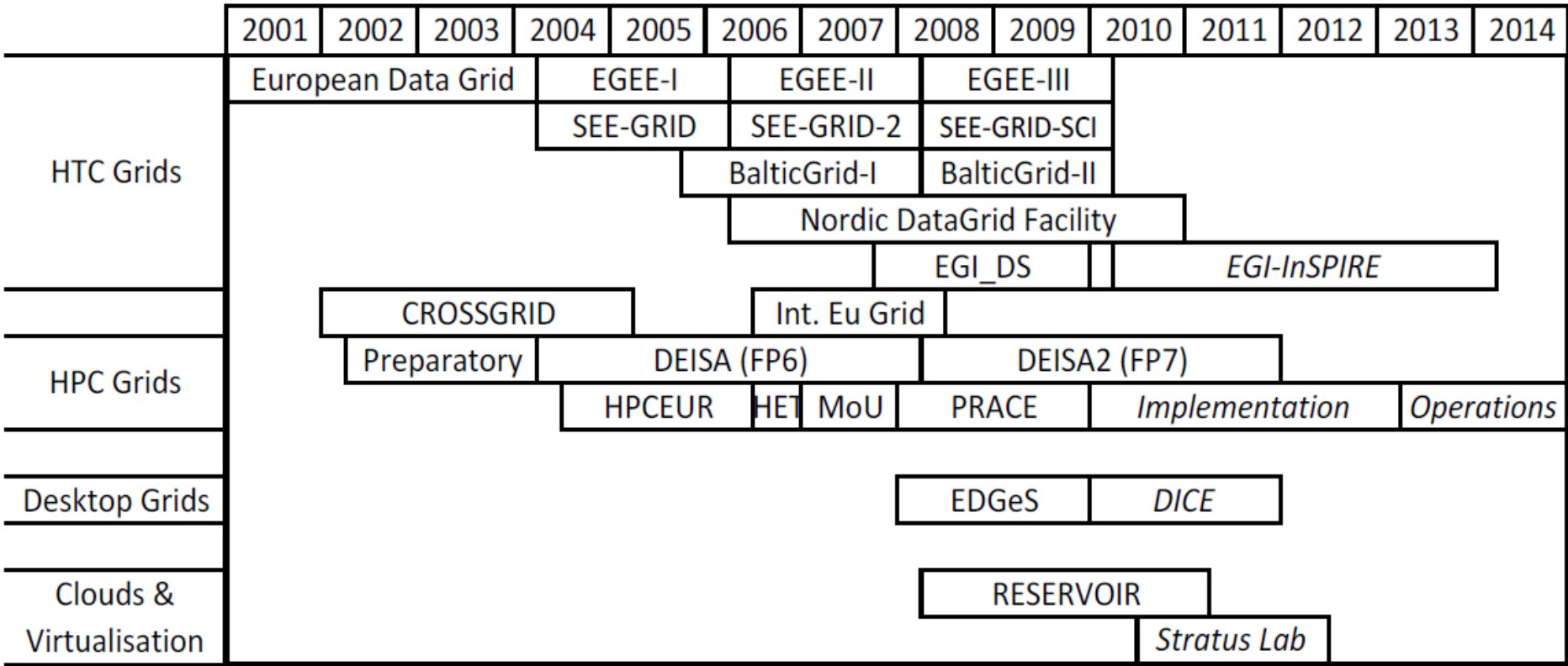
Technical Director, EGEE-III

Infrastructure (Wikipedia)

- Infrastructure is the *basic physical and organisational structures needed for the operation of a society or enterprise*, or the services and facilities necessary for an economy to function.
- Technical structures for us are:
 - Hardware: Compute, Storage, Instruments, Sensors, ...
 - Software: Authentication, Authorisation, Accounting, ...

The Enterprise is the research community

European Grid Infrastructure



what does it mean?

- **An opportunity!**
 - Draw a line under the experimentation in EDG & EGEE
 - Scope activities and structures so they are sustainable
- **A challenge!**
 - Evolve infrastructure as the technology changes
 - **Integrate desktop and HPC resources**
 - **Provide a roadmap for increased virtualisation**
 - Increasing diversity of application models and resources
 - **Data Intensive Science is getting ever more intensive**
 - **Flexibility to run different middlewares on demand**
- **A business model!**
 - Add value where you can in providing a generic infrastructure
 - Provide an open extensible infrastructure for all

What will EGI initially focus on?

- Continue to provide a secure reliable generic infrastructure
 - Integrate resources based on gLite, UNICORE, ARC, Globus, ...
 - Leverage new technologies to provide more flexibility to users
- Support the user communities using the infrastructure
 - Engage with structured user communities
 - Engage with ESFRI projects to support their requirements
- Improve the efficiency of the infrastructure
 - The number of jobs, users & data continue to increase
 - Utilisation and effectiveness of the resources needs to match

Make middleware selection and operation a domain specific decision

EGI means Innovation

- **Deploy Technology Innovation**
 - Distributed Computing continues to evolve
 - **Grids → Desktops → Virtualisation → Clouds →?**
- **Enable Software Innovation**
 - Provide reliable persistent technology platform
 - **Community tools built on the deployed technology**
- **Support Research Innovation**
 - Infrastructure for data intensive science
 - **Support for international research (e.g. ESFRI)**

Technology Innovation

- Will come from outside EGI
 - Moving research technologies into production
- Partnership with technology projects
 - EMI (European Middleware Infrastructure)
 - IGE (Initiative for Globus in Europe)
 - EDGI (European Desktop Grid Initiative)
 - StratusLab
 - VenusC

Software Innovation

- Will also come from outside EGI
 - EGI is a neutral platform for applications
- EGI cannot support all services in its core
 - Every community needs something different
- Foster innovation within different ‘sectors’
 - High Throughput Computing
 - gLite, ARC,
 - High Performance Computing
 - UNICORE, ...
 - Digital Libraries
 - gCube from D4Science



Research Innovation

- An infrastructure to support European Researchers
 - Within the EU27
 - Geographical Europe
 - Interoperability worldwide for collaboration
- Work with Virtual Research Communities
 - Groupings of aligned Virtual Organisations
 - Enable their community specific support activity:
 - **Support, training, consultancy, requirements etc.**



Open Science Grid

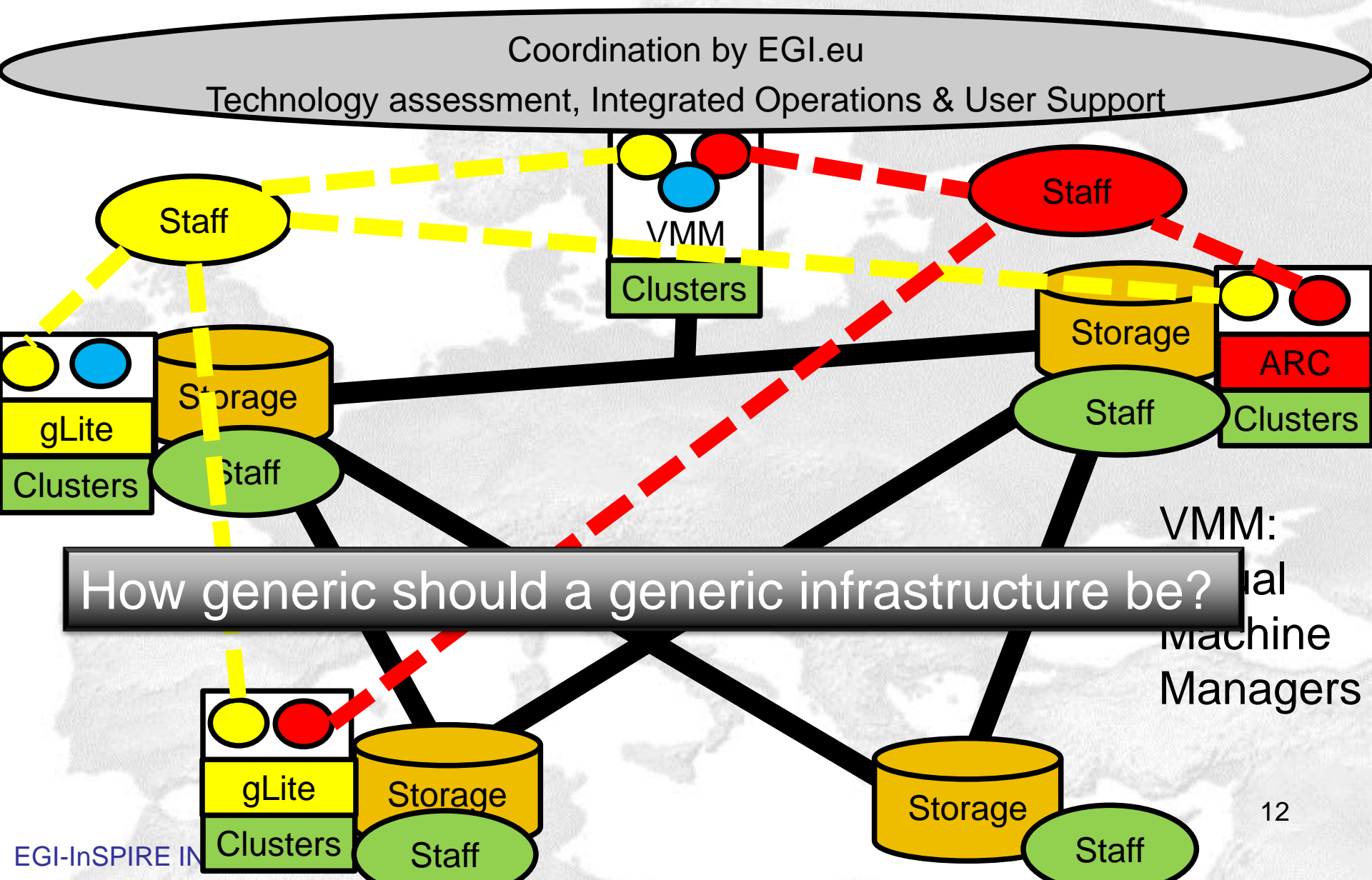
Be a Neutral Infrastructure

- Consider IP network providers
 - Open to any traffic from many different communities
 - Restrictions to protect other users
 - Customised solutions within a generic framework
 - Light paths on demand
 - Standards drive integrated deployment
 - Hardware and fibre from many different providers
- And for sustainable E-Infrastructures?
 - Any application domain or middleware technology
 - A platform for domain specific innovation and use
 - Integration of any compliant compatible resources

Can we learn from others?

- **Grids have benefited from commoditisation**
 - Hardware: HTC & HPC affordable to all
 - Networking: GBs can be moved over WAN
 - Software: Open source software comes of age
- **How will commodity virtualisation impact us?**
 - For transactional models →
 - **Cloud Computing: A model based on compute not data**
 - For large distributed data-oriented models →
 - **The emergence of true ‘function shipping’?**

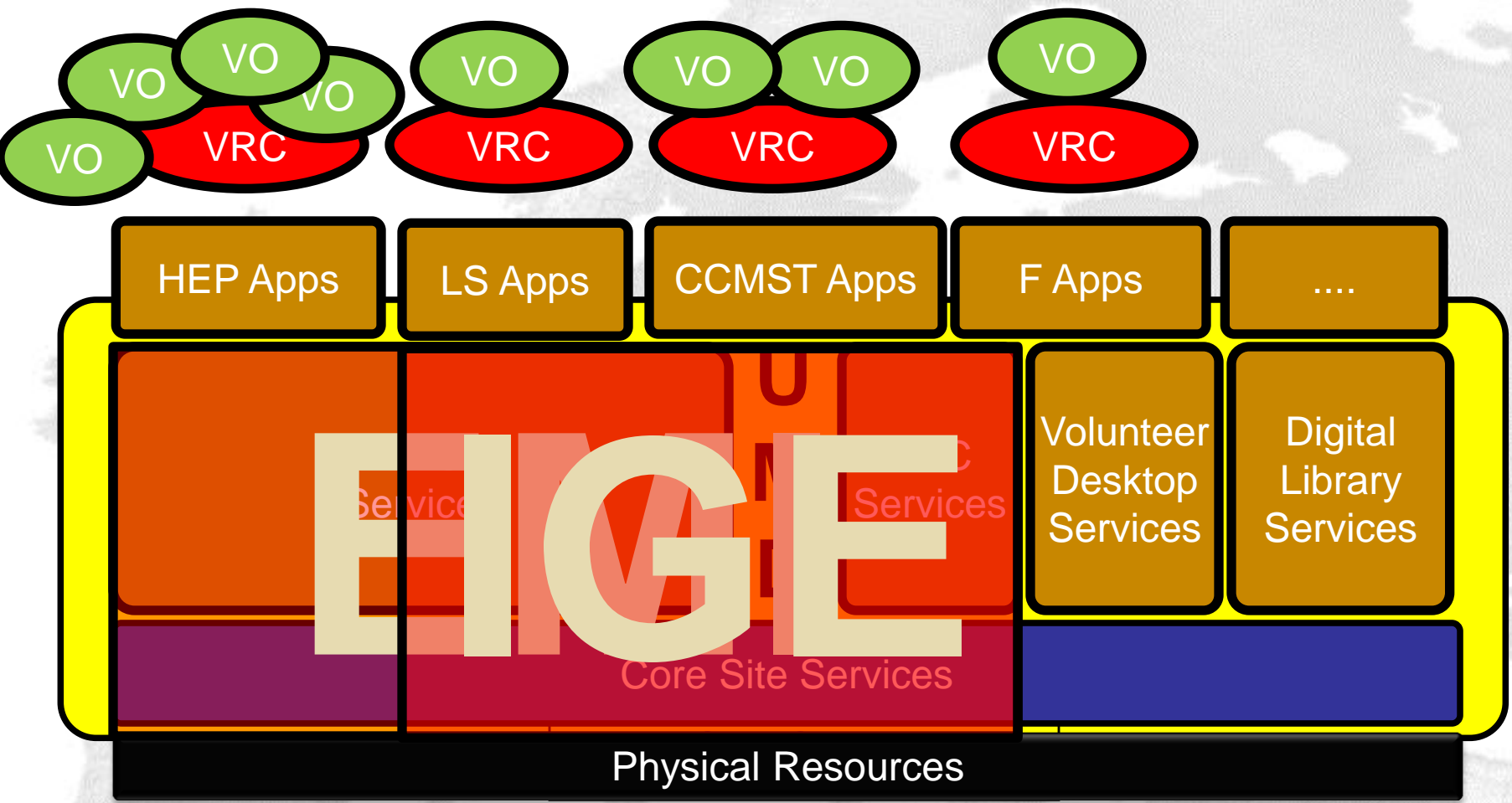
Data Intensive Science



How generic should a generic infrastructure be?

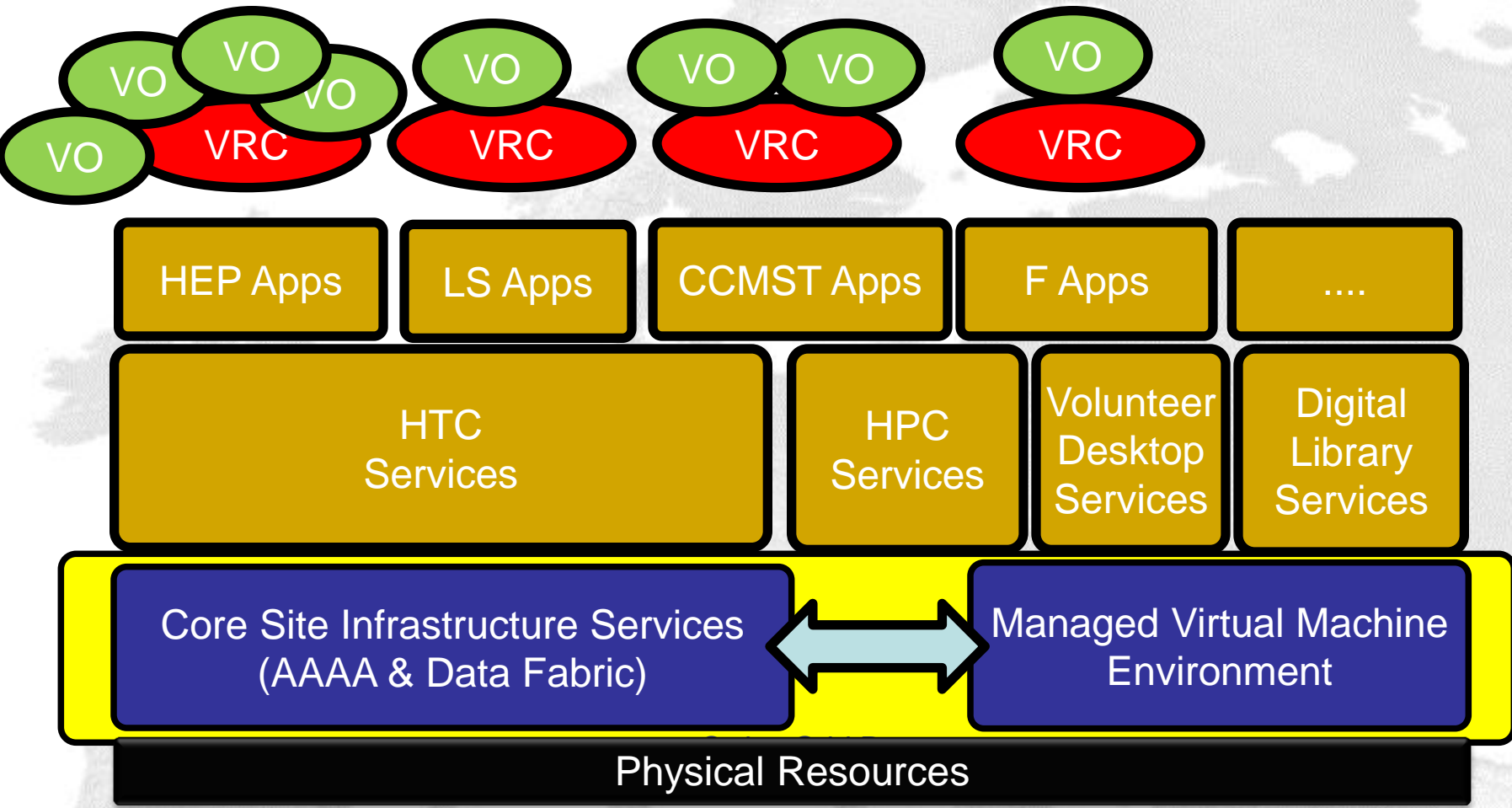
VMM:
Virtual
Machine
Managers

Supporting Multiple Communities



How to structure end-user service provision?

Supporting Multiple Communities



Core Site Infrastructure Services:
European Science Cloud Infrastructure?

Responsive Innovation

- Underpinned by an interoperable cloud infrastructure
 - Federated pan-European infrastructure
 - Use standards and the established AAAA mechanisms
- Provide a Data-Oriented Infrastructure as a Service
 - Use existing high performance data storage & transfers
 - Empower VRCs/VOs to source and run their own services
- Bring new research innovations into production
 - Federated cloud environments (i.e. VMs @ each site)
 - Experimenting with virtualised worker nodes in EGEE:
 - e.g. INFN, BiG Grid, CERN, NGS, Dgrid, ...

What does this evolution mean?

- EGI.eu coordinates the core infrastructure
 - Assessing & certifying technology for deployment
 - Ensure integration of the core services in Europe
 - Operate & manage domain specific environments
 - **If required by that domain!**
- VOs now manage their own infrastructure
 - Decide what services are deployed where
 - Flexibility (& responsibility) to meet their own needs

Deregulate and open up the infrastructure
(Where it makes sense to do so!)

A long-term need for Standards

- **Data Layer**
 - Secure reliable data movement
 - Standardised access to data resources
- **Virtualisation Layer**
 - VMM across trust domains within agreed policies
 - Monitoring as important as lifecycle control
- **Service Layer**
 - The services that go into the vir
 - Avoid domain specific silos & p

- Consensus
- Openness
- Balance
- Transparency

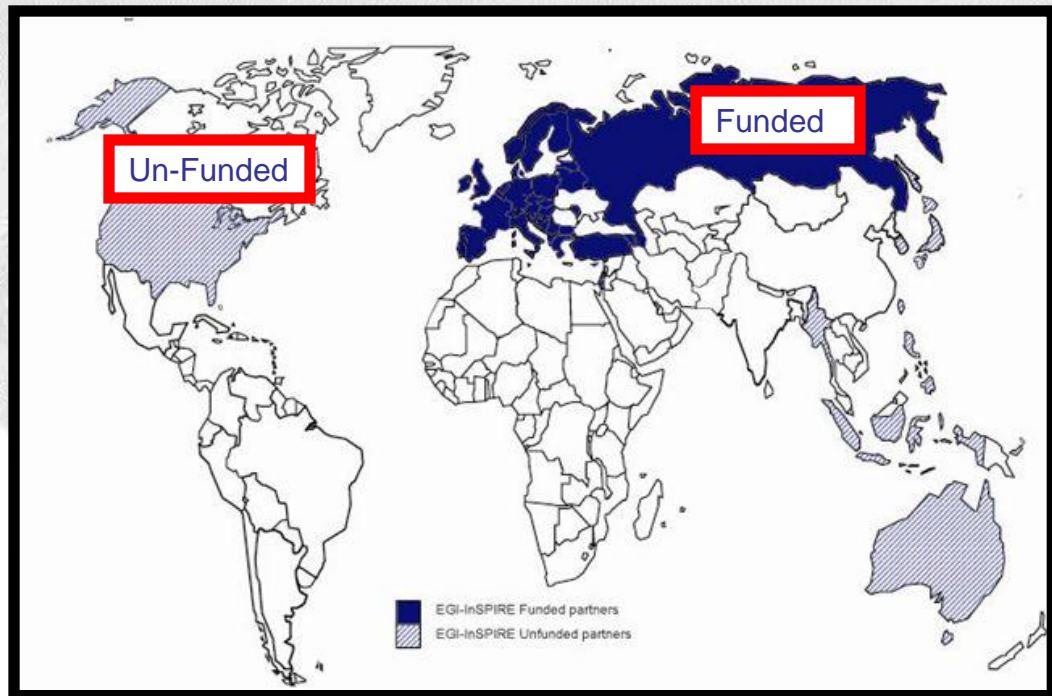
The EGI-InSPIRE Project

Integrated **S**ustainable **P**an-European
Infrastructure for **R**esearchers in **E**urope

- A 4 year project with €25M EC contribution
 - Project cost €69M
 - Total Effort ~€330M
 - Effort: 9261

Project Partners (51)

- EGI.eu, 40 NGIs, 2 EIROs
- Asia Pacific (8 partners)



Summary

- EGEE:
 - Demonstrated a production e-infrastructure
- EGI:
 - Provide a sustainable production e-infrastructure
- EGI.eu is now a legal entity based in Amsterdam
 - Supported transition for 4 years through EGI-InSPIRE
- Contact: director@egi.eu

EGI Technical Forum

14-17th September 2010 in Amsterdam